Code No: 133AG

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
DATA STRUCTURES THROUGH C++
(Common to CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)	Define Time Complexity.	[2]
b)	What is a copy constructor?	[3]
c)	Define a node of Single linked list in C++.	[2]
d)	With a neat diagram represent 4 elements (21, 30, 12, 11) in Circular linked list.	[3]
e)	Define node of a threaded binary tree.	[2]
f)	Define height of a binary tree.	[3]
g)	Write worst case time complexity of quick sort.	[2]
h)	Define Collision in hashing.	[3]
i)	Define Red black tree.	[2]
j)	Differentiate between directed and Undirected graph.	[3]

PART-B

(50 Marks)

2.a)	Write a C++ program to swap two numbers using function templates.	
b)	Differentiate between function overloading and function overriding.	[5+5]

OR

3.a)	Write a C++ program to overload + operator to concatenate two strings.	
b)	Define big- O notation and theta notation? Give examples.	[5+5]

4.a)	Write a Program to push an element into a stack.	
b)	Write an algorithm to convert infix expression into postfix.	[5+5]

OR

5.a)	Write a program to delete an element from a circular queue.	
b)	Write a program to delete an element from single linked list.	[5+5]

6.a)	What are the properties of a binary tree?	
b)	Draw all possible binary tree whose inorder traversal is 3, 4, 5.	[5+5]

OR

7.a)	Create max heap for the following elements **(28, 16, 14, 103, 52, 105, 139, 27, 190)**	
b)	If number of elements in a binary search tree are N. Give two sample binary search tree where the search time is proportional to i) Log N ii) N	[5+5]

8.a) Write a C++ Program to search an element using binary search.
 b) Trace the above program to search 23 in the following elements 12, 15, 18, 20, 22, 36, 39, 40, 46 which is unsuccessful search. [5+5]

OR

9.a) Write a C++ program to sort the following elements using Recursive Merge Sort.
 b) Trace the above program for the following elements:
   12, 22, 54, 19, 11, 84, 63, 17, 15, 4, 13 [5+5]

10.a) Create binary search tree for the following elements (**23, 32, 24, 36, 15, 12, 39, 2, 19**). Discuss about the height of the above binary search tree.
 b) Discuss about different ways of representing Graphs in memory. [5+5]

OR

11.a) Write an algorithm to traverse a graph using breadth first search.
 b) Explain about adjacency matrix and adjacency list. [5+5]

---oo0oo---

Code No: 133AQ

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRONIC CIRCUITS
(Electrical and Electronics Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
                                                                    (25 Marks)

1.a) Discuss a small signal JFET model of a common drain amplifier.   [2]
  b) List the benefits of H-Parameters.   [3]
  c) Distinguish the negative feedback and positive feedback.   [2]
  d) Discuss how does negative feedback reduce distortion in an amplifier?   [3]
  e) What is cross-over distortion?   [2]
  f) Compare voltage and power Amplifiers.   [3]
  g) Describe about the double ended clipping.   [2]
  h) Define clamping. What for clamping circuits are used?   [3]
  i) Discuss about a Schmitt trigger.   [2]
  j) Name the methods of triggering in multivibrators? Distinguish between them.
                                                                            [3]

PART-B
                                                                    (50 Marks)

2.a) Evaluate the expression for R_i, A_i, A_v and R_o for CE amplifier with un bypassed R_e.
  b) State Millers theorems. Explain its significance in transistor circuit analysis.[7+3]
OR
3.a) Classify the amplifier circuits based on frequency range, type of coupling, power delivered and signal handled.
  b) Define h-parameters? Why they called so? Define them and what are the benefits of h-parameters.   [5+5]

4.a) Discuss the circuits of voltage shunt feedback amplifier and derive the expressions for input impedance R_{if} and output impedance R_{of}.
  b) Show that for voltage shunt feedback amplifier trans resistance gain, Ri and Ro are decreased by a factor $(1+A\beta)$ with feedback.   [5+5]
OR
5.a) Explain the relevant information explain how the negative feedback improves stability reduce noise and Increase input impedance.
  b) With a neat sketch explain the working of a Colpitt's oscillator.   [5+5]

6.a) Evaluate the expression for maximum conversion efficiency for a simple series fed Class A power amplifier. What are the drawbacks of transformer coupled power amplifiers?

b) With a neat diagram explain the principle of operation of class B pushpull amplifier. [5+5]

OR

7.a) Define thermal resistance? Explain the thermal electrical analogy related to a transistor with heat sink.

b) Explain and analyze a transformer coupled class A power amplifier and also define the total harmonic distortion with three point method. [5+5]

8.a) Sketch the response of an RC high-pass for square wave input.

b) Explain the working of a simple diode comparator. Draw the output wave form for a ramp input. [5+5]

OR

9.a) Explain the working of a transistor clipper. With the help of a neat circuit diagram and waveforms.

b) Explain the response of an RC high-pass filter to behave as a good differentiator. [5+5]

10.a) Show that an astable multivibrator can be used as a voltage to frequency convertor.

b) Evaluate an expression for the gate width of a monostable multivibrator. [5+5]

OR

11.a) Explain the behavior of a BJT as a switch. Give Applications.

b) Explain the phenomenon of "latching" in a transistor switch. [5+5]

---oo0oo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
THERMODYNAMICS
(Common to ME, AE, MSNT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) What do you understand by macroscopic and microscopic viewpoints? [2]
   b) What do you understand by point function and path function? What are exact and inexact differentials? [3]
   c) State and prove the 'Clausis' theorem. [2]
   d) What is PMM 1? Why it is impossible? [3]
   e) Define ideal gas. And show that for ideal gas internal energy depends only on its temperature. [2]
   f) Why do the isobars on Mollier diagram diverge from one another? Why do isotherms on Mollier diagram become horizontal in superheated region at low pressures? [3]
   g) Draw psychrometric chart and show psychrometric processes in the chart. [2]
   h) State Gibb's theorem and write expressions of average specific internal energy, average specific enthalpy and average specific heats of the mixtures. [3]
   i) Draw P-V, T-S diagrams of Sterling cycle, Duel cycle and Bell-Coleman cycle. [2]
   j) State different types of power cycles. Mention the merits and demerits of Stirling and Ericsson Cycles. [3]

PART-B
(50 Marks)

2.a) Give the differential form of S.F.E.E. Under what condition the S.F.E.E. does reduces to Euler's equation.
   b) A reciprocating air compressor takes in 2 m^3/min at 0.11 MPa, 20^{0}C which is delivers at 1.5 MPa, 111 ^{0}C to an aftercooler where the air is cooled at constant pressure to 25 ^{0}C. The power absorbed by the compressor is 4.15 kW. Determine the heat transfer in compressor and the cooler.
   c) A turbine operates under steady flow conditions, receiving steam at the following state: 1.2 MPa, 180^{0}C, 2785 kJ/kg, 33.3 m/sec and elevation 3 m. Steam leaves the turbine at the following state: 20 kPa, 2512 kJ/kg, 100 m/sec and elevation 0 m. Heat is lost to the surrounding at the rate of 0.29 kJ/sec. if the rate of steam flow through the turbine is 0.42 kg/sec. what is power output of turbine in kW.
   [2+4+4]

OR

3.a) A cylinder/ piston contain 100 L of air at 110 kPa, 25^0C. The air is compressed in reversible polytrophic process to a final state of 800 kPa, 200^0C. Assume the heat transfer is with the ambient at 25^0C and determine the polytrophic exponent 'n' and the final volume of air. Find the work done by the air, the heat transfer.

b) Nitrogen gas flows into a convergent nozzle at 200 kPa, 400K and very low velocity. It flows out of the nozzle at 100 kPa, 330K. If the nozzle is insulated, find the exit velocity. [5+5]

4.a) Prove that the COP of the reversible refrigerator operating between two given temperatures is the maximum.

b) The amount of entropy generation quantifies the intrinsic irreversibility of a process. Explain.

c) Air flows through an adiabatic compressor at 2 kg/s. the initial conditions are 1 bar and 310 K and the exit conditions are 7 bar and 560 K. Compute the net rate of availability transfer and irreversibility. Take $T_0=298$ K. [2+4+4]

OR

5.a) In a steam power plant 1 MW is added at 700^0C in the boiler , 0.58 MW is taken at out at 40^0C in the condenser, and the pump work is 0.02 MW. Find the plant thermal efficiency. Assuming the same pump work and heat transfer to the boiler is given, how much turbine power could be produced if the plant were running in a Carnot cycle?

b) Differences in surface water and deep-water temperature can be utilized for power generation. It is proposed to construct a cyclic heat engine that will operate near Hawaii, where the ocean temperature is 20^0C near the surface and 5^0C at some depth. What is the possible thermal efficiency of such a heat engine? [5+5]

6.a) A cylinder has a thick piston initially held by a pin. The cylinder contains carbon dioxide at 200 kPa and ambient temperature of 290K. The metal piston has a density of 8000 Kg/m^3 and the atmospheric pressure is 101 kPa. The pin is now removed, allowing the piston to move and after a while the gas returns to ambient temperature. Is the piston against the stops?

b) Two tanks are connected as shown in figure, both containing water. Tank A is at 200 Kpa, v=1m^3 and tank B contains 3.5 Kg at 0.5 Mp, 400^0C. The valve is now opened and the two come to a uniform state. Find the specific volume. [5+5]

P=200KPa
v=0.5m^3/kg

M=3.5kg
P=500kPa
T=400°C
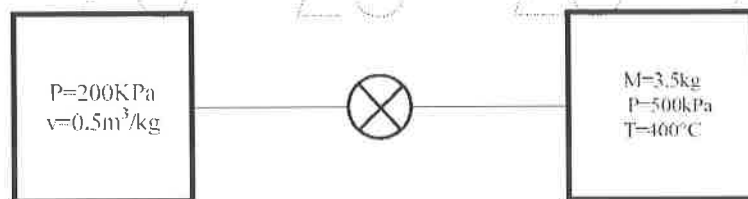
OR

7.a) Sample of steam from a boiler drum at 3 MPa is put through a throttling calorimeter in which pressure and temperature are found to be 0.1 MPa, 120^0C. Find the quality of a sample taken from the boiler.

b) A rigid close tank of volume 3 m^3 Contains 5 kg of wet steam at a pressure of 200 kPa. The tank is heated until the steam becomes dry saturated. Determine final pressure and heat transfer to the tank. [5+5]

8.a) A sling psychrometer reads 40^0C DBT and 36^0C WBT. Find the humidity ratio, Relative humidity, Dew point temperature, specific volume and enthalpy of air.

b) What do you understand by saturated and unsaturated air? State the various properties of air.

c) An air-water vapour mixture at 0.1 MPa, 30^0C, 80% relative humidity has a volume of 50 m^3. Calculate Specific humidity, Dew point, WBT, mass of dry air and mass of water vapour. [4+2+4]

OR

9.a) On a particular day the weather forecast states that the dry bulb temperature is 37^0C, while the relative humidity is 50% and the barometric pressure is 101.325 kPa. Find the humidity ratio, dew point temperature and enthalpy of moist air on this day.

b) Moist air at 1 atm. pressure has a dry bulb temperature of 32^0C and a wet bulb temperature of 26^0C. Calculate i) the partial pressure of water vapour, ii) humidity ratio, iii) relative humidity, iv) dew point temperature, v) density of dry air in the mixture, vi) density of water vapour in the mixture and vii) enthalpy of moist air using perfect gas law model and psychrometric equations. [5+5]

10.a) In a Diesel cycle, the compression ratio is 15. Compression begins at 0.1 MPa, 40^0C. The heat added is 1.675 MJ/kg. Find (i) the maximum temperature in the cycle, (ii) work done per kg of air (iii) the cycle efficiency (iv) the temperature at the end of the isentropic expansion (v) the cut-off ratio.

b) A refrigerator works on the carnet cycle in temperature between -70^0C and 270^0C. It makes 500kg of ice per hour at -50^0C from water at 140^0C. Find H.P required to drive the compressor and C.O.P. of the cycle. Take specific heat of ice as 2.1 kJ/kg-k and latent heat as 336kJ/kg? [5+5]

OR

11.a) An air standard Ericsson cycle has an ideal regenerator. Heat is supplied at 1000^0C and heat is rejected at 20^0C. If the heat added is 600 kJ/kg, find the compressor work, turbine work and cycle efficiency.

b) In a Stirling cycle the volume varies between 0.03 and 0.06 m^3, the maximum pressure is 0.2 MPa, and the temperature varies between 540^0C and 270^0C. The working fluid is air (an ideal gas). Find the efficiency and the work done per cycle for both simple cycle and cycle with ideal regenerator. Compare the results with Carnot cycle with same temperature limits. [5+5]

---ooOoo---

Code No: 133AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ANALOG ELECTRONICS
(Electronics and Communication Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART-A
(25 Marks)

1.a) What is Bias? What is the need for biasing? [2]
 b) How does the input impedance increases due to darlington connection? [3]
 c) Define Gain bandwidth product. [2]
 d) Mention important characteristics of CE amplifier. [3]
 e) Write the expression for basic current equation in MOSFET. [2]
 f) Compare the AC circuit characteristics of the CS, CG and CD. [3]
 g) List the four basic feedback topologies. [2]
 h) State Barkhausen criterion for sustained oscillation. What will happen to the oscillation if the magnitude of the loop gain is greater than unity? [3]
 i) Define Harmonic distortion and intermodulation distortion. [2]
 j) What are the advantages of push pull amplifiers? [3]

PART-B
(50 Marks)

2.a) In a single stage CB – amplifier circuit, R_E = 20K, R_c = 10K, V_{EE} = -20V, V_{cc} = 20V, R_L = 10K. Find out R_i, R_o , A_i, A_v and power gain in dB.
 b) Draw the circuit of two stage R-C coupled transistor amplifier and explain the working of it. [6+4]

OR

3.a) The h-parameters of CE-amplifier are h_{ie} = 1100Ω, h_{re} = 2.5 × 10^{-4} , h_{fe} = 50, h_{oe} 24 μA/V and R_s = 1KΩ, R_L = 10KΩ. Find out current and voltage gains with and without source resistance, input and output impedances.
 b) Discuss briefly Cascode amplifier. [6+4]

4. Derive the expression for the CE short circuit current gain A_i as a function of frequency using Hybrid - π model. [10]

OR

5. Define f_β and f_T and derive the relation between f_β and f_T . [10]

6.a) What is square law distortion? What is its effect in FET amplifiers?

b) Draw the small-signal high-frequency circuit of a common source amplifier and derive the expression for voltage gain. [4+6]

OR

7.a) Why self-bias is not suitable for depletion type and enhancement type MOSFET?

b) In a Drain-to-gate bias circuit $V_{CD} = 12V$, $R_d = 2k$, $R_f = 10m$. Calculate V_{GS}, I_D and V_{DS} for $I_{D(ON)} = 6mA$, $V_{GS(ON)} = 8V$, $V_{GS(TH)} = 3V$. [4+6]

8.a) Explain with the help of mathematical expressions, how the negative feedback in amplifiers increases amplifier bandwidth and reduces distortion in amplifiers.

b) In a transistorized Hartley oscillator the two inductances are 2mH and 20µH while the frequency is to be changed from 950KHZ to 2050KHZ. Calculate the range over which the capacitor is to be varied. [5+5]

OR

9.a) An amplifier circuit has a gain of 60 dB and an output impedance $Z_o=10K\Omega$. It is required to modify its output impedance to 500Ω by applying negative feedback. Calculate the value of the feedback factor. Also find the percentage change in the overall gain, for 10% change in the gain of the internal amplifiers.

b) What are the factors that affect the frequency stability of an oscillator? How frequency stability can be improved in oscillators. [5+5]

10.a) Derive the equation for maximum efficiency of a class A transformer coupled amplifier.

b) Explain the principle of stagger tuning technique of transformer – coupled amplifier that is used to obtain band pass filter characteristic with pass band of 10 KHZ with all necessary diagrams for illustration. [5+5]

OR

11.a) Design a class B power amplifiers to deliver 25w to a load resistor R_L=8ohms, using transformer coupling. $V_m=V_{cc}$=25V. Assume necessary data.

b) Draw the circuit of double-tuned transformer-coupled amplifier. Discuss the nature of responses of the amplifier for different values of KQ=1; KQ>1 and KQ<1. [5+5]

---ooOoo---

Code No: 123AP

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CE, ME, AME, PTM, CEE)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a)	Define Ohm's law.	[2]
b)	Discuss about series resistive circuit with an example.	[3]
c)	How should a generator be started?	[2]
d)	What is a DC series motor?	[3]
e)	Define voltage transformation ratio.	[2]
f)	What is the significance of slip?	[3]
g)	What is a rectifier?	[2]
h)	What is the relationship between break over voltage and gate current?	[3]
i)	What is the purpose of Cathode Ray Tube?	[2]
j)	What are the basic parts of a CRO?	[3]

PART-B
(50 Marks)

2.a) What is the basic principle of Indicating instrument? Explain.
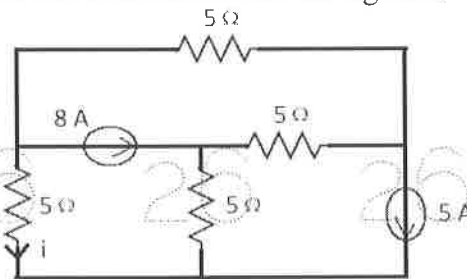 b) Find the current 'i' in the circuit shown in the figure 1.   [4+6]

Figure: 1

OR

3.a) What are the types of errors in any indicating instrument? Explain.
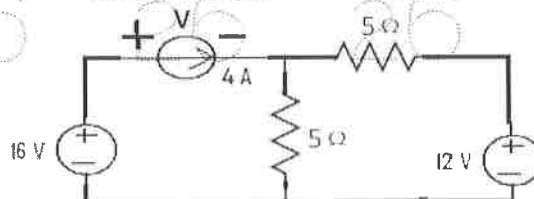 b) Find the voltage 'V' in the circuit shown in the figure 2.   [5+5]

Figure: 2

4.a) Explain the differences between self excited and separately excited DC generators.

b) A separately excited DC generator when running at 1200 RPM supplies 200 A at 125 V to a circuit of constant resistance. What will be the current when the speed is dropped to 1000 RPM and the field current is reduced to 80%? Armature resistance, 0.04 Ω and total drop at brushes, 2V. Ignore saturation and armature reaction. [5+5]

OR

5.a) Explain in detail about the production of torque in DC motors.

b) A DC motor takes an armature current of 110 A at 480 V. The armature circuit resistance is 0.2Ω. The machine has 6 poles and the armature is lap connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate the speed and the gross torque developed by the armature. [5+5]

6.a) Discuss in detail about the principle of operation of alternators.

b) Calculate the regulation of a transformer in which the percentage resistance drops is 1.0% and percentage reactance drop is 5.0% when the power factor is (i) 0.8 lagging (ii) unity and (iii) 0.8 leading. [5+5]

OR

7.a) Explain in detail about the torque-speed characteristics of induction motor.

b) A 25-kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000-V, 50-Hz supply. Find the full load primary and secondary currents, the secondary EMF and the maximum flux in the core. Neglect leakage drops and no-load primary current. [5+5]

8.a) Draw the V-I characteristics of a P-N junction diode and explain.
b) Explain in detail about the applications of SCR. [5+5]

OR

9.a) Explain in detail about the half wave rectifier with neat sketch.
b) With the help of physical structure, explain the operation of NPN transistor. [5+5]

10.a) Explain in detail about electrostatic deflection.
b) Draw various Lissajous patterns and explain them. [5+5]

OR

11.a) Discuss about Voltage and current measurements using CRO.
b) Explain briefly about various applications of CRO. [5+5]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, November/December - 2017

ELECTRONIC DEVICES AND CIRCUITS

(Common to EEE, ECE, CSE, EIE, IT, MCT, ETM)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) For what voltage will the reverse current in p-n junction Germanium diode reach 90% of its saturation value at room temperature? [2]

b) Write a short note on Varactor diode. [3]

c) Derive the ripple factor for full wave rectifier. [2]

d) Explain voltage regulation using zener diode. [3]

e) Explain how transistor acts as an amplifier. [2]

f) Give the Comparisons between CB, CE, CC configurations. [3]

g) Define thermal runaway. [2]

h) Compare all the three biasing circuits. [3]

i) For a p-channel Silicon FET, with effective width 'a'=2×10^{-4} cm and channel resistivity ρ =10 Ω. Find the pinch off voltage. [2]

j) Draw the circuit diagram of fixed bias arrangement of a JFET. [3]

PART-B
(50 Marks)

2.a) Explain PN diode characteristics in forward bias and reverse bias regions.

b) Find the width of the depletion layer in a germanium junction diode which has the following specifications: Area A = 0.001 cm^2, σ_n = 1 mhos / cm, μ_n = 3800 cm^2/sec, μ_p = 1800 cm^2/sec. [5+5]

OR

3.a) Explain tunnel diode operation with the help of energy band diagrams.

b) Explain the static characteristics of SCR. [5+5]

4.a) A full wave rectifier circuit with C-type capacitor filter is to supply a D.C. Current of 20 mA at 16V. If frequency is 50 Hz ripple allowed is 5%. Calculate:
i) Required secondary voltage of the transformer.
ii) Ratio of I peak/ I$_{max}$ through diodes and the value of C required.

b) With a neat circuit diagram and necessary wave forms explain the operation of half wave rectifier. [5+5]

OR

5.a) An ac supply of 220V is applied to a half wave rectifier circuit through a transformer with a turns ratio of 10:1. Assume the ideal diode. Find:
i) dc output voltage   ii) PIV.

b) Compare half wave, full wave and bridge rectifier circuits. [5+5]

6.a) Explain CE configuration with the help of input and output characteristics.

b) A transistor is operated at a forward current of $2\mu A$ and with the collector open circuited. Calculate the junction voltages V_C and V_E, the collector to emitter voltage V_{CE} assuming $I_{CO} = 2\mu A$, $I_{EO} = 1.6\mu A$ and $\alpha_N = 0.98$. [5+5]

OR

7.a) Draw and explain h-parameter model of BJT.

b) Qualitatively explain the static V-I characteristics of UJT. [5+5]

8.a) Explain the need for biasing in electronic circuits. What are the factors affecting the stability factor.

b) A transistor with $\beta = 100$ is to be used in Common Emitter Configuration with collector to base bias. The collector circuit resistance is $R_C = 1k\Omega$ and $V_{CC} = 10V$. Assume $V_{BE} = 0$.
i) Choose R_B so that the quiescent collector to emitter voltage is 4V.
ii) Find the stability factor. [5+5]

OR

9.a) Determine the quiescent currents and the collector to emitter voltage for a Ge transistor with $\beta = 50$ in the self biasing arrangements. The circuit component values are $V_{CC} = 20V$, $R_C = 2k\Omega$, $R_e = 0.1 k\Omega$, $R_1 = 100 k\Omega$ and $R_2 = 5 k\Omega$. Find the stability factor S.

b) Explain the terms Bias Stabilization and Bias Compensation. [5+5]

10.a) Derive the expression for the width of depletion region 'W' in the case of p-channel JFET.

b) Explain the working of a depletion type MOSFET with a neat construction diagram and its characteristics. [5+5]

OR

11. Draw the circuit of source follower Amplifier and derive the expressions for A_I, A_V, R_i and R_o. [10]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CE, ME, AME, PTM)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
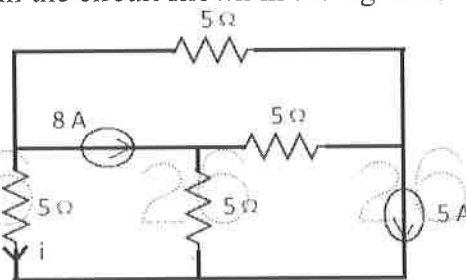Each question carries 10 marks and may have a, b, c as sub questions.
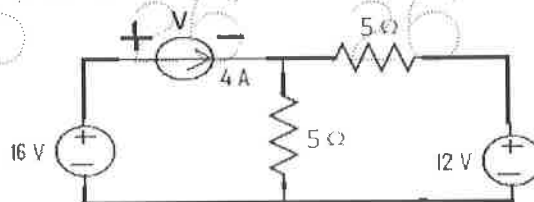
PART- A
(25 Marks)

1.a)	Define Ohm's law.	[2]
b)	Discuss about series resistive circuit with an example.	[3]
c)	How should a generator be started?	[2]
d)	What is a DC series motor?	[3]
e)	Define voltage transformation ratio.	[2]
f)	What is the significance of slip?	[3]
g)	What is a rectifier?	[2]
h)	What is the relationship between break over voltage and gate current?	[3]
i)	What is the purpose of Cathode Ray Tube?	[2]
j)	What are the basic parts of a CRO?	[3]

PART-B
(50 Marks)

2.a)   What is the basic principle of Indicating instrument? Explain.
   b)   Find the current 'i' in the circuit shown in the figure 1.   [4+6]

Figure: 1
OR

3.a)   What are the types of errors in any indicating instrument? Explain.
   b)   Find the voltage 'V' in the circuit shown in the figure 2.   [5+5]

Figure: 2

4.a) Explain the differences between self excited and separately excited DC generators.

b) A separately excited DC generator when running at 1200 RPM supplies 200 A at 125 V to a circuit of constant resistance. What will be the current when the speed is dropped to 1000 RPM and the field current is reduced to 80%? Armature resistance, 0.04 Ω and total drop at brushes, 2V. Ignore saturation and armature reaction. [5+5]

OR

5.a) Explain in detail about the production of torque in DC motors.

b) A DC motor takes an armature current of 110 A at 480 V. The armature circuit resistance is 0.2Ω. The machine has 6 poles and the armature is lap connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate the speed and the gross torque developed by the armature. [5+5]

6.a) Discuss in detail about the principle of operation of alternators.

b) Calculate the regulation of a transformer in which the percentage resistance drops is 1.0% and percentage reactance drop is 5.0% when the power factor is (i) 0.8 lagging (ii) unity and (iii) 0.8 leading. [5+5]

OR

7.a) Explain in detail about the torque-speed characteristics of induction motor.

b) A 25-kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000-V, 50-Hz supply. Find the full load primary and secondary currents, the secondary EMF and the maximum flux in the core. Neglect leakage drops and no-load primary current. [5+5]

8.a) Draw the V-I characteristics of a P-N junction diode and explain.

b) Explain in detail about the applications of SCR. [5+5]

OR

9.a) Explain in detail about the half wave rectifier with neat sketch.

b) With the help of physical structure, explain the operation of NPN transistor. [5+5]

10.a) Explain in detail about electrostatic deflection.

b) Draw various Lissajous patterns and explain them. [5+5]

OR

11.a) Discuss about Voltage and current measurements using CRO.

b) Explain briefly about various applications of CRO. [5+5]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRONIC DEVICES AND CIRCUITS
(Common to EEE, ECE, CSE, EIE, IT, MCT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) For what voltage will the reverse current in p-n junction Germanium diode reach 90% of its saturation value at room temperature?   [2]
   b) Write a short note on Varactor diode.   [3]
   c) Derive the ripple factor for full wave rectifier.   [2]
   d) Explain voltage regulation using zener diode.   [3]
   e) Explain how transistor acts as an amplifier.   [2]
   f) Give the Comparisons between CB, CE, CC configurations.   [3]
   g) Define thermal runaway.   [2]
   h) Compare all the three biasing circuits.   [3]
   i) For a p-channel Silicon FET, with effective width 'a'=2×10^{-4} cm and channel resistivity ρ =10 Ω. Find the pinch off voltage.   [2]
   j) Draw the circuit diagram of fixed bias arrangement of a JFET.   [3]

PART-B
(50 Marks)

2.a) Explain PN diode characteristics in forward bias and reverse bias regions.
   b) Find the width of the depletion layer in a germanium junction diode which has the following specifications: Area A = 0.001 cm^2, σ_n = 1 mhos / cm, μ_n = 3800 cm^2/sec, μ_p = 1800 cm^2/sec.   [5+5]

OR

3.a) Explain tunnel diode operation with the help of energy band diagrams.
   b) Explain the static characteristics of SCR.   [5+5]

4.a) A full wave rectifier circuit with C-type capacitor filter is to supply a D.C. Current of 20 mA at 16V. If frequency is 50 Hz ripple allowed is 5%. Calculate:
   i) Required secondary voltage of the transformer.
   ii) Ratio of I peak/ I_{max} through diodes and the value of C required.
   b) With a neat circuit diagram and necessary wave forms explain the operation of half wave rectifier.   [5+5]

OR

5.a) An ac supply of 220V is applied to a half wave rectifier circuit through a transformer with a turns ratio of 10:1. Assume the ideal diode. Find:
   i) dc output voltage   ii) PIV.
   b) Compare half wave, full wave and bridge rectifier circuits.   [5+5]

6.a) Explain CE configuration with the help of input and output characteristics.

b) A transistor is operated at a forward current of 2µA and with the collector open circuited. Calculate the junction voltages V_C and V_E, the collector to emitter voltage V_{CE} assuming $I_{CO} = 2µA$, $I_{EO} = 1.6µA$ and $\alpha_N = 0.98$. [5+5]

OR

7.a) Draw and explain h-parameter model of BJT.

b) Qualitatively explain the static V-I characteristics of UJT. [5+5]

8.a) Explain the need for biasing in electronic circuits. What are the factors affecting the stability factor.

b) A transistor with $\beta = 100$ is to be used in Common Emitter Configuration with collector to base bias. The collector circuit resistance is $R_C = 1k\Omega$ and $V_{CC} = 10V$. Assume $V_{BE} = 0$.
i) Choose R_B so that the quiescent collector to emitter voltage is 4V.
ii) Find the stability factor. [5+5]

OR

9.a) Determine the quiescent currents and the collector to emitter voltage for a Ge transistor with $\beta = 50$ in the self biasing arrangements. The circuit component values are $V_{CC} = 20V$, $R_C = 2k\Omega$, $R_e = 0.1 k\Omega$, $R_1 = 100 k\Omega$ and $R_2 = 5 k\Omega$. Find the stability factor S.

b) Explain the terms Bias Stabilization and Bias Compensation. [5+5]

10.a) Derive the expression for the width of depletion region 'W' in the case of p-channel JFET.

b) Explain the working of a depletion type MOSFET with a neat construction diagram and its characteristics. [5+5]

OR

11. Draw the circuit of source follower Amplifier and derive the expressions for A_I, A_V, R_i and R_o. [10]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CE, ME, AME, PTM)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) Draw the circuit diagram for parallel connection of resistors and give the detailed analysis.

   b) Find the current 'I' in the circuit shown in figure.   [8+7]
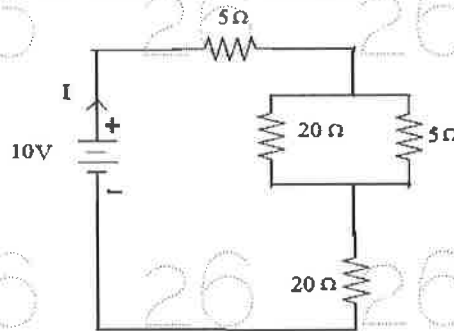
2.a) What is a Motor? Explain the working principle of DC motor in detail.

   b) A DC shunt generator delivers 100A at 200V and the resistance of shunt field and armature are 30Ω and 0.03Ω respectively. Calculate the generated EMF.   [8+7]

3.a) What is a transformer? Explain the principle of operation of transformer in detail.

   b) A 10 kVA, 50 Hz single phase transformer has full load copper loss of 200W and Hysteresis loss of 100 W and Eddy current loss of 50 W. Determine the transformer efficiency at half load and 0.9 lagging power factor.   [8+7]

4.a) What is the purpose of an alternator? How it works?

   b) Explain slip-torque characteristics of Induction motors.   [8+7]

5.a) What are the standard measures to be taken while designing indicating instruments? Explain.

   b) What are the merits and demerits of moving iron instruments? Explain.   [8+7]

6.a) Draw the V-I characteristics of PN junction diode and explain different operating regions.

   b) The supply voltage of a single phase full wave bridge rectifier with resistive load of 100Ω is 200V, 50 Hz. Assuming no voltage drop across the diode when it is turned ON, determine the average voltage across the load and average current in the load.   [8+7]

7.a) Draw the structure of a NPN transistor and explain.
  b) What is an SCR? Explain its working principle.   [8+7]

8.a) Derive the expression for the electrostatic deflection in CRT.
  b) How the frequency of supply is measured using CRO? Explain.   [8+7]

---ooOoo---

Code No: 233AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Pharmacy II Year I Semester Examinations, November-2017
PHARMACOGNOSY – I

Time: 3hours   Max.Marks:75

Note: This question paper contains two parts A and B.
        Part A is compulsory which carries 25 marks. Answer all questions in Part A.
        Part B consists of 5 Units. Answer any one full question from each unit. Each question
        carries 10 marks and may have a, b, c as sub questions.

PART- A   (25 Marks)

1.a)   Define crude drug with example.   [2]
  b)   Discuss the chemical classification of crude drug.   [3]
  c)   Give the application of Gibberalins.   [2]
  d)   Discuss in short the effect of irrigation on growth of plant.   [3]
  e)   Explain the term evaluation of crude drug with example.   [2]
  f)   Discuss in short about the physical evaluation of crude drug.   [3]
  g)   Give the biological source of Guar Gum.   [2]
  h)   Give the chemical constituents of Tragacanth and starch.   [3]
  i)   Discuss physical properties of lipids.   [2]
  j)   Give the biological source, chemical constituents and use of shark liver oil.   [3]

PART-B   (50 Marks)

2.a)   Discuss the Scope of Pharmacognosy.
  b)   Explain the Taxonomical classification of crude drug with suitable examples.   [10]
                                    OR
3.a)   Discuss the alphabetic classification of crude drugs with examples.
  b)   Discuss various parameters coming under the discussion of schemes of
       Pharmacognostic study.   [10]

4.a)   Discuss the demerits of cultivation of crude drugs.
  b)   Discuss the role of cytokinins in growth regulation of a plant.   [10]
                                    OR
5.a)   Discuss the significance of storage process in processing of drugs.
  b)   Discuss the method of collection of crude drugs.   [10]

6.a)   Explain adulteration of crude drug by sub standard commercial variety and harmful
       substance with special reference to medicinal plants.
  b)   Explain the pharmacological evaluation of crude drugs.   [10]
                                    OR
7.a)   Explain the adulteration of crude drug by exhausted drugs and Powdered drugs.
  b)   Discuss the chemical evaluation of crud drug.   [10]

8.a)   Define enzymes and discuss their properties.
  b)   Give systematic pharmacognostic study of Isabgol.   [10]
                                    OR
9.a)   Give the source, chemical constituents, identification test and uses of Diastase.
  b)   Give the biological source and applications of pectin and Gum acacia.   [10]

10.a) Discuss the chemical properties of lipids.
   b) Give the description of olive oil.   [10]

OR

11.a) Give the pharmaceutical applications of Shark liver oil, Cocoa butter, Bees wax and Wool fat.
   b) Give the biological source, chemical constituents, identification test and pharmaceutical applications of cod liver oil.   [10]

--ooOoo--

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Pharmacy II Year I Semester Examinations, November-2017
STATISTICAL METHODS AND COMPUTER APPLICATIONS

Time: 3hours   Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A   (25 Marks)

1.a) A bio statistical problem is given to three students A, B and C whose chances of it solving it are 1/3, 1/4 and 1/5 respectively. Find the probability that the problem would be solved. [2]
   b) What is the difference between correlation and regression? [3]
   c) Explain one tailed and two tailed test of hypothesis. [2]
   d) Write the applications of χ^2 test. [3]
   e) Define replication. [2]
   f) What are the advantages and disadvantages of split-plot design? [3]
   g) What are the options in page setup in MS-Power Point? [2]
   h) List the data types supported by MS-Excel? [3]
   i) Is DBMS software or hardware? Is it similar to a spread sheet? [2]
   j) Is SQL a programming language? Justify your answer. [3]

PART-B   (50 Marks)

2.a) What is the significance of graphic representation of data?
   b) Calculate the mean, variance, Standard deviation and coefficient of variation from the data record on respiration rate per minute of 10 persons.
   Respiration/minute : 22,22,20,24,16,17,18,19,21,21 [10]

OR

3.a) Write the importance of normal distribution. If the mean and standard deviation of normal distribution are 70 and 16, find P (38 < x < 45).
   b) Explain significance test for regression coefficient. [10]

4.a) Explain analysis of variance in one way classification.
   b) What is missing data formula technique for analysis of variance? [10]

OR

5.a) Describe the significance of χ^2 test and state various uses of χ^2 test

b) A certain drug was administered to 450 persons out of 800 persons in certain locality to test its efficacy against typhoid. The results are given bellow. Find out the effectiveness of drug against the disease. [10]

	Infection	No infection	Total
Drug	200	300	500
No drug	250	50	300
Total	450	350	800

6.a) What are the advantages and disadvantages of completely randomized design?

b) The following table shows the number of reverts observed at the time of inspection of 12 air craft's. Find the control limit for number of defect charts. [10]

Air craft Number	1	2	3	4	5	6	7	8	9	10	11	12
Number of missing reverts	7	15	13	18	10	14	13	10	20	11	22	15

OR

7.a) Write the advantages of statistical quality control.

b) Write the advantages and disadvantages of factorial experiment. Explain Yatels method of computing factorial effect. [10]

8.a) How to apply formulas to a cell in Excel sheet?

b) What is the need of cell formatting? Discuss various options in cell formatting. [10]

OR

9.a) Can you insert a video file into a slide? Substantiate your answer with suitable discussion.

b) What is wordart? What is its use? How to change its orientation? Give example. [10]

10.a) Explain the computer applications in clinical studies.

b) What is database? What is the support provided by DBMS to interact with database? Discuss DbaseIII as an example. [10]

OR

11. Consider the following database schema to write SQL queries.

   EMPLOYEE(eid, ename, ecity)
   COMPANY(cno, cname, ccity)
   WORKS_FOR(eid, cno, salary)

   a) Find the names of the employees working for Dr.Reddy Labs Company.
   b) Find the name of the company having more than 1000 employees.
   c) Find the names of the employee drawing more than Rs.50000 salary. [10]

--ooOoo--

Code No: R9202

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Pharmacy II Year I Semester Examinations, November-2017
PHARMACEUTICAL ORGANIC CHEMISTRY - II

Time: 3hours   Max.Marks:75

Answer any five questions
All questions carry equal marks
- - -

1.a) Give the structure and nomenclature of the following heterocyclic rings:
   i) Pyrrole
   ii) Acridine
   iii) Furan
  b) Explain the aromaticity and characteristic reactions of indole ring.   [5+10]

2.a) Give the structure and nomenclature of five membered ring systems with two heteroatoms with two examples.
  b) Explain the reactivity of pyrimidine ring.   [10+5]

3.a) Define the following terms with example:
   i) Racemic mixture
   ii) Plane polarized light
  b) Explain meso compound with example. Also provide a brief note on the concept of absolute configuration (R & S)   [5+10]

4.a) Define epimerization and mutarotation with example
  b) Write an account on structural components of starch and cellulose.   [5+10]

5. Define essential amino acids. Explain C-terminal and N-terminal concept of polypeptides in detail.   [15]

6.a) Explain briefly enzymatic hydrolysis.
  b) Write a brief note on the characterization of lipids.   [5+10]

7. Define nucleotides and write brief account on structure of RNA.   [15]

8. Give the mechanism and application of the following:
   a) Birch reduction
   b) Michael addition reaction
   c) Wittig reaction
   d) Lossen rearrangement.   [15]

--ooOoo--

Code No: 133BK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
NETWORK THEORY
(Electrical and Electronics Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
       Part A is compulsory which carries 25 marks. Answer all questions in Part A.
       Part B consists of 5 Units. Answer any one full question from each unit.
       Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)   Give the advantages and disadvantages of tie-set matrix.   [2]
  b)   Write the expression for total inductance of the three series connected coupled
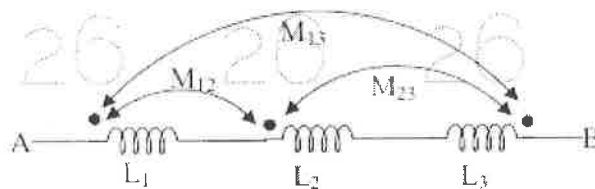   coils connected between A and B as shown in circuit shown in figure 1.   [3]

Figure: 1

  c)   What are the advantages of poly phase system over single phase system?   [2]
  d)   Explain the effect of power factor on wattmeter readings in two wattmeter
       method.   [3]
  e)   Explain why the current in inductance does not change in zero time.   [2]
  f)   Write a short note on the procedure employed to evaluate initial conditions.
                                                                                 [3]
  g)   Define active and passive ports.   [2]
  h)   Express Z-parameters in terms of ABCD parameters.   [3]
  i)   List out the disadvantages of constant – k filters.   [2]
  j)   Sketch the frequency response of high pass filters.   [3]

PART-B

(50 Marks)

2.   Determine voltage V across a 15 ohms resistor in the magnetically coupled circuit
       shown in Figure 2. Take Vs = 30∠40 degrees.   [10]
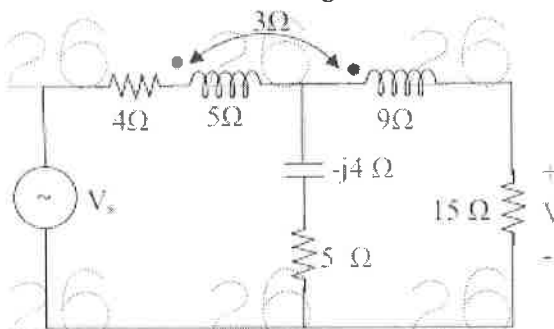

Figure: 2
OR

3. For the graph shown in Figure 3, write the incidence matrix. Express branch voltage in terms of node voltages and then write a loop matrix and express branch currents in terms of loop currents. [10]
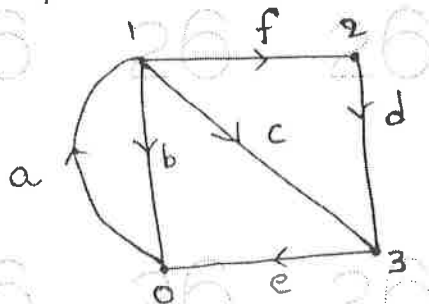

Figure: 3

4.a) Derive the relation between line and phase voltages and currents for a balanced STAR connected system.

b) The two watt meter readings in a 3-phase power measurement are 8 KW. The latter reading is being obtained after the reversal of current coil. Calculate the total power, Active Power, Reactive power and power factor of the load. [5+5]

OR

5. A three phase balanced delta connected load of (9+j2) ohm is connected across a 400V, 3φ balanced supply. Determine the phase currents and line currents. Assume the phase of sequence to be RYB. Also calculate the power drawn by load. [10]

6. With the switch open steady state is reached with V =100 sin 314 t volts. The switch is closed at t=0. The circuit is allowed to come to steady state again. Determine steady state current and complete solution of transient current (figure 4). [10]
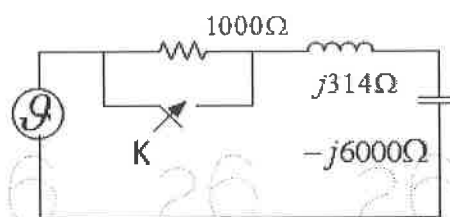

Figure: 4

OR

7. Obtain the expression for i(t) for a series RL circuit when exited by a source of V(t)=Vm sin (wt+θ) using Laplace transform. [10]

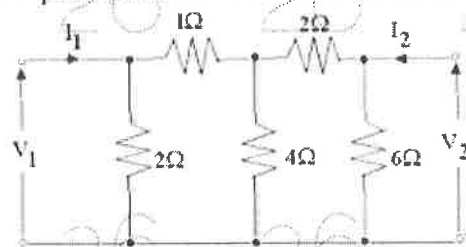8. Find the Y-parameters for the circuit shown in figure 5. [10]

Figure: 5

OR

9. The Z-parameters of a two-port network are $Z_{11}=15\Omega$, $Z_{12}=Z_{21}=6\Omega$ and $Z_{22}=24\Omega$. Determine ABCD parameters. [10]

10. Design a band pass filter with cutoff frequencies of 2000Hz and 5000Hz with a design impedance of 500 ohms. [10]

OR

11. Design a m-derived low filter with a design impedance of 300Ω and the cut off frequency at 2 KHz and infinite attenuation at 2345Hz. [10]

---oo0oo---

Code No: 133BE

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
MECHANICS OF SOLIDS
(Common to ME, MCT, AE, MIE, MSNT)
Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Draw the stress-strain curve for mild steel and indicate salient points.   [2]
  b) What is lateral strain and poisson's ratio?   [3]
  c) Describe the concept of shear force in beams.   [2]
  d) Differentiate between varying loads and uniformly distributed loads.   [3]
  e) What assumptions are made in theory of simple bending?   [2]
  f) What are the advantages and applications of I-Section?   [3]
  g) What are the axial stresses and compound stresses?   [2]
  h) What is maximum principal stress theory?   [3]
  i) How the shaft is designed for maximum shear stress?   [2]
  j) What is hoop-stress and volumetric strain in shells?   [3]

PART – B

(50 Marks)

2.a) How the temperature stresses are developed?
  b) A steel bar is placed between two copper bars of same area and length at a temp of 15^0C. At this stage, they are rigidly connected together at both ends. When the temperature is raised to 315^0 C, the length of bars increase by 1.6 mm. Find the original length and stresses in bars. Take E_s = 200 Gpa, E_c = 100 Gpa, α_s = 0.000012 per ^{0}C, α_c = 0.000018 per ^{0}C.   [5+5]

OR

3.a) Derive equation for the relation between three elastic moduli.
  b) A bar of 25 mm. diameter is subjected to a pull of 70 kN. The extension measured on a gauge length of 200 mm is 0.1 mm and change in diameter is 0.004 mm. Find poisson's ratio and values of three moduli.   [5+5]

4. A simply supported beam of span 10 m carry as UDL of 10 KN/m over a length of 3 m from left support and also from right support. Draw SF and BM diagram.   [10]

OR

5. A beam of length 12 m has overhanging of 3 m on left and right leaving the span between the supports of 6 m. It carries UDL of 8 KN/m over the entire length and a concentrated load of 10 KN at the right extreme end. Draw SF and BM diagrams and find the point of contra flexure point.   [10]

6.a) How to find neutral axis of a beam and explain its importance?

b) A cantilever beam of cross-section 90 mm. width 120 mm deep carries a UDL of 12 KN/m. over the entire length and a concentrated load of 15 KN at the right end. Find the bending stress in the beam, when the length of beam is 10 m.   [5+5]

OR

7. A rolled steel Joist of I-Section has flange length of 300 mm. wide and 20 mm thick with a web thickness of 20 mm. and overall depth of I-Section is 600 mm. If this beam carries a UDL of 40 KN/m over the simply supported beam of span 10 m, find the maximum stress produced in the beam.   [10]

8. At a point in a strained material, the intensities of normal stresses on two planes at right angles to each other are 35 N/mm^2 and 20 N/mm^2 both tensile. They are accompanied by shear stress of 15 N/mm^2. Find the principal planes and principal stresses. Find also maximum shear stress.   [10]

OR

9. A circular shaft of 12 cm dia. is subjected to combined bending and twisting moments. The bending moment being three times the twisting moment. If the direct tensile yield point of material is 350 MN/m^2 and factor of safety on yield is 4, find the allowable twisting moment by a) Maximum principal stress theory b) Maximum shear stress theory.   [10]

10. A hollow shaft of 600 mm. external dia. and 400 mm internal dia. is transmitting a power of 6000 KW at 160 rpm. Find the shear stresses at the outer and inner surfaces of the shaft. Draw the shear stress distribution for the wall of the shaft. Find the twist over a length of 4 m. of the shaft. Take E = 80 Gpa.   [10]

OR

11. A shell of 4 m. long, 1 m. diameter is subjected to an internal pressure of 1 N/mm^2. If the thickness of shell is 10 mm; find the circumferential and longitudinal stresses. Find also the maximum shear stress and changes in the dimensions of the shell. Take E = 200 Gpa. and poisson's ratio = 0.3.   [10]

---ooOoo---

Code No: 133BJ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
NETWORK ANALYSIS
(Electronics and Communication Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
                                                                      (25 Marks)

1.a)   Define Graph, Tree, Basic Cut set and Basic Tie set. Illustrate with an example.
                                                                      [2]
 b)   Explain Active elements in detail.   [3]
 c)   Derive the relation between voltage and current in a series connected RL Circuits.
                                                                      [2]
 d)   Draw a power triangle in series connected RLC networks.   [3]
 e)   Derive the relation between RMS and maximum value.   [2]
 f)   Define form factor and peak factor.   [3]
 g)   Define characteristic impedance.   [2]
 h)   Define image and iterative impedance.   [3]
 i)   Draw and explain T section network.   [2]
 j)   Explain about LC Filters.   [3]

PART-B
                                                                      (50 Marks)

2.a)   What is an electric circuit? What is a magnetic circuit? Make a comparison between electric circuit and magnetic circuit.
 b)   Coil 1 of a pair of coupled coils has a continuous current of 5A, and the corresponding fluxes ϕ_{11} and ϕ_{12} are 0.2 and 0.4 mWb respectively. If the turns are $N_1 = 500$ and $N_2 = 1500$, find L_1, L_2, M and k.   [5+5]

OR

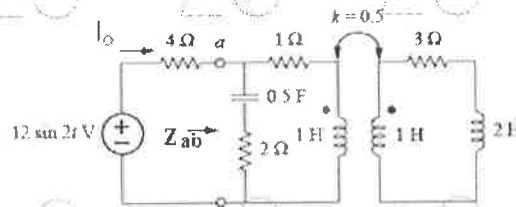3.a)   For the network shown in below Figure 1 find Z_{ab} and I_o.

Figure: 1

b) Find the input impedance of the circuit shown in Figure 2. Assume that the circuit operates at $\omega = 50$ rad/s. [5+5]
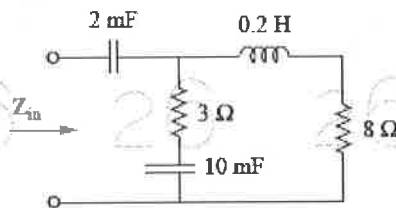

Figure: 2

4.a) Obtain the current locus of a fixed resistance and a variable capacitance.

b) Given a series RLC circuit with R = 10 ohms, L = 1 mH and C = 1 µF is connected across a sinusoidal source of 20 V with variable frequency. Find: i) The resonant frequency ii) Q factor of the circuit at resonant frequency iii) Half power frequencies [5+5]

OR

5.a) Derive and draw the response of a series RLC circuit for step input.

b) An impedance $Z_1 = 10 + j10$ Ω is connected in parallel with another impedance of resistance 8.5 Ω and a variable capacitance connected in series. Find C such that the circuit is in resonance at 5 KHz. [5+5]

6. A series-connected RLC circuit has R = 4 and L = 25 mH:
a) Calculate the value of C that will produce a quality factor of 50.
b) Find ω_1, ω_2, and B.
c) Determine the average power dissipated at $\omega = \omega_0$, ω_1, ω_2. Take $V_{in} = 100$ V. [3+3+4]

OR

7.a) Obtain the current locus of a series circuit having a fixed resistance and a variable inductance.

b) Given a series RLC circuit with R = 100 ohms, L = 0.5 H and C = 40 µF, Calculate the resonant, lower and upper half – power frequencies. [5+5]

8. Explain clearly the terms:
a) Characteristic Impedance and
b) Image Transfer Constant. [5+5]

OR

9.a) Define Hybrid parameters of a Two Port network. Establish the relation between Hybrid Parameters and ABCD Parameters.

b) A symmetrical T-section has an inductance of 0.47H in each series arm and a 300 µF capacitor in the shunt arm.
i) Find the characteristic impedance at frequencies of 50 Hz and 100 Hz.
ii) If the T-section is terminated in the characteristic impedance, find the ratio of load current to input current at both the frequencies. [5+5]

10.a) What is a high pass filter? In what respects it is different from a low pass filter?
   b) Derive the equations to find the inductances and capacitances of a constant K high pass filter. [5+5]

OR

11.a) What is an LC immittance function? State the properties of such functions.
   b) Design a constant 'K' T-section low pass filter having cutoff frequency of 2 kHz and nominal characteristic impedance of 600 ohms. [5+5]

---oo0oo---

Code No: 133BC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Represent the proposition "If you have the flee then you miss the final examination" into symbolic form and also it negation. [2]
   b) Provide a proof by direct method of the following statement, "If x is odd then x^2 is odd". [3]
   c) Differentiate partial ordering and total ordering relations. [2]
   d) Define lattice and write its properties. [3]
   e) Find out how many 5-digit numbers greater than 30,000 can be formed from the digits 1,2,3,4 and 5. [2]
   f) In how many ways can we draw a heart or queen from a pack of cards. [3]
   g) Define recurrence relation and explain recurrence relation for towers of Hanoi. [2]
   h) Solve recurrence relation $a_n - 4a_{n-1} + 4a_{n-2} = 0$, $a_0 = 0$, $a_1 = 1$. [3]
   i) Define complete graph and wheel graph. [2]
   j) Define planar graph and write conditions for testing planarity of the graph .[3]

PART-B

(50 Marks)

2.a) State and explain the rules that can generate a well formed formula.
   b) Show that $R \rightarrow S$ can be derived from premises, $P \rightarrow (Q \rightarrow S)$, $(\sim R \vee P)$ and Q. [5+5]

OR

3.a) Define PDNF and find PDNF for $(\sim P \leftrightarrow R) \wedge (Q \leftrightarrow P)$.
   b) Prove or disprove the validity of the following arguments using the rules of inference, All men are fallible, All kings are men, Therefore, all kings are fallible. [5+5]

4.a) If a, b are any two elements of a group (G, .) which commute, show that a^{-1} and b commute, b^{-1} and a commute, a^{-1} and b^{-1} commute.
   b) Let A= {1,2,3,4,6,8,12,24}, show that the relation 'divides' is partial ordering on A and draw Hasse diagram. [5+5]

OR

5.a) Let G = {-1, 0, 1}, verify whether G forms a group under usual addition.
   b) Show that the sets of even numbers and odd numbers are both recursive. [5+5]

6.a) Find the number of integers between 1 and 250 which are divisible by any of the integers 2,3,5 or 7 and hence find the number of integers between 1, 250 which are not divisible by 2, 3, 5 or 7.

b) State and prove binomial theorem. [5+5]

OR

7.a) The letters of the word VICTORY are rearranged in all possible ways and the words thus obtained are arranged as in a dictionary, what is the rank of the given word?

b) Use multinomial theorem to expand $(x_1+x_2+x_3+x_4)^4$. [5+5]

8.a) Solve the recurrence relation $a_n - 5a_{n-1} + 6a_{n-2} = (n+1)^2$, $a_0=0$, $a_1=1$.

b) Solve the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 4^n$, $a_0=0$, $a_1=1$. [5+5]

OR

9.a) Explain Fibonacci relation with suitable examples and also solve it.

b) Solve $a_n - 7a_{n-1} + 10a_{n-2} = 0$, $a_0=10$, $a_1=41$ using generating functions. [5+5]

10.a) In any planar graph, show that $|V|-|E|+R|=2$.

b) Prove that complete graph of 5 vertices is non planar. [5+5]

OR

11.a) Write an algorithm for breadth-first search spanning tree.

b) Write Kruskal's Algorithm and explain it with an example. [5+5]

---oo0oo---

Code No: 123BW

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL CIRCUITS
(Common to EEE, ECE)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)	States the Kirchhoff's Laws.	[2]
b)	What is meant by Super Node?	[3]
c)	Define the Average value of a periodic waveform.	[2]
d)	Define the instantaneous value and peak value.	[3]
e)	Define the band width and Q factor? Write its expressions.	[2]
f)	What is the significance of dot convention?	[3]
g)	What is meant by duality? Give elements equivalent to dual elements.	[2]
h)	Write the procedure for constructing a tie set matrix for a given graph.	[3]
i)	State the Superposition theorem.	[2]
j)	Write the procedure to obtain the Thevenin's equivalent circuit.	[3]

PART-B

(50 Marks)

2.   Find the mesh currents in the circuit shown in below figure1.   [10]
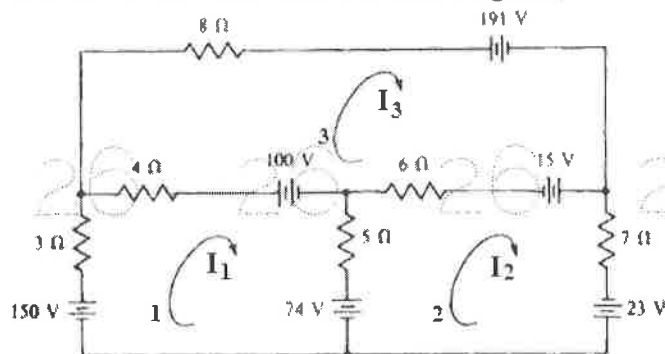

Figure: 1
OR

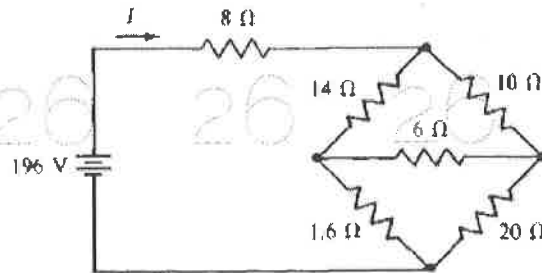3.a) Find current 'I' for the circuit shown in figure 2 by using delta/star transformation.

Figure: 2

b) Use current division twice find the current I_1, in the circuit shown in Figure 3. [5+5]
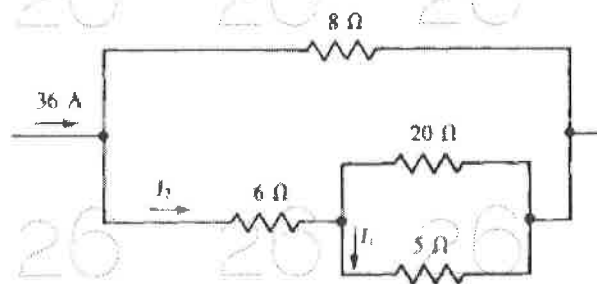

Figure: 3

4.a) A coil of R = 4 ohms, X_L= 3 ohms connected in series with a condenser of R = 8 ohms, Xc= 8 ohms, this combination is connected to 4 ohms resistor. Across this series circuit a voltage 100 volts is applied. Calculate:
i) current
ii) voltage drops across coil, condenser and resistor and
iii) power absorbed by the circuit.

b) A series R-L-C circuit consists of 100 ohms resistor and an inductor of 0.318H and a capacitor of unknown value. This circuit is supplied by 230V, 50 Hz supply and draws a current of 2.3A, and the current is in phase with the supply voltage. Find the value of the capacitance, and the power supplied by the source.   [5+5]

OR

5.a) A circuit consists of a pure resistance and a coil connected in series as shown in figure 4. Powers dissipated in the resistance and in the coil are 1000W and 250W respectively. Voltage drops across the resistance and the coil are 200 V and 300 V respectively. Determine the reactance of the coil and the supply voltage.
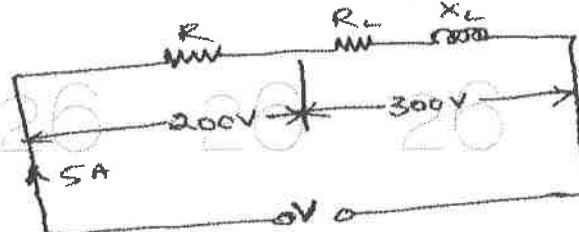

Figure: 4

b)   An inductor of 0.5H inductance 90Ω resistance is connected in parallel with a 25μF capacitor. A voltage of 230V at 50Hz is maintained across the circuit. Determine the total power taken from the source (Figure 5).   [5+5]
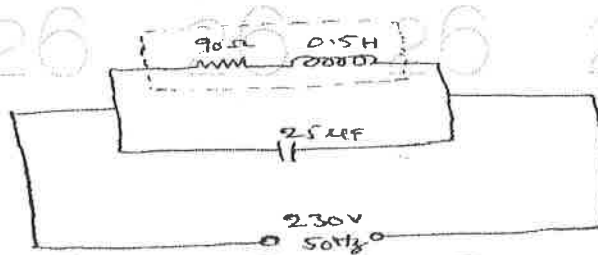

Figure: 5

6.a)   Explain the procedure to draw the locus diagram of R-L series circuit when L is varying.

   b)   Two coils having 500 and 1000 turns, respectively, are wound side by side on a closed iron circuit of area of cross-section 100 cm^2 and mean length 800 cm. Calculate the coefficients of self induction of the two coils and the mutual induction between the two. Neglect leakage. Take μ_r as 2000. If a current steadily grows from 0 to 1 A in 0.1 sec, in the first coil, find emf induced in the other coil.   [4+6]

OR

7.a)   State and explain Faraday's laws of electromagnetic induction.

   b)   A series RLC circuit has to be designed so that it has a band width of 320 Hz and inductance of the coil is 0.2H. It is has to resonate at 350Hz, determine the resistance of coil and capacitance of condenser. If the applied voltage is 150V, determine the voltage across capacitor and coil.   [5+5]

8.a)   Describe the procedure to construct the duel network with an example.

   b)   For the resistive network as shown in figure 6, write a cut set schedule and equilibrium equations on voltage basis. Hence obtain value of branch voltage and branch currents.   [5+5]

Figure: 6

OR

9.a) Draw the dual network for the circuit shown in figure 7 and explain the procedure employed.

Figure: 7

b) Explain the super mesh analysis with an example. [5+5]

10. Calculate the change in current of the network given in figure 8 using compensation theorem when load resistor changes to 10 ohms. [10]

Figure: 8

OR

11. Find the current through 9 ohms resistor for the following network shown in figure 9 using Norton's theorem. [10]

Figure: 9

---ooOoo---

R15

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question
carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Draw the stress-strain curve for mild steel and indicate salient points.   [2]
  b) What is lateral strain and poisson's ratio?   [3]
  c) Describe the concept of shear force in beams.   [2]
  d) Differentiate between varying loads and uniformly distributed loads.   [3]
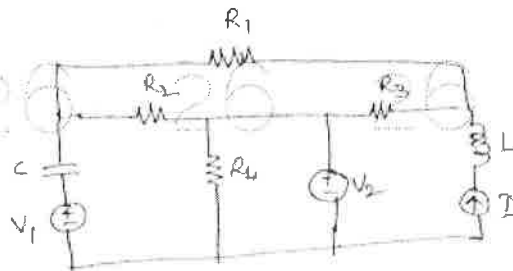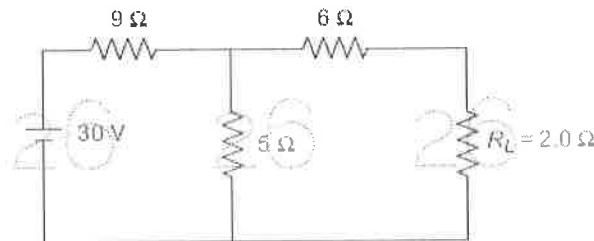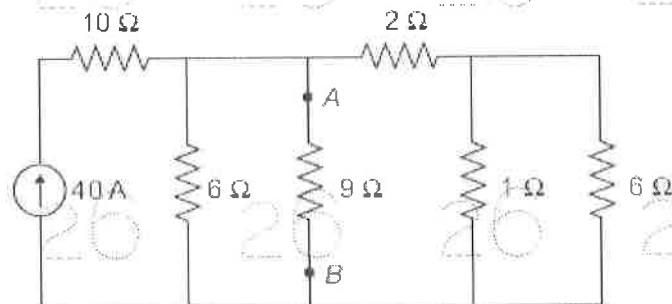 e) What assumptions are made in theory of simple bending?   [2]
  f) What are the advantages and applications of I-Section?   [3]
  g) What are the axial stresses and compound stresses?   [2]
  h) What is maximum principal stress theory?   [3]
  i) How the shaft is designed for maximum shear stress?   [2]
  j) What is hoop-stress and volumetric strain in shells?   [3]

PART – B

(50 Marks)

2.a) How the temperature stresses are developed?
  b) A steel bar is placed between two copper bars of same area and length at a temp of $15^0 C$.
     At this stage, they are rigidly connected together at both ends. When the temperature is
     raised to 315^0 C, the length of bars increase by 1.6 mm. Find the original length and
     stresses in bars. Take E_s = 200 Gpa, E_c = 100 Gpa, α_s = 0.000012 per ^{0}C, α_c = 0.000018
     per ^{0}C.   [5+5]

OR

3.a) Derive equation for the relation between three elastic moduli.
  b) A bar of 25 mm. diameter is subjected to a pull of 70 kN. The extension measured on a
     gauge length of 200 mm is 0.1 mm and change in diameter is 0.004 mm. Find poisson's
     ratio and values of three moduli.   [5+5]

4.   A simply supported beam of span 10 m carry as UDL of 10 KN/m over a length of 3 m
     from left support and also from right support. Draw SF and BM diagram.   [10]

OR

5.   A beam of length 12 m has overhanging of 3 m on left and right leaving the span between
     the supports of 6 m. It carries UDL of 8 KN/m over the entire length and a concentrated
     load of 10 KN at the right extreme end. Draw SF and BM diagrams and find the point of
     contra flexure point.   [10]

6.a) How to find neutral axis of a beam and explain its importance?

b) A cantilever beam of cross-section 90 mm. width 120 mm deep carries a UDL of 12 KN/m. over the entire length and a concentrated load of 15 KN at the right end. Find the bending stress in the beam, when the length of beam is 10 m. [5+5]

OR

7. A rolled steel Joist of I-Section has flange length of 300 mm. wide and 20 mm thick with a web thickness of 20 mm. and overall depth of I-Section is 600 mm. If this beam carries a UDL of 40 KN/m over the simply supported beam of span 10 m, find the maximum stress produced in the beam. [10]

8. At a point in a strained material, the intensities of normal stresses on two planes at right angles to each other are 35 N/mm^2 and 20 N/mm^2 both tensile. They are accompanied by shear stress of 15 N/mm^2. Find the principal planes and principal stresses. Find also maximum shear stress. [10]

OR

9. A circular shaft of 12 cm dia. is subjected to combined bending and twisting moments. The bending moment being three times the twisting moment. If the direct tensile yield point of material is 350 MN/m^2 and factor of safety on yield is 4, find the allowable twisting moment by a) Maximum principal stress theory b) Maximum shear stress theory. [10]

10. A hollow shaft of 600 mm. external dia. and 400 mm internal dia. is transmitting a power of 6000 KW at 160 rpm. Find the shear stresses at the outer and inner surfaces of the shaft. Draw the shear stress distribution for the wall of the shaft. Find the twist over a length of 4 m. of the shaft. Take E = 80 Gpa. [10]

OR

11. A shell of 4 m. long, 1 m. diameter is subjected to an internal pressure of 1 N/mm^2. If the thickness of shell is 10 mm; find the circumferential and longitudinal stresses. Find also the maximum shear stress and changes in the dimensions of the shell. Take E = 200 Gpa. and poisson's ratio = 0.3. [10]

---ooOoo---

Code No: 123BN

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each
question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Define well-formed formulae and clause form. [2]
 b) Write the statement in symbolic form then negate statements:
   i) Some Drivers do not obey the speed limit.
   ii) All dogs have fleas. [3]
 c) If R is set of real numbers, then show that the function: $F : R \to R$ defined by
   $f(x) = 5x^3 - 1$ is one-one function. [2]
 d) Give an example of group which is abelian but not cyclic. [3]
 e) From 6 boys and 4 girls, 5 are to be selected for admission for a particular course. In
   How many ways can this be done if there must be exactly 2 girls? [2]
 f) Determine the co-efficient of x^{12} in $x^3 (1-2x)^{10}$. [3]
 g) Find the generating function for the following sequence 0, 1, -2, 3, -4…. [2]
 h) Define first order and second order recurrence relations. [3]
 i) What is minimum spanning tree? Give an example. [2]
 j) Define Bipartite graph and Isomorphic graphs. [3]

PART-B

(50 Marks)

2.a) Show that the following premises are inconsistent.
   If Jack misses many classes through illness, then he fails high school.
   If Jack fails high school, then he is uneducated.
   If Jack reads a lot of books, then he is not uneducated.
   Jack misses many classes through illness and reads a lot of books.
 b) Show that R → S can be drawn from the premises P → (Q → S), ¬ R ∨ P and Q.
   [5+5]

OR

3.a) Show that $\forall x (P(x) \wedge Q(x)) \equiv \forall x P(x) \wedge \forall x Q(x)$.
 b) Obtain principle disjunctive normal form of the following: [5+5]
   $p \to \{(p \to q) \wedge \neg(\neg q \vee \neg q)\}$

4.a) If R and S are equivalence relations on a set A. Prove that $R \cap S$ is an equivalence Relation.

b) Let $B = \{a,b,c\}$ and $A = P(B)$ be the power set of B. Draw the Hasse diagram for $\subseteq$ and poset A. [5+5]

OR

5.a) Prove that every subgroup of a cyclic group is cyclic.

b) In any group $(G,*)$, by proving the inverse of every element is unique. Show that $(a*b)^{-1} = b^{-1} * a^{-1}, \forall a,b \in G$. [5+5]

6.a) Show that $\sum_{i=1}^{n} iC(n,i) = n2^{n-1}$.

b) In how many ways can 4 mathematics books, 3 history books, 3 chemistry books and 2 sociology books be arranged on the shelf so that all books of the same subject are together. [5+5]

OR

7. State and prove extended pigeon principle. Using it show that 9 colors are used to paint 100 houses at least 12 houses will be of the same color. [10]

8.a) Solve recurrence relation $a_n = 3a_{n-1} - 2a_{n-2}$ for $n \geq 2$.

b) Find the recurrence relation and initial condition for the following sequence:
6, -18, 54, -162 ... [5+5]

OR

9.a) If the person invests Rs.10, 000 at 10% annual interest compounded quarterly, in how Many months the money will become 15000.

b) Solve the following recurrence relation $a_{n+1} - 2a_n = 2^n, n \geq 0, a_0 = 1$. [5+5]

10.a) Prove that a simple graph with n vertices and k components can have at most $(n-k)(n-k+1)$ edges.

b) What is the shortest path between ϑ_1 and ϑ_7 in the following weighted figure 1?
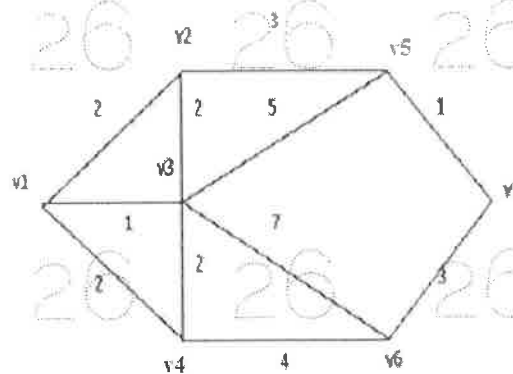[5+5]

Figure: 1
OR

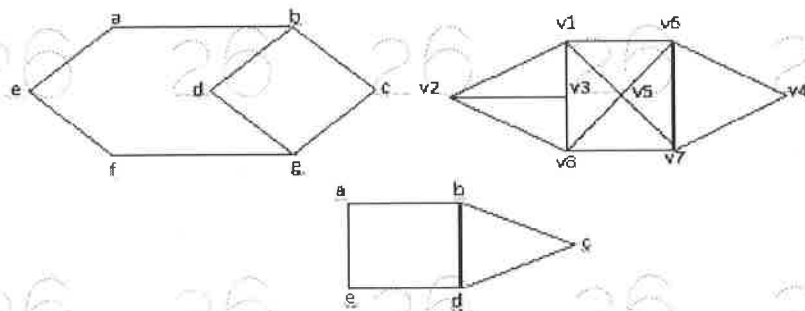11. Determine whether the given graphs have Hamilton circuits. If it has for such circuits shown in figure 2. [10]

Figure: 2

---ooOoo---

R13

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)	Draw the stress-strain curve for mild steel and indicate salient points.	[2]
b)	What is lateral strain and poisson's ratio?	[3]
c)	Describe the concept of shear force in beams.	[2]
d)	Differentiate between varying loads and uniformly distributed loads.	[3]
e)	What assumptions are made in theory of simple bending?	[2]
f)	What are the advantages and applications of I-Section?	[3]
g)	What are the axial stresses and compound stresses?	[2]
h)	What is maximum principal stress theory?	[3]
i)	How the shaft is designed for maximum shear stress?	[2]
j)	What is hoop-stress and volumetric strain in shells?	[3]

PART – B

(50 Marks)

2.a) How the temperature stresses are developed?

b) A steel bar is placed between two copper bars of same area and length at a temp of 15^0 C. At this stage, they are rigidly connected together at both ends. When the temperature is raised to 315^0 C, the length of bars increase by 1.6 mm. Find the original length and stresses in bars. Take E_s = 200 Gpa, E_c = 100 Gpa, α_s = 0.000012 per ^{0}C, α_c = 0.000018 per ^{0}C.   [5+5]

OR

3.a) Derive equation for the relation between three elastic moduli.

b) A bar of 25 mm. diameter is subjected to a pull of 70 kN. The extension measured on a gauge length of 200 mm is 0.1 mm and change in diameter is 0.004 mm. Find poisson's ratio and values of three moduli.   [5+5]

4. A simply supported beam of span 10 m carry as UDL of 10 KN/m over a length of 3 m from left support and also from right support. Draw SF and BM diagram.   [10]

OR

5. A beam of length 12 m has overhanging of 3 m on left and right leaving the span between the supports of 6 m. It carries UDL of 8 KN/m over the entire length and a concentrated load of 10 KN at the right extreme end. Draw SF and BM diagrams and find the point of contra flexure point.   [10]

6.a) How to find neutral axis of a beam and explain its importance?

b) A cantilever beam of cross-section 90 mm. width 120 mm deep carries a UDL of 12 KN/m. over the entire length and a concentrated load of 15 KN at the right end. Find the bending stress in the beam, when the length of beam is 10 m. [5+5]

OR

7. A rolled steel Joist of I-Section has flange length of 300 mm. wide and 20 mm thick with a web thickness of 20 mm. and overall depth of I-Section is 600 mm. If this beam carries a UDL of 40 KN/m over the simply supported beam of span 10 m, find the maximum stress produced in the beam. [10]

8. At a point in a strained material, the intensities of normal stresses on two planes at right angles to each other are 35 N/mm^2 and 20 N/mm^2 both tensile. They are accompanied by shear stress of 15 N/mm^2. Find the principal planes and principal stresses. Find also maximum shear stress. [10]

OR

9. A circular shaft of 12 cm dia. is subjected to combined bending and twisting moments. The bending moment being three times the twisting moment. If the direct tensile yield point of material is 350 MN/m^2 and factor of safety on yield is 4, find the allowable twisting moment by a) Maximum principal stress theory b) Maximum shear stress theory. [10]

10. A hollow shaft of 600 mm. external dia. and 400 mm internal dia. is transmitting a power of 6000 KW at 160 rpm. Find the shear stresses at the outer and inner surfaces of the shaft. Draw the shear stress distribution for the wall of the shaft. Find the twist over a length of 4 m. of the shaft. Take E = 80 Gpa. [10]

OR

11. A shell of 4 m. long, 1 m. diameter is subjected to an internal pressure of 1 N/mm^2 If the thickness of shell is 10 mm; find the circumferential and longitudinal stresses. Find also the maximum shear stress and changes in the dimensions of the shell. Take E = 200 Gpa. and poisson's ratio = 0.3. [10]

---ooOoo---

Code No: 113BW

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL CIRCUITS
(Common to EEE, ECE, ETM)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)	States the Kirchhoff's Laws.	[2]
b)	What is meant by Super Node?	[3]
c)	Define the Average value of a periodic waveform.	[2]
d)	Define the instantaneous value and peak value.	[3]
e)	Define the band width and Q factor? Write its expressions.	[2]
f)	What is the significance of dot convention?	[3]
g)	What is meant by duality? Give elements equivalent to dual elements.	[2]
h)	Write the procedure for constructing a tie set matrix for a given graph.	[3]
i)	State the Superposition theorem.	[2]
j)	Write the procedure to obtain the Thevenin's equivalent circuit.	[3]

PART-B

(50 Marks)

2. Find the mesh currents in the circuit shown in below figure1.   [10]

Figure: 1

OR

3.a) Find current 'I' for the circuit shown in figure 2 by using delta/star transformation.

Figure: 2

b)   Use current division twice find the current I_1, in the circuit shown in Figure 3.   [5+5]

Figure: 3

4.a)   A coil of R = 4 ohms, X_L= 3 ohms connected in series with a condenser of R = 8 ohms, Xc= 8 ohms, this combination is connected to 4 ohms resistor. Across this series circuit a voltage 100 volts is applied. Calculate:
i) current
ii) voltage drops across coil, condenser and resistor and
iii) power absorbed by the circuit.

b)   A series R-L-C circuit consists of 100 ohms resistor and an inductor of 0.318H and a capacitor of unknown value. This circuit is supplied by 230V, 50 Hz supply and draws a current of 2.3A, and the current is in phase with the supply voltage. Find the value of the capacitance, and the power supplied by the source.   [5+5]

OR

5.a)   A circuit consists of a pure resistance and a coil connected in series as shown in figure 4. Powers dissipated in the resistance and in the coil are 1000W and 250W respectively. Voltage drops across the resistance and the coil are 200 V and 300 V respectively. Determine the reactance of the coil and the supply voltage.

Figure: 4

b)   An inductor of 0.5H inductance 90Ω resistance is connected in parallel with a 25µF capacitor. A voltage of 230V at 50Hz is maintained across the circuit. Determine the total power taken from the source (Figure 5).   [5+5]

Figure: 5

6.a) Explain the procedure to draw the locus diagram of R-L series circuit when L is varying.

b) Two coils having 500 and 1000 turns, respectively, are wound side by side on a closed iron circuit of area of cross-section 100 cm² and mean length 800 cm. Calculate the coefficients of self induction of the two coils and the mutual induction between the two. Neglect leakage. Take μ_r as 2000. If a current steadily grows from 0 to 1 A in 0.1 sec, in the first coil, find emf induced in the other coil. [4+6]

OR

7.a) State and explain Faraday's laws of electromagnetic induction.

b) A series RLC circuit has to be designed so that it has a band width of 320 Hz and inductance of the coil is 0.2H. It is has to resonate at 350Hz, determine the resistance of coil and capacitance of condenser. If the applied voltage is 150V, determine the voltage across capacitor and coil. [5+5]

8.a) Describe the procedure to construct the duel network with an example.

b) For the resistive network as shown in figure 6, write a cut set schedule and equilibrium equations on voltage basis. Hence obtain value of branch voltage and branch currents. [5+5]

Figure: 6
OR

9.a) Draw the dual network for the circuit shown in figure 7 and explain the procedure employed.

Figure: 7

b) Explain the super mesh analysis with an example. [5+5]

10. Calculate the change in current of the network given in figure 8 using compensation theorem when load resistor changes to 10 ohms. [10]

Figure: 8

OR

11. Find the current through 9 ohms resistor for the following network shown in figure 9 using Norton's theorem. [10]

Figure: 9

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each
question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Define well-formed formulae and clause form. [2]
  b) Write the statement in symbolic form then negate statements:
     i) Some Drivers do not obey the speed limit.
     ii) All dogs have fleas. [3]
  c) If R is set of real numbers, then show that the function: $F : R \rightarrow R$ defined by
     $f(x) = 5x^3 - 1$ is one-one function. [2]
  d) Give an example of group which is abelian but not cyclic. [3]
  e) From 6 boys and 4 girls, 5 are to be selected for admission for a particular course. In
     How many ways can this be done if there must be exactly 2 girls? [2]
  f) Determine the co-efficient of x^{12} in $x^3 (1-2x)^{10}$. [3]
  g) Find the generating function for the following sequence 0, 1, -2, 3, -4.... [2]
  h) Define first order and second order recurrence relations. [3]
  i) What is minimum spanning tree? Give an example. [2]
  j) Define Bipartite graph and Isomorphic graphs. [3]

PART-B

(50 Marks)

2.a) Show that the following premises are inconsistent.
     If Jack misses many classes through illness, then he fails high school.
     If Jack fails high school, then he is uneducated.
     If Jack reads a lot of books, then he is not uneducated.
     Jack misses many classes through illness and reads a lot of books.
  b) Show that R → S can be drawn from the premises P → (Q → S), ¬ R ∨ P and Q.
                                                                        [5+5]

OR

3.a) Show that $\forall x \left(P(x) \wedge Q(x) \right) \equiv \forall x P(x) \wedge \forall x Q(x)$.
  b) Obtain principle disjunctive normal form of the following: [5+5]
     $p \rightarrow \left\{ (p \rightarrow q) \wedge \neg (\neg q \vee \neg q) \right\}$

4.a) If R and S are equivalence relations on a set A. Prove that $R \cap S$ is an equivalence Relation.

b) Let $B = \{a, b, c\}$ and $A = P(B)$ be the power set of B. Draw the Hasse diagram for $\subseteq$ and poset A. [5+5]

OR

5.a) Prove that every subgroup of a cyclic group is cyclic.

b) In any group $(G, *)$, by proving the inverse of every element is unique. Show that $(a * b)^{-1} = b^{-1} * a^{-1}, \forall a, b \in G$. [5+5]

6.a) Show that $\sum_{i=1}^{n} iC(n, i) = n2^{n-1}$.

b) In how many ways can 4 mathematics books, 3 history books, 3 chemistry books and 2 sociology books be arranged on the shelf so that all books of the same subject are together. [5+5]

OR

7. State and prove extended pigeon principle. Using it show that 9 colors are used to paint 100 houses at least 12 houses will be of the same color. [10]

8.a) Solve recurrence relation $a_n = 3a_{n-1} - 2a_{n-2}$ for $n \geq 2$.

b) Find the recurrence relation and initial condition for the following sequence:
6, -18, 54, -162 … [5+5]

OR

9.a) If the person invests Rs.10,000 at 10% annual interest compounded quarterly, in how Many months the money will become 15000.

b) Solve the following recurrence relation $a_{n+1} - 2a_n = 2^n, n \geq 0, a_0 = 1$. [5+5]

10.a) Prove that a simple graph with n vertices and k components can have at most $(n-k)(n-k+1)$ edges.

b) What is the shortest path between ϑ_1 and ϑ_7 in the following weighted figure 1? [5+5]

Figure: 1
OR

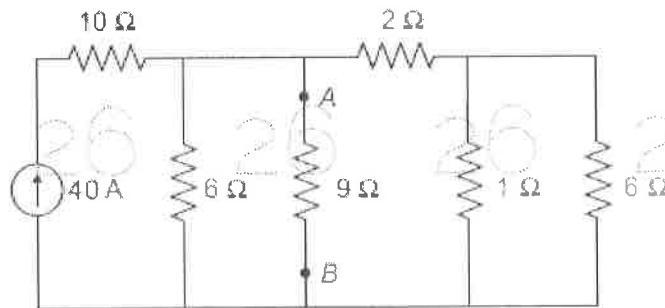11. Determine whether the given graphs have Hamilton circuits. If it has for such circuits shown in figure 2. [10]

Figure: 2

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
STRENGTH OF MATERIALS-I
(Civil Engineering)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks

- - -

1.a) Explain the different types of stresses and also derive the relationship between the various elastic moduli (E, C and K).

  b) A steel bar of length 1.5 m and diameter 100 mm is enclosed concentrically in a copper tube of external diameter 150 mm and internal diameter 125 mm also of length 1.5 m. If the composite bar is subjected to an axial compressive force of 500 kN, find the stresses in steel bar and the copper tube also find the strain. Adopt E for steel is 200 kN/mm^2 and for copper 110 kN/mm^2. [7+8]

2. Draw the shear force and bending moment diagrams for a beam supported and loaded as shown in Figure 1. [15]
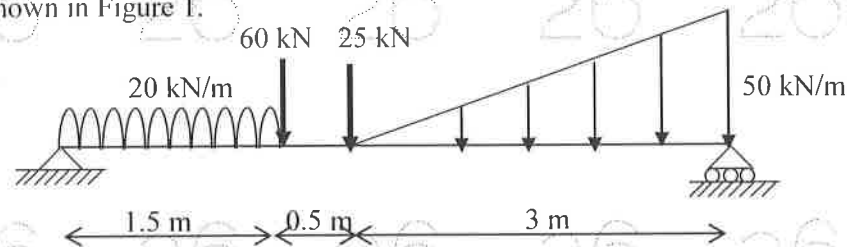
Figure: 1

3.a) State and explain the assumptions made in the theory of simple bending.

  b) A simply supported steel beam of span 5 m has an unsymmetrical I-section, top flange 200 mm × 16 mm, bottom flange 150 mm × 16 mm, web of thickness 12 mm and the total depth of the section is 250 mm. If the permissible stresses are 175 N/mm^2 in tension and 140 N/mm^2 in compression respectively, determine the safe uniformly distributed load carried by the beam. [7+8]

4. A beam of T-section, flange 250 mm × 20 mm, web of 16 mm thickness and the total depth of the section is 300 mm, is subjected to a shear force of 150 kN. Draw the shear stress distribution across the depth of the section and also find the location and magnitude of maximum shear stress. [15]

5. Determine the maximum deflection, deflection under the concentrated load and the slopes at the supports of a beam supported and loaded as shown in Figure 2. Assume the flexural rigidity is constant. [15]

50 kN

25 kN/m

3 m

2 m
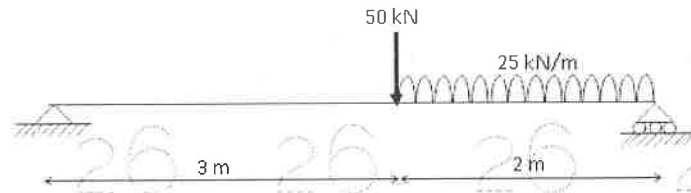
Figure: 2

6.a) The state of stress at a point in a strained body is shown in Figure 3, using the Mohar's circle of stress, determine (i) the maximum shear stress and its location (ii) the plane of action and the magnitude of principal stresses and (iii) the normal and shear stresses acting on a plane making an angle 60^0 in the clockwise direction with respect to x-axis.

30 MPa

60 MPa

x

10 MPa
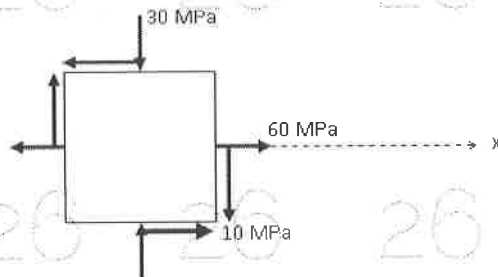
Figure: 3

b) State and explain the maximum strain energy theory and the failure criterion. [8+7]

7. A thin steel cylindrical shell of 20 mm thickness, 1.5 m diameter and 3.5 m long is carrying a fluid at a pressure of 3 N/mm^2. Find the maximum shear stress induced and the change in diameter, change in length and change in the volume of the cylinder. E for steel is 200 kN/mm^2 and Poisson's ratio is 0.3. [15]

8. Draw the radial stress and hoop stress distribution across the section of a pipe 250 mm external diameter and 125 mm internal diameter due to an internal fluid pressure of 75 N/mm^2 and external fluid pressure of 10 N/mm^2. [15]

---ooOoo---

Code No: 53010

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL CIRCUITS
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) Derive the expression for energy stored in a capacitive element from the fundamentals.
  b) Discuss the differences between dependent and independent sources.
  c) An electric oven connected to 220V supply consumes 3KW. Find the power consumed if the supply voltage in dropped to 200V.   [5+5+5]

2.a) Derive expression for delta to star transformation of three resistive elements.
  b) Find the currents in all branches of following circuit shown in figure 1 using node voltage method.   [7+8]
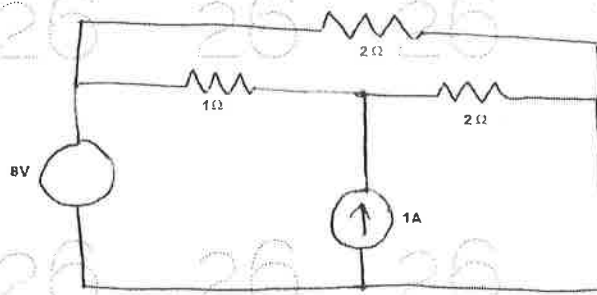
Figure: 1

3.a) Determine the peak factor and form factor of the following wave form shown in figure 2.
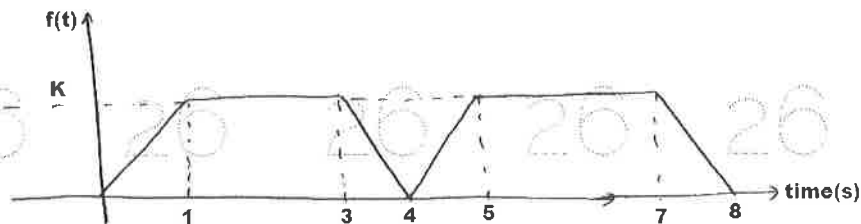
Figure: 2

  b) Determine the total current supplied, complex power in each branch of following circuit shown in figure 3. What is the overall power factor.   [7+8]
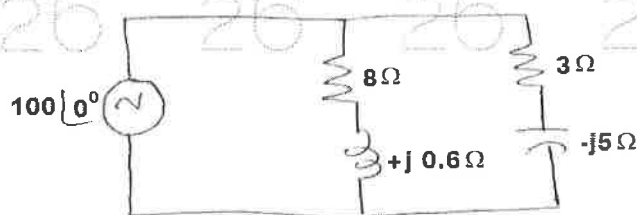
Figure: 3

4.a) Derive the expression for half power frequencies of an RLC series circuit.

b) A coil of 20 ohm resistance and an inductance of 0.2H is connected in parallel with a capacitor of $100\,\mu F$. Determine the resonant frequency and the input impedance at resonance. [7+8]

5.a) Explain dot convention for coupled circuits.

b) Find the equivalent inductance of the following circuit shown in figure 4. [7+8]
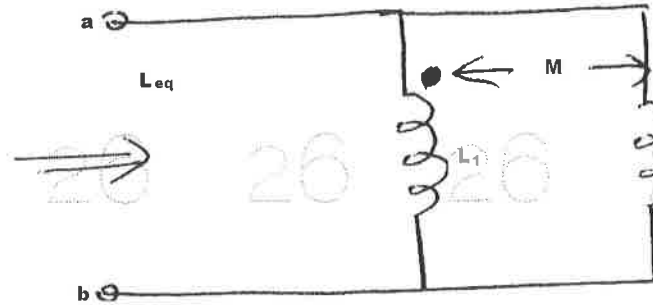
Figure: 4

6.a) Determine the cut set and tieset matrices for the following graph shown in figure 5 considering the tree (3,4,2).
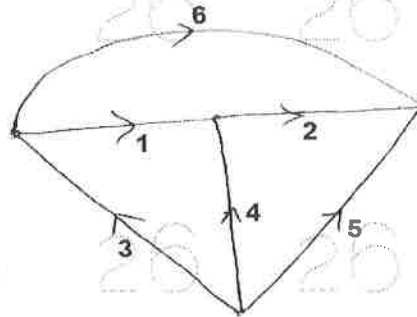
Figure: 5

b) Define and explain the following:
i) twigs ii) links iii) graph iv) tree v) cut set. [7+8]

7.a) For the circuit shown in the figure 6, find the Thevinin's equivalent.
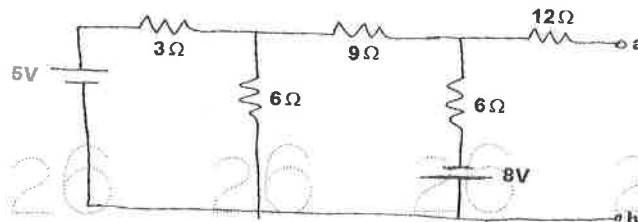
Figure: 6

b)   Find the power in 10Ω resistance using superposition theorem shown in figure 7.

[7+8]
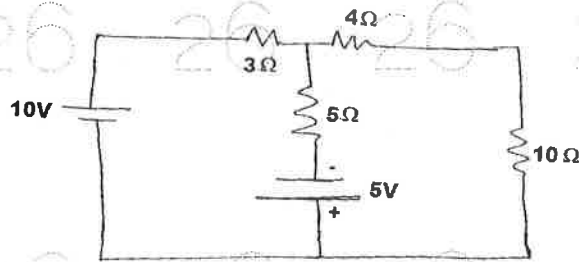
Figure: 7

8.a)   Find the value of Z_L in the circuit shown in figure 8 for maximum power transfer and also the maximum power.
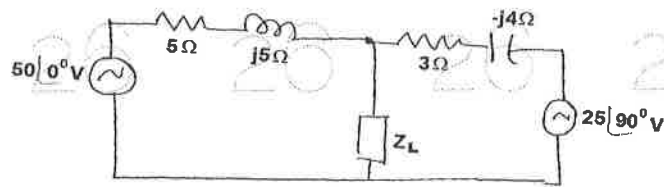
Figure: 8

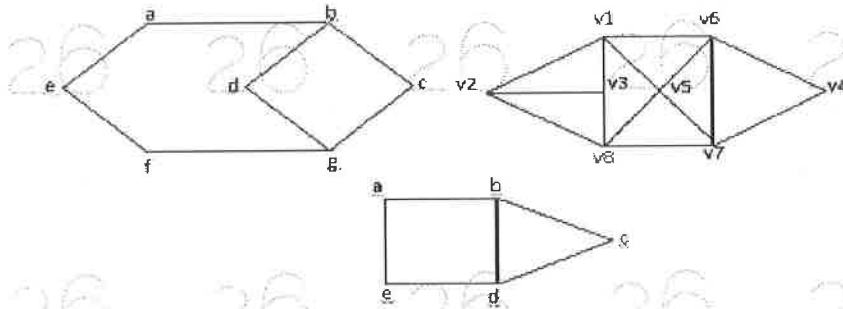b)   Find the current in 4Ω resistance using Norton theorem shown in figure 9.   [8+7]
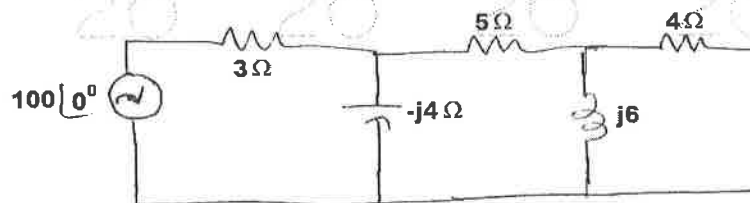
Figure: 9

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, November/December – 2017
MECHANICS OF SOLIDS
(Common to ME, MCT, MMT, AE, AME)

Time: 3 Hours   Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks
- - -

1.a)   Draw stress-strain curve for mild steel rod subjected to tension and explain various salient points on the curve.

b)   Two bars of copper and aluminum are of equal length and have cross-sections of 400 and 800 sq. mm. respectively. They are rigidly connected at their ends. If this compound member is subjected to a longitudinal pull of 300 KN, find the proportion of load carried on each rod and induced stresses. Take E for copper as 1.4×10^5 N/mm^2, for aluminum as 0.9×10^5 N/mm^2.   [7+8]

2.   Draw S.F and B.M diagram for the simply supported beam carrying loads as shown in figure 1.   [15]
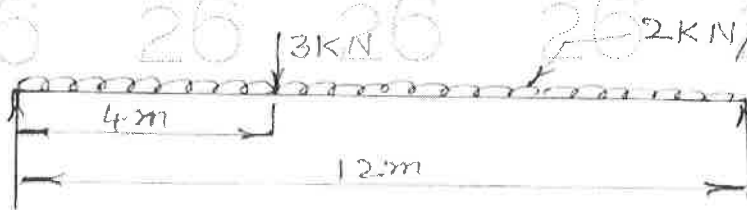
Figure: 1

3.a)   Derive the equation M/I = f/y = E/R. Where:
   M - Bending moment;   I – Moment of Inertic
   f – Bending stress   y – Distance from N.A
   E – Young's modulus   R - Radius of curvature.

b)   A hollow circular beam having outside diameter twice the inside diameter, is subjected to a point load of 30 KN at its centre of span of 6 m. If the allowable bending stress in the beam is limited to 120 MN/sq. m, find the inside diameter of bar.   [8+7]

4.a)   Derive an equation for the shear stress developed in a beam of rectangular cross-section.
b)   Find the maximum shear stress induced by a load of 4 KN in the vertical section of a hollow beam of square section of outside width of 12 cm and thickness of material 2 cms.
                                                                                   [7+8]

5.   Determine the magnitudes and nature of forces in the members of the frame shown in figure 2.   [15]
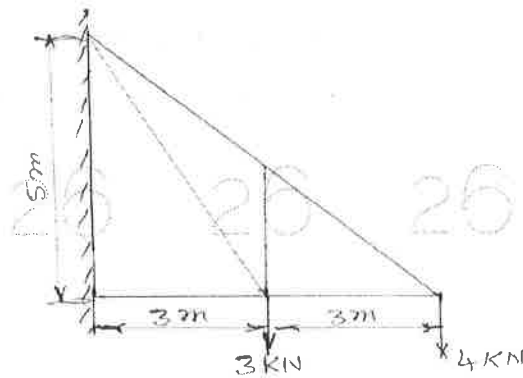
Figure: 2

6.a) Derive an equation to find slope and deflection at the end of cantilever beam of length 'L' when a concentrated load of 'W' is placed at the end.

b) A beam of length 8m and having uniform rectangular section is supported at its ends and carries a uniformly distributed load of 2 KN/m over the entire length. Calculate the depth of section, if the central deflection is not to exceed 12 mm. Take ratio between depth to width as 2. and E = 210 Gpa.   [7+8]

7.a) Derive equations to find longitudinal and hoop stress for a thin cylinder.

b) A thin spherical shell of 2 m. diameter is 10 mm. thick. If it is filled with liquid at a pressure of 3.5 Mpa, find longitudinal and hoop stress. Take E = 210 Gpa, Poisson's ratio = 0.25.   [7+8]

8.a) Sketch the radial and hoop – stress distribution across the section of a thick – cylinder.

b) A thick cylinder of internal dia 125 mm. and external diameter 250 mm is subjected to an internal pressure of 12 N/sq. mm. Find the radial and hoop stresses across the section.   [7+8]

--ooOoo--

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
BIOCHEMISTRY
(Biotechnology)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) Write about physiological buffers and their significance.
  b) Compare covalent and non covalent interactions.   [8+7]

2.a) Describe saturated and unsaturated hydrocarbons with examples.
  b) Write how stereochemistry is important for the study of structure of molecules and their manipulations.   [7+8]

3.a) Write a note on industrially significant carbohydrates.
  b) Describe the process of glycolysis and also mention the fate of pyruvate under aerobic and anaerobic conditions.   [7+8]

4. Write notes on:
    a) Oxidative phosphorylation
    b) Gibb's free energy.   [7+8]

5. Give an overview of various types of amino acids with their properties. [15]

6.a) Describe Shikimate pathway for the production of amino acids.
  b) Write a note on nitrogen cycle.   [8+7]

7.a) Give classification of lipids and emphasize upon complex lipids.
  b) Discuss the significance of cholesterol in lipid profile analysis.   [8+7]

8.a) Describe the structure of purines and pyrimidines.
  b) Discuss the fate of nitrogenous bases, pentoses and phosphoric acid in an organism.   [7+8]

---ooOoo---

Code No: X0224

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
SWITCHING THEORY AND LOGIC DESIGN
(Electrical and Electronics Engineering)

Time: 3 hours
Max. Marks: 80

Answer any five questions
All questions carry equal marks

- - -

1.a) How do you convert hexadecimal fractional number into decimal number and binary number?
  b) Describe different types of numeric codes. Explain them with suitable examples.
  [8+8]

2.a) Implement the following switching functions with minimum number of NOR gates?
  i) $\sigma(AX + BX)(A + X)$ ii) $AB + (B + X)A$
  b) What are the different degenerative and non-degenerative forms of logic gate combinations in two level realization? Briefly explain them? [8+8]

3. Simplify the following Boolean expression using tabulation method?
  $\phi(A, B, X, \Delta, E) = \sum m(2, 3, 4, 7, 8, 11, 13, 14) + d(1, 5, 10)$. [16]

4.a) Design half subtractor. Realize full subtractor using half subtractors and explain the circuit operation.
  b) Draw the logic diagram and explain the operation of the 4 bit excess3 adder/subtractor. [8+8]

5.a) Obtain logical functions to design decimal to octal priority encoder? Implement the circuit with NAND gates.
  b) Implement the following Boolean function using 1×8 de-multiplexer and 4×1 multiplexer? $\Phi(A, B, X) = AB + AX + BX + AX$ [8+8]

6.a) How the ROM architecture is constructed? Draw structure of for 32×8 ROM.
 b) How the programming tables are prepared for PAL and PLA, use the following logic functions?
  i) $A(\omega, \xi, \psi, \zeta) = \sum m(0, 2, 5, 7, 8, 10, 12, 13)$
  ii) $B(\omega, \xi, \psi, \zeta) = \sum m(0, 1, 2, 6, 8, 9, 14, 15)$
  iii) $X(\omega, \xi, \psi, \zeta) = \sum m(0, 8, 14, 15)$. [8+8]

7.a) Explain the operation of J-K flip-flop. What is race around condition and how it is eliminated?
  b) Design a synchronous counter to count 3, 4, 6, 7, 3, 4, ...using J-K flip flops? [8+8]

8. Obtain a minimal state table using partition technique for the state table given below. Find the minimum length sequence that distinguishes state from A from state B. [16]

PS	NS, Z	
	X=0	X=1
A	B,0	H,1
B	F,0	D,1
C	D,1	E,0
D	C,1	F,0
E	D,0	E,1
F	C,0	E,1
G	C,0	D,1
H	C,1	A,0

---ooOoo---

Code No: 233AC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Pharmacy II Year I Semester Examinations, November-2017
HOSPITAL AND COMMUNITY PHARMACY

Time: 3hours   Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A   (25 Marks)

1.a) Define hospital and give classifications of hospitals.   [2]
  b) Explain the legal basis of hospital formulary system.   [3]
  c) Write the organization of drug store.   [2]
  d) Explain the procedure for controlling ward stock of narcotics by the nurses.   [3]
  e) How demand and costing affect sterile and non sterile manufacturing.   [2]
  f) Write a note on policy making of manufacturable items.   [3]
  g) Enumerate various processes for easy retrieval of drug information.   [2]
  h) Mention various factors contributing for medication error and explain any one.   [3]
  i) Write a note on response of community pharmacist giving one example of common
      symptom.   [2]
  j) Write notes on the maintenance of records of retail sale.   [3]

PART-B   (50 Marks)

2. Define Pharmacy and Therapeutic Committee and explain its objectives and operation of
    the same (PTC).   [10]
                                                OR
3.a) Give the procedure for budget preparation and implementation for hospital pharmacy.
  b) Explain the responsibility of chief pharmacists.   [6+4]

4.a) Explain the purchase procedure followed in hospital pharmacy in the large hospital.
  b) Explain on stocking norms in Drug stores for uninterrupted supply of drugs in hospitals.
                                                                                                     [4+6]
                                                OR
5.a) Discuss unit dose drug distribution system with its advantages.
  b) What is ambulatory patient? Explain the method of dispensing to out patients.   [6+4]

6. Define Central Sterile Supply Room. Explain its function, location and layout.   [10]
                                                OR
7.a) Write about manufacturing records to be maintained for manufacture of sterile products.
  b) Discuss on personnel requirements in sterile manufacturing area.   [6+4]

8.   Define medication error. Discuss the various factors contributing for medication error and strategies to overcome the same.   [10]

OR

9.   Write a note on following:
     a) Patients medication profile
     b) Adverse drug reaction reports and records.   [5+5]

10. Write exhaustive note on organization and structure of retail drug store and its legal requirements.   [10]

OR

11. Define compliance. Explain the strategies to enhance patient compliance. Mention compliance aid.   [10]

--ooOoo--

Code No: 223AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Pharmacy II Year I Semester Examinations, November-2017
ANATOMY PHYSIOLOGY AND PATHOPHYSIOLOGY

Time: 3hours   Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each
question carries 10 marks and may have a, b, c as sub questions.

PART - A   (25 Marks)

1.a) Define Psychosis and epilepsy.   [2]
  b) Name the receptors of Parasympathetic nervous system?   [3]
  c) Define respiratory volumes and vital capacity.   [2]
  d) Write the difference between Acute and Chronic renal failure?   [3]
  e) Define Diabetes hyperthyroidism.   [2]
  f) Name the different layers of Adrenal gland with their respective secretions?[3]
  g) Define Fertilization and sex differentiation.   [2]
  h) Write a note on Trimesters.   [3]
  i) Define pathogenesis and cellular adoptations.   [2]
  j) Write the difference between atrophy and hypertrophy?   [3]

PART - B   (50 Marks)

2.   Draw a neat labeled diagram of Brain. Write a detailed note on Cerebellum.
                                                                                [10]
OR
3.   Write a detailed note on receptors and secretion of ANS?   [10]

4.   Draw a neat labeled diagram of respiratory system and in detail about the
      mechanism of respiration?   [10]
OR
5.a) Enumerate the formation of urine?
  b) Write note on micturition.   [7+3]

6.   Explain the anatomy of adrenal gland and explain about the secretions of adrenal
      gland.   [10]
OR
7.   Write a note on pancreas and explain about the blood glucose regulation? [10]

8.   Enumerate the phases of menstrual cycle along with the changes in the uterus?
                                                                                [10]
OR
9.   Draw a neat labeled diagram of male reproductive system and explain about the
      spermatogenesis?   [10]

10. Explain in detail about the acute and chronic inflammation? [10]

OR

11. Write short note on:
    a) Mediators of inflammation
    b) Morphology of cell injury
    c) Methods of cell repair. [4+3+3]

--ooOoo--

Code No: 133AJ

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
DIGITAL LOGIC DESIGN
(Common to CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Subtract the following using 1's and 2's complement $(101)_2 - (10110)_2$. [2]
   b) Distinguish between canonical and standard forms by giving an example. [3]
   c) Derive the sum of minterms for the function $f(a,b,c)=a'b+b'c'$ [2]
   d) Implement the following function using only NAND Gates $F=a.(b'+c') + (b.c)$. [3]
   e) Differentiate multiplexer and de-multiplexer. [2]
   f) Draw the diagram of 4-Bit Parallel adder cum parallel subtractor. [3]
   g) Show the excitation table and truth table of JK flip flop. [2]
   h) Differentiate critical and non-critical race. [3]
   i) Define Register Transfer Language. [2]
   j) Differentiate PLA and PAL. [3]

PART-B
(50 Marks)

2.a) What are the various logic gates, give the representation along with the truth table.
   b) What is the use of complements? Perform subtraction using 7's complement for the given Base-7 numbers (565)-(666). [5+5]

OR

3.a) Convert the following to the corresponding bases
   i) $(9BCD)_{16} = ($ $)_8$
   ii) $(323)_4 = ($ $)_5$
   b) Given the 8 bit data word 11011011, generate the 12 bit composite word for the Hamming code that corrects and detects single errors. [5+5]

4.a) Derive the product of maxterms for $f(a,b,c,d)=a.b.c+ b'.d+c.d'$.
   b) Derive and Implement Exclusive OR function involving three variables using only NAND function. [5+5]

OR

5.a) Obtain the simplified expression in SOP form of
   $F(a,b,c,d,e)=\sum(1,2,4,7,12,14,15,24,27,29,30,31)$ using K-maps.
   b) Implement the function $f(a,b,c)=\pi(0,1,3,4)$ using NAND-NAND two level gate structure. [5+5]

6.a) Implement and odd parity generator for 3-bit using a decoder.
  b) Design a circuit for 2-bit binary multiplier.   [5+5]

OR

7.a) Define a multiplexer? Draw a 4:1 multiplexer for the function
      $f(a,b,c,d)=\sum(0, 4,5,10,11,12,15)$
  b) Design a full binary adder with two half adders and a OR gate.   [5+5]

8.a) Explain about a NOR Latch in detail, with a neat diagram.
  b) Design a 3-bit counter using T flip flops.   [5+5]

OR

9.   Define essential hazard? Implement SR Latch by avoiding Hazard Neatly draw
     the diagram of SR latch before hazard and after Hazard elimination.   [10]

10. Explain about RAM in detail.   [10]

OR

11. What is a micro operation? List and explain its categories with relevant examples.
                                                                                       [10]

---oo0oo---

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
SIGNALS AND STOCHASTIC PROCESS
(Electronics and Communication Engineering)

Time: 3 Hours　　　　　　　　　　　　　　　　　　　**Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
　　　　　　　　　　　　　　　　　　　　　　　　　　　　(25 Marks)

1.a) Write about unit step function and unit impulse function.　　　　[2]
　b) Define signal bandwidth and system bandwidth.　　　　[3]
　c) Determine the complex exponential Fourier series representation for
$x(t) = \cos\left(2t + \frac{\pi}{4}\right)$.　　　　[2]
　d) Find the Fourier transform of $x(t) = e^{j\omega_0 t}$.　　　　[3]
　e) Find the Laplace transform of $x(t) = -e^{at} u(-t)$.　　　　[2]
　f) Write the differences between the continuous-time signal $e^{j\omega_0 t}$ and the discrete-time signal $e^{j\omega_0 n}$.　　　　[3]
　g) Explain about second order stationary process.　　　　[2]
　h) Explain about Cross- Covariance function.　　　　[3]
　i) Define Cross-Power Spectrum function.　　　　[2]
　j) Find auto correlation function for $S_{XX}(\omega) = \frac{8}{(9+\omega^2)^2}$.　　　　[3]

PART-B
　　　　　　　　　　　　　　　　　　　　　　　　　　　　(50 Marks)

2.a) Define orthogonal signal space and orthogonal vector space. Bring out clearly its applications in representing a signal and vector respectively.
　b) Explain how functions can be approximated using orthogonal functions.　　　[5+5]
OR
3.a) Derive the relationship between rise time and bandwidth.
　b) State and Prove the Convolution property of Fourier transform.　　　[5+5]

4.a) Expand following function f(t) by trigonometric Fourier series over the interval (0,1). In this interval f(t) is expressed as f(t) = At
　b) State and prove multiplication property of continuous time Fourier series.　　　[5+5]
OR
5.a) Find the Fourier transform of symmetrical gate pulse and sketch the spectrum.
　b) State and prove sampling theorem for band limited signals using analytical approach.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　[5+5]

6.a) State and prove the properties of ROC of Laplace transform.
　b) Find the inverse Laplace transform of $X(s) = \frac{5s+13}{s(s^2+4s+13)}$, $Re(s) > 0$.　　　[5+5]
OR
7.a) Find X(z) and sketch the zero-pole plot and the ROC for a < 1 and a > 1 for the signal $x[n] = a^{|n|}$.
　b) Determine the inverse Z transform of $X(z) = \log\left(\frac{1}{1-az^{-1}}\right)$; ROC $|z| > |a|$.　　　[5+5]

8.a) Explain briefly about Gaussian and Poisson Random Process.
  b) Show that the random process $X(t) = A\cos(\omega_0 t + \theta)$ is wide-sense stationary if it is assumed that A and ω_0 are constants and θ is a uniformly density random variable over the interval $(0, 2\pi)$. [5+5]

OR

9.a) Explain about Auto-correlation function with their properties.
  b) Show that mean square value of output response is independent of time t. [5+5]

10. Explain about cross power spectrum density and its properties with proofs. [10]

OR

11. Derive the relationship between cross-power spectrum and cross correlation function. [10]

---oo0oo---

Code No: 133AM

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL MACHINES – I
(Electrical and Electronics Engineering)

Time: 3 Hours
Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) How does field distortion affect commutation? [2]
 b) Mention the causes for failure of dc shunt generator to excite. [3]
 c) What do you mean by stalling current in DC Motor? [2]
 d) What are the functions of no-voltage release coil and over load release coil in dc motor starter? [3]
 e) Mention the factors on which hysteresis loss depends. [2]
 f) What are the advantages and disadvantages of Swinburne's Test? [3]
 g) Why transformer rating is expressed in terms of kVA? [2]
 h) What is the difference between cylindrical-type and sandwich-type winding? [3]
 i) What are the advantages of Sumpner's test over OC and SC tests? [2]
 j) What are the necessary conditions required for parallel operation of single phase transformer? [3]

PART-B
(50 Marks)

2.a) Discuss in detail, the load characteristics of DC Series and Shunt generators.
 b) A 440 V, 4-pole, 25 kW, dc generator has a wave-connected armature winding with 846 conductors. The mean flux density in the air-gap under the interpoles is 0.5 Wb/m^2 on full load and the radial gap length is 0.3 cm. Calculate the number of turns required on each interpole. [5+5]

OR

3.a) Explain about demagnetizing AT/pole and cross magnetizing AT/pole.
 b) Briefly explain the function of compensating winding in DC machine. [5+5]

4.a) Derive the torque equation of a DC Motor.
 b) A 250V shunt motor runs at 1000 rpm at no load and takes 8A. The total armature and shunt field resistances are 0.2 and 250 ohms respectively. Calculate the speed when loaded and taking 50A. Assume the flux to be constant. [5+5]

OR

5.a) Derive the condition for maximum efficiency in DC machines.
 b) The iron losses in a dc machine, when driven at normal speed and at normal excitation are 8KW. When driven at half speed and same excitation the losses are reduced to 3 KW. Determine the values of eddy current and hysteresis losses at (i) half speed and (ii) full speed. [5+5]

6.a) Describe the brake test on DC motor to determine the performance characteristics of DC motor.

  b) A 440V DC Shunt motor takes 4A at no load. Its armature and field resistances are 0.4Ω and 220Ω respectively. Estimate the kW output and efficiency when the motor takes 60A on full load. [5+5]

OR

7. With a neat sketch, explain the procedure of Hopkinson's Test? Mention its advantages and disadvantages. [10]

8.a) From the fundamentals, develop the exact equivalent circuit of a Transformer.

  b) A single phase 50Hz transformer has 100 turns on the primary and 400 turns on the secondary winding. The net cross sectional area of core is 250cm^2. If the primary winding is connected to a 230V 50Hz supply, determine:
  i) The EMF induced in the secondary winding
  ii) The maximum value of flux density in the core. [5+5]

OR

9.a) Define efficiency and regulation of a transformer. Show how the power factor affects both of them.

  b) The voltage per turn of a single phase transformer is 1.1V. When the primary winding is connected to a 220V, 50Hz A.C supply, the secondary voltage is found to be 550V. Find:
  i) Primary and Secondary turns
  ii) Core area if the maximum flux density is 1.1 wb/m^2. [5+5]

10. Mention the different tests that are conducted on Transformer? Explain the procedure for conducting Sumpner's test along with all precautions to be taken while conducting the test with neat diagram. [10]

OR

11.a) Explain the effect of third harmonics in phase voltages of three phase transformers.

  b) A 3phase transformer bank consisting of three 1-phase transformers is used to step-down the voltage of a 3-phase, 6600V transmission line. If primary line-current is 10Amp, calculate the secondary line voltage, line current and output KVA for the following connections. i. Y/ Δ and ii. Δ/Y. The turn's ratio is 12. Neglect losses. [5+5]

---ooOoo---

Code No: 123BY

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, November/December - 2017
ELECTROMAGNETIC FIELDS
(Electrical and Electronics Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)	What are the properties of potential function?	[2]
b)	What are the limitations of Coulomb's law?	[3]
c)	Define dipole and dipole moment.	[2]
d)	What is the capacitance of a parallel plate capacitor when the stored energy is 5 μJ and the voltage across the plates is 5 V?	[3]
e)	What are the limitations of Ampere's circuital law?	[2]
f)	State Biot-Savart's law.	[3]
g)	What is the significance of Lorentz force equation in magnetic fields?	[2]
h)	A solenoid with air core has 2000 turns and a length of 500 mm. Core radius is 40 mm. Find its inductance.	[3]
i)	Write the Maxwell's equations in integral form for time varying fields.	[2]
j)	What is meant by statically induced e.m.f?	[3]

PART-B

(50 Marks)

2.a) Derive the expression for electric field intensity due to line charge.
  b) Four concentrated charges $Q_1 = 0.3$ μC, $Q_2 = 0.2$ μC, $Q_3 = -0.3$ μC, $Q_4 = 0.2$ μC are located at the vertices of a plane rectangle. The length of rectangle is 5 cm and breadth of the rectangle is 2 cm. Find the magnitude and direction of resultant force on Q_1.   [5+5]

OR

3.a) Explain the Laplace and Poisson's equations for electrostatic fields.
  b) Using Gauss law, derive an expression for electric field intensity at any point inside and outside of a sphere of radius 'a' due to a uniform spherical charge distribution of volume charge density of 'ρ'.   [5+5]

4.a) Derive the expression for energy stored and energy density in static electric field.
  b) A parallel plate capacitor consists of two square metal plates of side 500 mm and separated by a 10 mm slab of Teflon with $\epsilon_r = 2$ and 6 mm thickness is placed on the lower plate leaving an air gap of 4mm thick between it and upper plate. If 100 V is applied across the capacitor, find D, in Teflon and air.   [5+5]

OR

5.a) State and prove the conditions on the tangential and normal components of electric flux density and electric field intensity, at the boundary between the dielectrics.

b) A square parallel plate capacitor 200 mm on side with a plate spacing of 25 mm is filled with a dielectric slap (ε_r =240 of the same dimensions if 100 V is applied to the capacitor) Find: (i) the polarization P in the dielectric and (ii) the energy stored by the capacitor. [5+5]

6.a) State Biot-Savart's law for magnetic field B due to a steady line current in free space.

b) Derive an expression for magnetic field intensity due to infinite sheet of current. [5+5]

OR

7.a) A steady current of 10 A is established in a long straight hollow aluminum conductor having inner and outer radius of 1.5 cm and 3 cm respectively. Find the value of B as function of radius.

b) Derive an expression for the magnetic field strength at the center of a square loop of side 'a' meters and N turns. [5+5]

8.a) Derive point form of Ampere's circuital law.

b) Two infinitely long parallel conductors are separated by a distance 'd'. Find the force per unit length exerted by one of the conductor on the other if the currents in the two conductors are I_1 and I_2. [5+5]

OR

9.a) Derive the expression for inductance of a solenoid.

b) A single-phase circuit comprises two parallel conductors A and B, each 1 cm diameter and spaced 1 meter apart. The conductors carry currents of +100 and -100 amperes respectively. Determine the magnetic field intensity at the surface of each conductor and also exactly midway between A and B. [5+5]

10.a) A conductor with cross sectional area of 10 cm^2 carries a conduction current of 0.2 sin(109t) mA. Given that σ = 2.5 × 10^6 S/m and ε_r = 6, calculate the magnitude of the displacement current density.

b) Derive the Maxwell's equations in point and integral form for time varying fields. [5+5]

OR

11.a) Explain the concept of displacement current and obtain an expression for the displacement current density.

b) Derive Maxwell's fourth equation, $\nabla \times E = -\dfrac{\partial \vec{B}}{\partial t}$. [5+5]

---ooOoo---

Code No: 123AF

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ENVIRONMENTAL STUDIES
(Common to ME, AE, MIE)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a)	What is an ecosystem?	[2]
b)	What are the alternative sources of energy?	[3]
c)	What is biodiversity?	[2]
d)	What is the purpose of Kyoto protocol?	[3]
e)	Define ecological foot print.	[2]
f)	What do you mean by biomagnifications?	[3]
g)	What are the problems associated with mining?	[2]
h)	How does the biodiversity contribute to the ecosystem services?	[3]
i)	Give the health impacts of noise pollution.	[2]
j)	What are EIA and EMP?	[3]

PART-B
(50 Marks)

2.a)	Write about the differences between a food chain and a food web.	
b)	How does energy flow in an ecosystem?	[5+5]

OR

3.a)	How do nutrients move through the biotic and abiotic parts of an ecosystem?	
b)	What happens to a population that exceeds the ecosystem's carrying capacity?	[5+5]

4.a)	What are the causes for floods and droughts?	
b)	What are the limitations of dams?	[5+5]

OR

5.a)	What are the reasons for deforestation?	
b)	What is the present status of fossil fuels?	[5+5]

6.a)	How does biodiversity influence the climate?	
b)	Discuss the relationship between biodiversity and sustainability.	[5+5]

OR

7.a)	How does biodiversity improve food security?	
b)	How can biodiversity be conserved?	[5+5]

8.a)	What are the secondary air pollutants and how are they formed?	
b)	What are modern agricultural practices that cause soil pollution?	[5+5]

OR

9.a)	Discuss about particulate pollution control technology.	
b)	Give the characteristics of e waste.	[5+5]

10.a) Write about the differences between a sanitary land fill and a secured land fill.
   b) Write down salient features of the forest Act.   [5+5]

OR

11.a) Give the salient features of hazardous waste management rules.
   b) How can we segregate biomedical waste?   [5+5]

---ooOoo---

Code No: 123BU

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
SWITCHING THEORY AND LOGIC DESIGN
(Common to ECE, EIE, ETM)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)	What is Gray code?	[2]
b)	How do you obtain dual of an expression?	[3]
c)	What are don't cares?	[2]
d)	What is minterm?	[3]
e)	Compare combinational and sequential circuits.	[2]
f)	Explain about binary cell.	[3]
g)	What are the basic types of shift registers?	[2]
h)	Compare asynchronous and synchronous counters.	[3]
i)	Explain capabilities of finite state machine.	[2]
j)	Explain concept of minimal cover table.	[3]

PART-B

(50 Marks)

2.a) Solve for x:
(i) $(367)_8 = (x)_2$ (ii) $(378.93)_{10} = (x)_8$ (iii) $(B9F.AE)_{16} = (x)_8$ (iv) $(16)_{10} = (100)_x$

b) Convert $(163.875)_{10}$ to binary, octal, hexadecimal.   [5+5]

OR

3.a) Obtain dual of the following Boolean expressions:
(i) AB+A(B+C)+B'(B+D) (ii) A+B+A'B'C.

b) Obtain the compliment of the following Boolean expressions:
(i) A'B+A'BC'+A'BCD+A'BC'D'E. (ii) ABEF+ABE'F'+A'B'EF.   [5+5]

4.a) Minimize the following expression using K-map and realize using NAND Gates.
$F(A,B,C,D) = \sum m(0,1,2,9,11) + d(8,10,14,15)$.

b) Minimize the following expression using K-map and realize using NOR gates.
$f = \prod M(0,4,6,7,8,12,13,14,15)$ [5+5]

OR

5.a) Explain the differences between a MUX and a DEMUX. Realize 16-input
multiplexer by cascading of two 8-input multiplexers 74151.

b) Realize the function $f(A,B,C,D) = \prod(1,4,6,10,14) + d(0,8,11,15)$ using
(i) 16:1 MUX (ii) 8:1 MUX.   [5+5]

6.a) What is meant by 'edge triggered'? Differentiate SR-FF and JK-FF with their functional operation and excitation tables.

   b) Draw and explain the circuit diagram of positive edge triggered J-K flip-flop using NOR gates with its truth table. How race around conditions are eliminated? [5+5]

OR

7. Explain in detail about timing and triggering considerations sequential circuits. [10]

8.a) Discuss about synchronous and ripple counters. Compare their merits and demerits.

   b) What do you mean by universal shift register? Draw and explain its circuit diagram and operation. [5+5]

OR

9.a) What is a shift register? Explain about the following modes of operations in a four bit shift register (i) shift right (ii) shift left (iii) bidirectional.

   b) Explain the differences between ring and Johnson counters. Design and explain the operation of a decade Johnson counter. [5+5]

10.a) What are the Moore and Melay machines? Compare them.

   b) Explain the procedure for state minimization using the partition technique with example. [5+5]

OR

11.a) Name the elements of an ASM chart and define each one of them.

   b) Explain the control subsystem implementation of weighing machine. [5+5]

---ooOoo---

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
DIGITAL LOGIC DESIGN
(Computer Science and Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Convert the hexadecimal member 68BE to binary and then from binary to octal number.
[2]
b) Write about error detecting and error minimizing codes with examples. [3]
c) Define pair, quad and octet with examples in K – maps. [2]
d) Explain SOP and POS of Boolean functions. [3]
e) Write the logic diagram and truth table of a Full – adder. [2]
f) What is an encoder? Write the truth table of a parity encoder. [3]
g) What are sequential circuits? Give some examples. [2]
h) Explain the working of a 4 – bit ripple counter with help of truth table. [3]
i) List various types of semiconductor memories and write their uses. [2]
j) What are programmable logic arrays? What are their applications? [3]

PART-B
(50 Marks)

2.a) Explain various number systems used in digital logic design with examples and their representation with examples.
b) Simplify the following Boolean functions to a minimum number of literals

(i) $(x+y)(x+y')$ (ii) $xy+x'z+yz$ [5+5]

OR

3.a) Explain about signed binary number and Floating point representation of number system with examples and discuss their advantages.
b) Express the Boolean function $F = A + B'C$ in a sum of Minterms and write its truth table.
[5+5]

4.a) Explain the design procedure for 4 – variable K – map and discuss its simplification methods using prime implicants methods.
b) Simplify the Boolean function using K - map method. [5+5]
F (A, B, C,D) = $\sum$ (0,1,2,4,5,6,8,9,12,13,14)

OR

5.a) Implement the following Boolean function with NAND gates after simplification
F (A,B,C) = (1,2,3,4,5,7)
b) Simplify the following Boolean function in sum of products and product of sums
F (A,B,C,D) = $\sum$(0,1,2,5,8,9,10) [5+5]

6.a) Design a combinational circuit hat converts a 4-bit Gray code to a 4bit binary number Implement the circuit with XOR gates.

b) Design a BCD to decimal decoder using the unused combinations of the BCD code as don't care conditions.   [5+5]

OR

7.a) Explain the design procedure for constructing BCD adder – subtractor circuit using BCD adder and 9's complementer block diagrams.

b) Construct a 4 to 16 line decoder with five 2 – to -4 – line decoder with enable.   [5+5]

8.a) Explain the state equation, state table and state diagrams of sequential circuit with block diagram.

b) Draw the block diagram of a 4 bit synchronous Binary counter using J-K Flip-slops.
                                                                                             [5+5]

OR

9.a) Explain the analysis of clocked sequential circuit using T Flip Flops with help of circuit diagram, state diagram and state table.

b) Draw the block diagram of a 4 bit universal shift Register and explain its working with its function table.   [5+5]

10.a) Explain about memory decoding and address multiplexing in memories with the help of neat diagrams.

b) Draw the logic diagram of a Programmable Logic Array with 3 inputs, 4 product terms and 2 outputs.   [5+5]

OR

11.a) Discuss various types of sequential programmable devices with block diagrams.

b) Tabulate the PLA programming table for the following Boolean functions and minimize the number of product terms.   [5+5]

$$A(x,y,z) = \sum(1,2,4,6)$$
$$B(x,y,z) = \sum(0,1,6,7)$$
$$C(x,y,z) = \sum(2,6)$$
$$D(x,y,z) = \sum(1,2,3,5,7)$$

---ooOoo---

Code No: 113BY

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, November/December - 2017
ELECTROMAGNETIC FIELDS
(Electrical and Electronics Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a)	What are the properties of potential function?	[2]
b)	What are the limitations of Coulomb's law?	[3]
c)	Define dipole and dipole moment.	[2]
d)	What is the capacitance of a parallel plate capacitor when the stored energy is 5 µJ and the voltage across the plates is 5 V?	[3]
e)	What are the limitations of Ampere's circuital law?	[2]
f)	State Biot-Savart's law.	[3]
g)	What is the significance of Lorentz force equation in magnetic fields?	[2]
h)	A solenoid with air core has 2000 turns and a length of 500 mm. Core radius is 40 mm. Find its inductance.	[3]
i)	Write the Maxwell's equations in integral form for time varying fields.	[2]
j)	What is meant by statically induced e.m.f?	[3]

PART-B
(50 Marks)

2.a)   Derive the expression for electric field intensity due to line charge.
 b)   Four concentrated charges $Q_1 = 0.3$ µC, $Q_2 = 0.2$ µC, $Q_3 = -0.3$ µC, $Q_4 = 0.2$ µC are located at the vertices of a plane rectangle. The length of rectangle is 5 cm and breadth of the rectangle is 2 cm. Find the magnitude and direction of resultant force on Q_1.   [5+5]

OR

3.a)   Explain the Laplace and Poisson's equations for electrostatic fields.
 b)   Using Gauss law, derive an expression for electric field intensity at any point inside and outside of a sphere of radius 'a' due to a uniform spherical charge distribution of volume charge density of 'ρ'.   [5+5]

4.a)   Derive the expression for energy stored and energy density in static electric field.
 b)   A parallel plate capacitor consists of two square metal plates of side 500 mm and separated by a 10 mm slab of Teflon with $\epsilon_r = 2$ and 6 mm thickness is placed on the lower plate leaving an air gap of 4mm thick between it and upper plate. If 100 V is applied across the capacitor, find D, in Teflon and air.   [5+5]

OR

5.a) State and prove the conditions on the tangential and normal components of electric flux density and electric field intensity, at the boundary between the dielectrics.

b) A square parallel plate capacitor 200 mm on side with a plate spacing of 25 mm is filled with a dielectric slap (ε_r =240 of the same dimensions if 100 V is applied to the capacitor) Find: (i) the polarization P in the dielectric and (ii) the energy stored by the capacitor. [5+5]

6.a) State Biot-Savart's law for magnetic field B due to a steady line current in free space.

b) Derive an expression for magnetic field intensity due to infinite sheet of current. [5+5]

OR

7.a) A steady current of 10 A is established in a long straight hollow aluminum conductor having inner and outer radius of 1.5 cm and 3 cm respectively. Find the value of B as function of radius.

b) Derive an expression for the magnetic field strength at the center of a square loop of side 'a' meters and N turns. [5+5]

8.a) Derive point form of Ampere's circuital law.

b) Two infinitely long parallel conductors are separated by a distance 'd'. Find the force per unit length exerted by one of the conductor on the other if the currents in the two conductors are I_1 and I_2. [5+5]

OR

9.a) Derive the expression for inductance of a solenoid.

b) A single-phase circuit comprises two parallel conductors A and B, each 1 cm diameter and spaced 1 meter apart. The conductors carry currents of +100 and -100 amperes respectively. Determine the magnetic field intensity at the surface of each conductor and also exactly midway between A and B. [5+5]

10.a) A conductor with cross sectional area of 10 cm^2 carries a conduction current of 0.2 sin(109t) mA. Given that $\sigma = 2.5 \times 10^6$ S/m and $\varepsilon_r = 6$, calculate the magnitude of the displacement current density.

b) Derive the Maxwell's equations in point and integral form for time varying fields. [5+5]

OR

11.a) Explain the concept of displacement current and obtain an expression for the displacement current density.

b) Derive Maxwell's fourth equation, $\nabla \times E = -\dfrac{\partial \vec{B}}{\partial t}$. [5+5]

---ooOoo---

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
DIGITAL LOGIC DESIGN
(Computer Science and Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Convert the hexadecimal member 68BE to binary and then from binary to octal number. [2]
  b) Write about error detecting and error minimizing codes with examples. [3]
  c) Define pair, quad and octet with examples in K – maps. [2]
  d) Explain SOP and POS of Boolean functions. [3]
  e) Write the logic diagram and truth table of a Full – adder. [2]
  f) What is an encoder? Write the truth table of a parity encoder. [3]
  g) What are sequential circuits? Give some examples. [2]
  h) Explain the working of a 4 – bit ripple counter with help of truth table. [3]
  i) List various types of semiconductor memories and write their uses. [2]
  j) What are programmable logic arrays? What are their applications? [3]

PART-B
(50 Marks)

2.a) Explain various number systems used in digital logic design with examples and their representation with examples.
  b) Simplify the following Boolean functions to a minimum number of literals
  (i) $(x + y)(x + y')$ (ii) $xy + x'z + yz$ [5+5]

OR

3.a) Explain about signed binary number and Floating point representation of number system with examples and discuss their advantages.
  b) Express the Boolean function $F = A + B'C$ in a sum of Minterms and write its truth table. [5+5]

4.a) Explain the design procedure for 4 – variable K – map and discuss its simplification methods using prime implicants methods.
  b) Simplify the Boolean function using K- map method. [5+5]
  $F (A, B, C,D) = \sum (0,1,2,4,5,6,8,9,12,13,14)$

OR

5.a) Implement the following Boolean function with NAND gates after simplification
  $F (A,B,C) = (1,2,3,4,5,7)$
  b) Simplify the following Boolean function in sum of products and product of sums
  $F (A,B,C,D) = \sum(0,1,2,5,8,9,10)$ [5+5]

6.a) Design a combinational circuit hat converts a 4-bit Gray code to a 4bit binary number Implement the circuit with XOR gates.

b) Design a BCD to decimal decoder using the unused combinations of the BCD code as don't care conditions. [5+5]

OR

7.a) Explain the design procedure for constructing BCD adder – subtractor circuit using BCD adder and 9's complementer block diagrams.

b) Construct a 4 to 16 line decoder with five 2 – to -4 – line decoder with enable. [5+5]

8.a) Explain the state equation, state table and state diagrams of sequential circuit with block diagram.

b) Draw the block diagram of a 4 bit synchronous Binary counter using J-K Flip-slops. [5+5]

OR

9.a) Explain the analysis of clocked sequential circuit using T Flip Flops with help of circuit diagram, state diagram and state table.

b) Draw the block diagram of a 4 bit universal shift Register and explain its working with its function table. [5+5]

10.a) Explain about memory decoding and address multiplexing in memories with the help of neat diagrams.

b) Draw the logic diagram of a Programmable Logic Array with 3 inputs, 4 product terms and 2 outputs. [5+5]

OR

11.a) Discuss various types of sequential programmable devices with block diagrams.

b) Tabulate the PLA programming table for the following Boolean functions and minimize the number of product terms. [5+5]

$$A(x,y,z) = \sum(1,2,4,6)$$
$$B(x,y,z) = \sum(0,1,6,7)$$
$$C(x,y,z) = \sum(2,6)$$
$$D(x,y,z) = \sum(1,2,3,5,7)$$

---ooOoo---

Code No: 113BU

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
SWITCHING THEORY AND LOGIC DESIGN
(Common to ECE, EIE)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)	What is Gray code?	[2]
b)	How do you obtain dual of an expression?	[3]
c)	What are don't cares?	[2]
d)	What is minterm?	[3]
e)	Compare combinational and sequential circuits.	[2]
f)	Explain about binary cell.	[3]
g)	What are the basic types of shift registers?	[2]
h)	Compare asynchronous and synchronous counters.	[3]
i)	Explain capabilities of finite state machine.	[2]
j)	Explain concept of minimal cover table.	[3]

PART-B

(50 Marks)

2.a) Solve for x:
(i) $(367)_8=(x)_2$ (ii) $(378.93)_{10} = (x)_8$ (iii) $(B9F.AE)_{16} = (x)_8$ (iv) $(16)_{10} = (100)_x$

b) Convert $(163.875)_{10}$ to binary, octal, hexadecimal. [5+5]

OR

3.a) Obtain dual of the following Boolean expressions:
(i) AB+A(B+C)+B'(B+D) (ii) A+B+A'B'C.

b) Obtain the compliment of the following Boolean expressions:
(i) A'B+A'BC'+A'BCD+A'BC'D'E. (ii) ABEF+ABE'F'+A'B'EF. [5+5]

4.a) Minimize the following expression using K-map and realize using NAND Gates.
$F (A,B,C,D) = \sum m (0,1,2,9,11) +d(8,10,14,15)$.

b) Minimize the following expression using K-map and realize using NOR gates.
$f = \prod M(0,4,6,7,8,12,13,14,15)$ [5+5]

OR

5.a) Explain the differences between a MUX and a DEMUX. Realize 16-input multiplexer by cascading of two 8-input multiplexers 74151.

b) Realize the function $f(A,B,C,D) = \prod(1,4,6,10,14) + d (0,8,11,15)$ using
(i) 16:1 MUX (ii) 8:1 MUX. [5+5]

6.a) What is meant by 'edge triggered'? Differentiate SR-FF and JK-FF with their functional operation and excitation tables.
  b) Draw and explain the circuit diagram of positive edge triggered J-K flip-flop using NOR gates with its truth table. How race around conditions are eliminated? [5+5]

OR

7. Explain in detail about timing and triggering considerations sequential circuits. [10]

8.a) Discuss about synchronous and ripple counters. Compare their merits and demerits.
  b) What do you mean by universal shift register? Draw and explain its circuit diagram and operation. [5+5]

OR

9.a) What is a shift register? Explain about the following modes of operations in a four bit shift register (i) shift right (ii) shift left (iii) bidirectional.
  b) Explain the differences between ring and Johnson counters. Design and explain the operation of a decade Johnson counter. [5+5]

10.a) What are the Moore and Melay machines? Compare them.
  b) Explain the procedure for state minimization using the partition technique with example. [5+5]

OR

11.a) Name the elements of an ASM chart and define each one of them.
  b) Explain the control subsystem implementation of weighing machine. [5+5]

---ooOoo---

Code No: 113AF

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ENVIRONMENTAL STUDIES
(Common to ME, AE, MIE, AGE, MSNT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)	What is an ecosystem?	[2]
b)	What are the alternative sources of energy?	[3]
c)	What is biodiversity?	[2]
d)	What is the purpose of Kyoto protocol?	[3]
e)	Define ecological foot print.	[2]
f)	What do you mean by biomagnifications?	[3]
g)	What are the problems associated with mining?	[2]
h)	How does the biodiversity contribute to the ecosystem services?	[3]
i)	Give the health impacts of noise pollution.	[2]
j)	What are EIA and EMP?	[3]

PART-B

(50 Marks)

2.a)	Write about the differences between a food chain and a food web.	
b)	How does energy flow in an ecosystem?	[5+5]

OR

3.a)	How do nutrients move through the biotic and abiotic parts of an ecosystem?	
b)	What happens to a population that exceeds the ecosystem's carrying capacity?	[5+5]

4.a)	What are the causes for floods and droughts?	
b)	What are the limitations of dams?	[5+5]

OR

5.a)	What are the reasons for deforestation?	
b)	What is the present status of fossil fuels?	[5+5]

6.a)	How does biodiversity influence the climate?	
b)	Discuss the relationship between biodiversity and sustainability.	[5+5]

OR

7.a)	How does biodiversity improve food security?	
b)	How can biodiversity be conserved?	[5+5]

8.a)	What are the secondary air pollutants and how are they formed?	
b)	What are modern agricultural practices that cause soil pollution?	[5+5]

OR

9.a)	Discuss about particulate pollution control technology.	
b)	Give the characteristics of e waste.	[5+5]

10.a) Write about the differences between a sanitary land fill and a secured land fill.
  b) Write down salient features of the forest Act.   [5+5]

OR

11.a) Give the salient features of hazardous waste management rules.
  b) How can we segregate biomedical waste?   [5+5]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
DATA STRUCTURES THROUGH C++
(Common to CSE, IT)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) Explain various parameter passing methods in C++.
 b) What is constructor? Explain any two types of constructors in C++ with examples.   [7+8]

2.a) Explain static polymorphism and how it is achieved.
 b) Explain in detail multiple inheritance mechanism in C++ with an example program.   [7+8]

3.a) Explain with an example how to implement two stacks in one array A[1 ... n] in such a way that neither stack overflows unless the total number of elements in both stacks together is n. Write functions for push (insert) and pop (remove) operations of stack.
 b) Give formal definitions of big-oh, big-theta notations. Explain with an example for each.   [10+5]

4.a) What is hash function? Explain different hash functions with example.
 b) Analyze input (371, 325, 163, 199, 344, 679, 989, 534, 448, 355) and the hash function is h(x) = x mod 10. Show the result using quadratic probing and double hashing $h_2(x) = 7 - (x \bmod 7)$.   [7+8]

5.a) Given an array of 6 elements: [15, 19, 10, 7, 17, 16], sort in ascending order using heap sort.
 b) Define priority queue. Write the ADT for priority queue.   [10+5]

6.a) Construct an AVL tree by considering the keys in order: 10, 20, 30, 35, 40, 32, 15, 6 and 8. Show the structure of tree before and after inserting each key.
 b) Write algorithm for deleting an element from a binary search tree.   [8+7]

7.a) Explain Depth First Search method with example.
 b) Construct a B-tree of order 3 by considering the keys : 5, 3, 21, 9, 1, 13, 2, 7, 10, 12, 4 and 8. Show the structure of the tree before and after inserting each key.
                                                                               [7+8]

8.a) What is a trie data structure? Explain with an example searching a trie for an element with a given key.
  b) Construct a trie for the following data.   [7+8]

Name	Social Security Number(SSN)
Jack	951-94-1654
Jill	562-44-2169
Bill	271-16-3624
Kathy	278-49-1515
April	951-23-7625

---ooOoo---

Code No: 53011

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTROMAGNETIC FIELDS
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) Define Electric Potential and work done. Derive the expression for work done in moving a point charge in an electrostatic field.
  b) Calculate Electric field 'E' at a point P(6, -8, 4) in free space caused by
   i) a charge $Q_1 = 4$ μC at $N_1(0, 0, 0)$
   ii) a charge $Q_2 = 6$ μC at $N_1(-1, 2, 3)$
   iii) both the Q_1, Q_2 charges present. All distances in meters.   [7+8]

2.a) Derive the expression for Electric Field Intensity due to an Electric Dipole.
  b) What are conductors and Insulators? Give examples and explain the behavior of conductors under the influence of an Electric Field.   [7+8]

3.a) What is Polarization? And how Polarization takes place in an Dielectric?
  b) Three point charges 6, 7, 8 coulombs are situated in free space at three corners of an equilateral triangle with sides 8 cm. Find the Energy density due to Electric Field in the Triangle.   [7+8]

4.a) Obtain the expression for MFI due to Circular current carrying wire by applying Biot-Savort's law.
  b) Derive the expression for Maxwell's Second Equation.   [8+7]

5.a) Obtain the expression for MFI due to a infinite sheet of current using ACL?
  b) Derive Lorentz force equation. Specify its application.   [8+7]

6.a) With necessary equations and diagram explain about Magnetic Dipole and Magnetic Dipole moment.
  b) Derive the expression for Torque on a current loop placed in Magnetic Field.   [8+7]

7.a) What are the properties of Vector Magnetic Potential?
  b) Obtain the expression for self-inductance of a toroidal.   [7+8]

8.a) State and explain Faraday's laws of electromagnetic induction in Point form.
  b) What is Displacement current also derive the expression for displacement current.   [7+8]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ENVIRONMENTAL STUDIES
(Common to ME, ECE, AE, MIE)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) With a neat sketch explain how the energy flows in an ecosystem.
  b) Explain why certain pyramids are upright while others are inverted? Give suitable examples.   [7+8]

2.a) Differentiate between renewable and non-renewable resources with suitable examples.
  b) Distinguish between positive and negative environmental impacts of construction of dams. Name the person who termed dams as "Temples of modern India"?
                                                                      [7+8]

3.a) Define biodiversity? What are the levels of biodiversity? Give suitable examples.
  b) India is a mega diversity nation. Justify.   [8+7]

4.a) What is air pollution? Explain how green belt and plantation in industrial areas helps in controlling air pollution?
  b) What is thermal pollution? Explain in detail about the effects of thermal pollution and suggest remedial measures to control it.   [7+8]

5.a) Define desertification and mentions its causes? What are the negative impacts of desertification on the ecosystem?
  b) Discuss the importance of ozone layer. Mention the sources leading to ozone depletion; Explain the possible consequences of depletion of ozone layer.
                                                                      [7+8]

6.a) Enumerate various techniques that are used for rain water harvesting and describe any one of them in detail.
  b) What is EIA? Explain how EIA can be useful as a planning tool for environmental protection in various developmental projects?   [7+8]

7.a) Write the salient features of Environmental Protection Act 1986.
  b) Explain the significance of environmental legislation in environmental protection.
                                                                      [7+8]

8.a) What do you mean by environmental ethics? Mention few environmental ethics which each one of us must follow to have harmony with nature.
  b) Write about "Man cannot command nature except by obeying it".   [7+8]

---ooOoo---

R07

Time: 3 hours   Max. Marks: 80

<div align="center">Answer any five questions
All questions carry equal marks
- - -</div>

1.a)   Prove that $\int_0^{\pi/2} \sqrt{cosx}\ dx \cdot \int_0^{\pi/2} \frac{1}{\sqrt{cosx}} dx = \pi$

    b)   Prove that $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} sinx$ [8+8]

2.a)   Find the conjugate harmonic function of the harmonic function $u = x^2 - y^2$

    b)   Show that the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin although Cauchy-Riemann equations are satisfied at the point.   [8+8]

3.a)   Find all roots of the equation i) $tanhz + 2 = 0$ ii) $sinz = i$

    b)   If $(x + iy)^{\frac{1}{3}} = a + ib$, then prove that $4(a^2 - b^2) = \frac{x}{a} + \frac{y}{b}$

    c)   Determine all the principal values of $\log(-9)$.   [8+4+4]

4.a)   Evaluate $\int_{(0,0)}^{(1,1)} [3x^2 + 5y + i(x^2 - y^2)]dz$ along $y^2 = x$.

    b)   State and prove Cauchy's Integral theorem.   [8+8]

5.a)   Find the Laurent series expansion of the function $\frac{z^2-1}{z^2+5z+6}$ about $z = 0$ in the region $2 < |z| < 3$.

    b)   Find Taylor's expansion for the function $f(z) = \frac{1}{(1+z)^2}$ with centre $-i$ [8+8]

6.   Show that $\int_0^{2\pi} \frac{d\theta}{a+bcos\theta} = \frac{2\pi}{\sqrt{a^2-b^2}}$.   [16]

7.a)   State and prove Rouche's theorem.

    b)   Apply Rouche's theorem to find number of zeros for the function $f(z) = z^4 - 5z + 1$ in the annulus region $1 < |z| < 2$ [8+8]

8.a)   Show that the transformation $w = z + \frac{1}{z}$ converts the radial lines $\theta =$ constant in the z-plane into a family of confocal hyperbolas in the w-plane.

    b)   Under the transformation $w = \frac{1}{z}$ find the image of the circle $|z - 2i| = 2$.   [8+8]

<div align="center">---ooOoo---</div>

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Pharmacy II Year I Semester Examinations, November-2017
PHARMACEUTICAL UNIT OPERATIONS- I

Time: 3hours   Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each
question carries 10 marks and may have a, b, c as sub questions.

PART- A   (25 Marks)

1.a) How Reynold's number is used to differentiate streamline and turbulent flow. [2]
  b) Define absolute humidity, humid heat and dew point.   [3]
  c) Write the advantages of rotary drum filter.   [2]
  d) Write the role of filter aids in filtration and give two examples.   [3]
  e) Write the causes for caking of crystals?   [2]
  f) Suggest suitable crystallizer for sodium chloride and write its principle. [3]
  g) What are azeotropes and give two examples.   [2]
  h) Write the principle of molecular distillation.   [3]
  i) Mention the causes for industrial dermatitis?   [2]
  j) Write about possible accidents due to mechanical hazards?   [3]

PART-B   (50 Marks)

2. Explain the working of gate valve, globe valve and diaphragm valve. [10]

OR

3. Define wet and dry bulb temperatures and explain humidity chart and its
    applications.   [10]

4. Discuss the factors influencing the filtration. Write about optimum cleaning cycle in
    batch filters.   [10]

OR

5. Explain the working of an industrial centrifuge.   [10]

6. Explain the working of Krystal crystallizer.   [10]

OR

7. Explain Mier's theory and its limitations.   [10]

8. Explain the construction of a fractionating column and its working in fractional
    distillation.   [10]

OR

9. Explain steam distillation and mention its advantages. Give two examples of
    products prepared by steam distillation.   [10]

10. Discuss the causes for electrical hazards in pharmaceutical industry and how they
    are to be prevented?   [10]

OR

11. Write about the following:
    a) Accident records
    b) Fire accidents   [5+5]

---ooOoo---

Code No: 223AA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Pharmacy II Year I Semester Examinations, November-2017
PHARMACEUTICAL UNIT OPERATIONS- I

Time: 3hours   Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A   (25 Marks)

1.a)   How Reynold's number is used to differentiate streamline and turbulent flow.
                                                                             [2]
  b)   Define absolute humidity, humid heat and dew point.   [3]
  c)   Write the advantages of rotary drum filter.   [2]
  d)   Write the role of filter aids in filtration and give two examples.   [3]
  e)   Write the causes for caking of crystals?   [2]
  f)   Suggest suitable crystallizer for sodium chloride and write its principle.   [3]
  g)   What are azeotropes and give two examples.   [2]
  h)   Write the principle of molecular distillation.   [3]
  i)   Mention the causes for industrial dermatitis?   [2]
  j)   Write about possible accidents due to mechanical hazards?   [3]

PART-B   (50 Marks)

2.   Explain the working of gate valve, globe valve and diaphragm valve.   [10]

OR

3.   Define wet and dry bulb temperatures and explain humidity chart and its applications.   [10]

4.   Discuss the factors influencing the filtration. Write about optimum cleaning cycle in batch filters.   [10]

OR

5.   Explain the working of an industrial centrifuge.   [10]

6.   Explain the working of Krystal crystallizer.   [10]

OR

7.   Explain Mier's theory and its limitations.   [10]

8.   Explain the construction of a fractionating column and its working in fractional distillation.   [10]

OR

9.   Explain steam distillation and mention its advantages. Give two examples of products prepared by steam distillation.   [10]

10. Discuss the causes for electrical hazards in pharmaceutical industry and how they are to be prevented?   [10]

OR

11. Write about the following:
     a) Accident records
     b) Fire accidents   [5+5]

---ooOoo---

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
KINEMATICS OF MACHINERY
(Common to ME, MSNT)

Time: 3 Hours
Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

Illustrate your answers with NEAT sketches wherever necessary.

PART- A
(25 Marks)

1.a) Distinguish between Rigid link, Flexible link, Fluid link, and Floating link. [2]

b) In a kinematic chain having five links, the links are joined to each other by turning pairs in such a way as to form a pentagon. Show that it is an unconstrained chain. [3]

c) If a link AB is rotating with uniform angular velocity, and the location of its instantaneous center of rotation is known, how do you find the velocity of any point on AB? Explain with the necessary geometric construction. [2]

d) In a single slider crank chain ABC, A is the fixed point, AB is the crank rotating with uniform angular velocity ω, BC is the connecting rod, and C is the slider. If a vertical drawn through 'A' intersects the line CB extended at 'D', then what are the velocities of the connecting rod and the slider? Give the answer by drawing a rough sketch of the mechanism. [3]

e) Write the main advantage and the main limitation of the Hart mechanism over the Peaucellier mechanism. [2]

f) Explain why two Hooke's joints are used to transmit motion from the engine to the differential of an automobile. [3]

g) Write the expressions for the maximum velocity and maximum acceleration of the follower during its outstroke when the follower is moving with i) SHM ii) Uniform acceleration and retardation. [2]

h) Write the basic differences between the tangent cam and a circular arc convex cam, both being operated by a roller follower. [3]

i) Explain briefly the concept of Interference in gears. [2]

j) Explain how you will determine the torques and the tooth loads in epicyclic gear train. [3]

PART-B
(50 Marks)

2.a) The distance between the axes of two parallel shafts of an Oldham coupling is 20 mm. The driving shaft rotates at 300 rpm. Calculate the maximum speed of sliding of the tongue of the intermediate piece along its groove.

b) What are the different Inversions of a Double Slider crank chain? Describe the working of the inversion (with a neat sketch) which can be used to convert rotary motion to reciprocating motion. [5+5]

OR

3.a) Explain the different types of constraints between Kinematic pairs, and give two examples for each.

b) A double slider mechanism is used to draw an ellipse with major axis equal to 20 cm and minor axis 15 cm. Set out the mechanism, and draw the locus of the points tracing the required ellipse. [5+5]

4. In a mechanism shown in Figure, the crank OA rotates clockwise at 200 rpm. The link lengths are: AB = 12 cm; BC = 48 cm; CD = 18 cm; DE = 36 cm; EF = 12 cm; FP = 36 cm. Find the velocities of the points C, E, and P, using the *Instantaneous center method.* (All dimensions are in cm). [10]
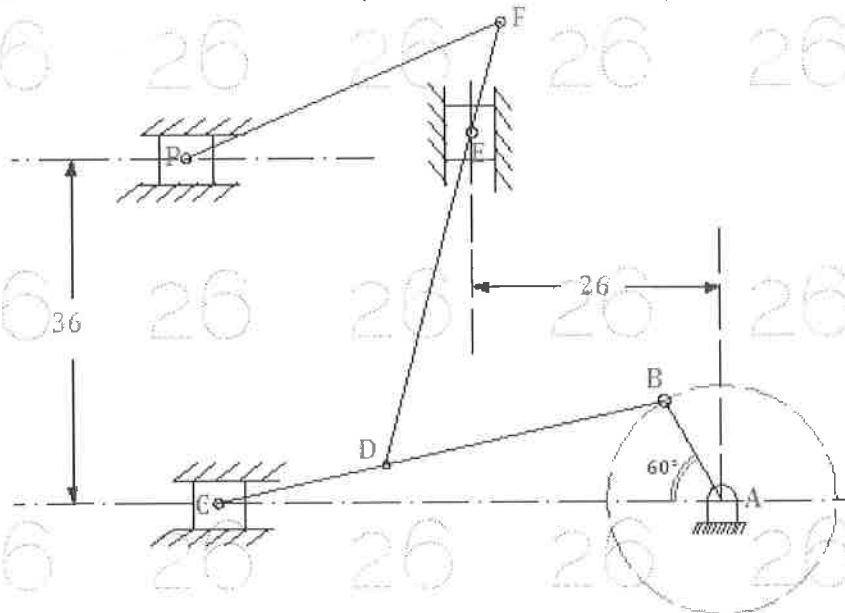
OR

5. If 'P' is a point on a link OR which is rotating about the fixed point 'O' with an angular velocity of ω, and P is sliding *inwards* towards 'O' on the link OR with a linear velocity v, derive the expression for Coriolis component of acceleration when (a) both ω and v are constant, b) both ω and v vary with time. [10]

6.a) Draw a neat sketch of the *Robert's mechanism,* and explain its working. How do you find the location of the (tracing) point *P* which produces the approximate straight line motion?

b) A Hooke's joint is used to connect two shafts. The driving shaft is rotating with a uniform speed of 600 rpm. The maximum speed of the driven shaft is 630 rpm. Find the minimum speed of the driven shaft. [5+5]

OR

7.a) What condition is to be satisfied by the Davis steering gear whenever the vehicle is taking a turn - for any radius of curvature of the path of the vehicle? Derive the expression of this condition.

b) Two shafts are connected by a Hooke's joint. The angle between the shafts is 18^0. What will be the angle turned by the driving shaft when the velocity ratio is maximum? [5+5]

8. A symmetric circular cam with convex flanks operates a roller follower of radius 25 mm. Minimum radius of the cam is 60 mm, the radius of curvature of the flanks is 75 mm, and that of the rounded corner is 4 mm. Lift of the cam is 10 mm, and the angle through which the cam rotates from the beginning of the outstroke to the end of the instroke of the follower is 120^0. If the cam rotates at a uniform speed of 1000 rpm, find (a) the maximum velocity of the follower, (b) the acceleration of the follower at the beginning and end of each stroke, (c)the acceleration at the instant the follower changes from contact with the flank to contact with the rounded corner of the cam profile. [10]

OR

9. Draw the profile of a cam to raise a valve with SHM through 40 mm in $(1/4)^{th}$ of the cam rotation, keep it fully raised through $(1/10)^{th}$ of the cam rotation, and to lower it with uniform and equal acceleration and retardation in $(1/6)^{th}$ of the cam rotation. The valve remains closed during the rest of the cam rotation. The diameter of roller follower is 20 mm, and the minimum radius of cam is to be 30 mm. The axis of the follower passes through the axis of the cam shaft. [10]

10.a) Prove that the center distance between two involute gear teeth, which are in mesh, is given by : $C = \dfrac{(R_1 + R_2)}{\cos\phi}$, where R_1 = Radius of the base circle of wheel 1, R_2 = Radius of the base circle of wheel 2 and ϕ = Pressure angle.

   b) The arm of an epicyclic gear train rotates at 100 rpm anti-clockwise. The arm carries two wheels A and B, having 36 and 45 teeth respectively, and meshing with each other. Wheel A makes 200 rpm clockwise, and the arm rotates about the center of wheel A. Find the speed of wheel B. [5+5]

OR

11.a) Two mating spur gears have 24 and 30 teeth, a standard addendum of one module, and a pressure angle of 20^0. Find the length of the arc of contact in terms of the circular pitch.

   b) Derive the expression for the velocity ratio of a compound gear train. [5+5]

---oo0oo---

Code No: 133BM

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Differentiate between print() and println() methods in Java.   [2]
  b) What are symbolic constants? Explain with examples.   [3]
  c) What are the methods available in the character streams?   [2]
  d) What is the significance of the CLASSPATH environment variable in
     creating/using a package?   [3]
  e) What is the difference between error and an exception?   [2]
  f) What is synchronization and why is it important?   [3]
  g) What is the significance of Legacy class? Give example.   [2]
  h) What is the purpose of String Tokenizer class? Explain.   [3]
  i) What are the differences between JToggle button and Radio buttion?   [2]
  j) What is an adapter class? Explain with an example.   [3]

PART-B
(50 Marks)

2.a) What is meant by byte code? Briefly explain how Java is platform independent.
  b) Explain the significance of public, protected and private access specifiers in
     inheritance.   [5+5]

OR

3.a) Explain different parts of a Java program with an appropriate example.
  b) How does polymorphism promote extensibility? Explain with example.   [5+5]

4.a) Explain the process of defining and creating a package with suitable examples.
  b) Give an example where interface can be used to support multiple inheritance.
                                                                                  [5+5]

OR

5.a) What is the accessibility of a public method or field inside a nonpublic class or
     interface? Explain.
  b) Describe the process of importing and accessing a package with suitable
     examples.   [5+5]

6.a) Differentiate between Checked and UnChecked Exceptions with examples.
  b) Write a program to create four threads using Runnable interface. [5+5]

OR

7.a) What are the different ways to handle exceptions? Explain.
  b) How many ways are possible in java to create multiple threaded programs? Discuss the differences between them. [5+5]

8.a) Differentiate between ArrayList and a Vector? Why ArrayList is faster than Vector? Explain.
  b) How an Hashtable can change the iterator? Explain. [5+5]

OR

9.a) Explain the Bit Set and Calander classes in detail.
  b) Discuss the differences between HashList and HashMap, Set and List. [5+5]

10.a) List and explain different types of Layout managers with suitable examples.
  b) How to move/drag a component placed in Swing Container? Explain. [5+5]

OR

11.a) Discuss about different applet display methods in brief.
  b) What are the various components of Swing? Explain. [5+5]

---ooOoo---

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTROMAGNETIC FIELDS
(Electrical and Electronics Engineering)

Time: 3 Hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
                                                                              (25 Marks)

1.a) What is Maxwell's First Law? [2]
  b) Derive the relationship between potential and electric field intensity. [3]
  c) Justify that electric field is conservative. [2]
  d) Define current density. Write the relation between current and current density. [3]
  e) What is the fundamental difference between static electric and magnetic field lines? [2]
  f) A long straight wire carries a current I = 1 amp. At what distance is the magnetic field H= 1A/m. [3]
  g) Mention the limitations of scalar magnetic potential. [2]
  h) A solenoid has an inductance of 20 mH. If the length of the solenoid is increased by two times and the radius is decreased to half of its original value, find the new inductance. [3]
  i) What is the significance of displacement current? [2]
  j) Derive Maxwell's equation derived from Ampere's law. [3]

PART-B
                                                                              (50 Marks)

2.a) If $V=2x2y+20z-(4/(x2+y2))$ Volts, Find E and D at P (6,-2.5,3).
  b) Derive Laplace and Poisson equation. [5+5]

OR

3.a) A circular disc of radius 'a' m is charged uniformly with a charge density of σ c/ m². Find the electric field at a point 'h' m from the disc along its axis.
  b) What is an electric dipole? Obtain expression for torque experienced by an electric dipole in a uniform electric field. [5+5]

4.a) Show the expression of the capacitance for a spherical capacitor consists of 2 concentric spheres of radius 'a'&'b' also obtain the capacitance for an isolated sphere.
  b) Find the capacitance of a conducting sphere of 2 cm in diameter, covered with a layer of polyethelene with $\in r = 2.26$ and 3 cm thick. [5+5]

OR

5.a) Derive an expression for capacitance of co-axial cable.
  b) In a material for which σ = 5.0 s/m and $\in r$ = 1, the electric field intensity is E = 250 Sin1010t (V/m). Find the conduction and displacement current densities. [5+5]

6.a) Using Biot-Savart's law, find the magnetic field intensity on the axis of a circular loop with radius R and carrying a steady current I.

b) Find the magnetic field intensity at the centre of square loop of side 5m carrying 10A of current. [5+5]

OR

7.a) State Ampere's circuital law and explain any two applications of Ampere's circuital law.

b) Derive the equation to show that curl of magnetic field intensity in equal to current density. [5+5]

8.a) Show that the force between two parallel conductors carrying current in the same direction is attractive.

b) A magnetic field, $B = 3.5 \times 10^{-2}\ \hat{a}_z$ Tesla, exerts a force on a 0.3m conductor along the x-axis. If the conductor current is 5 A in the $-A_x$ direction, what force must be applied to hold the conductor in position. [5+5]

OR

9.a) Derive the expression for self inductance of a coaxial cable of inner radius 'a' and outer radius 'b'.

b) Determine the inductance of a solenoid of 2500 turns wound uniformly over a length of 0.25m on a cylindrical paper tube, 4 cm in diameter and the medium is air. [5+5]

10.a) Write Maxwell's equations in integral form for time varying Fields.

b) Generalize Ampere's law for time varying fields. [5+5]

OR

11.a) State and explain Faraday's laws of electromagnetic induction.

b) In a material for which σ = 5.0 s/m and ∈r = 1, the electric field intensity is E = 250 Sin1010t (V/m). Find the conduction and displacement current densities, and the frequency at which they have equal magnitudes. [5+5]

---ooOoo---

Code No: 133AN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL TECHNOLOGY
(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) What is critical field resistance and critical speed of a d.c generator? [2]
  b) Write the expressions for core losses and remedial measures to reduce them in a dc machine. [3]
  c) What is the principle of operation of single phase transformer? [2]
  d) Derive the condition for maximum efficiency of a 1-phase transformer. [3]
  e) Define slip. [2]
  f) Define crawling and cogging. [3]
  g) Write the EMF equation of Alternator. [2]
  h) Define Distribution and Coil span factors. [3]
  i) What is the difference between Moving Coil and Moving iron Instruments? [2]
  j) What are the applications of stepper motor? [3]

PART-B

(50 Marks)

2.a) Derive emf equation of dc generator.
  b) Explain Magnetization and load characteristics of DC generators. [5+5]

OR

3. Discuss the various methods of speed control of a D.C motor. [10]

4.a) Derive an emf equation of a single phase transformer.
  b) Explain about hysteresis and eddy current losses occur in a transformer. [5+5]

OR

5. A 10kVA, 1-phase, 50Hz, 500/250V transformer gave following test results:
OC test (LV) side: 250V, 3.0A, 200W
SC test (HV) side: 25V, 20A, 300W
Calculate efficiency and regulation at full-load, 0.8 p.f lagging. [10]

6.a) Explain Principle of operation of three-phase induction motors.
  b) Distinguish the difference between squirrel cage and slip ring induction motor.
[5+5]

OR

7. Explain different starting methods of 3-phase induction motor. [10]

8.a) Draw the phasor diagram of the synchronous generator on load. Explain the meaning synchronous reactance.

b) Explain constructional features of alternator.   [5+5]

OR

9.a) Explain the Principle of operation of alternator.

b) Write short notes on SC,OC tests on alternator.   [5+5]

10.a) Explain the construction and operation of an a.c. tachometer.

b) How the shaded pole motor works explain in detail?   [5+5]

OR

11.a) Explain construction and working of moving coil instruments.

b) What are the applications of synchro?   [5+5]

---oo0oo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
THERMODYNAMICS
(Common to ME, AE, AME, MSNT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Show that heat is a path function.   [2]
  b) Show that energy is a property of a system.   [3]
  c) What are the causes of irreversibility of a process?   [2]
  d) Why is the second law called a directional law of nature?   [3]
  e) What do you understand by the degree of superheat and the degree of subcooling?
                                                                                        [2]
  f) Show that for an ideal gas, $c_p - c_v = R$.   [3]
  g) How is the partial pressure in a gas mixture related to the mole fraction?   [2]
  h) What is an adiabatic saturation process?   [3]
  i) Why is the COP of a gas cycle refrigeration system low?   [2]
  j) Define m.e.p.   [3]

PART-B
(50 Marks)

2. A gas of mass 1.5 kg undergoes a quasi-static expansion which follows a
relationship $p = a + bV$, where a and b are constants. The initial and final pressures
are 1000 kPa and 200 kPa respectively and corresponding volumes are 0.20 m^3
and 1.20 m^3. The specific internal energy of the gas is given by the relation

$$u = 1.5 \, pv - 85 \text{ kJ/kg}$$

where p is the kPa and v is in m^3/kg. Calculate the net heat transfer and the
maximum internal energy of the gas attained during expansion.   [10]

OR

3. A reciprocating air compressor takes in 2 m^3/min at 0.11 MPa, 20^{0}C which it
delivers at 1.5 MPa, 111^{0}C to an after cooler where the air is cooled at constant
pressure to 25^{0}C. The power absorbed by the compressor is 4.15 kW. Determine
the heat transfer in (a) the compressor, and (b) the cooler. State your assumptions.
                                                                                        [10]

4. Using an engine of 30% thermal efficiency to drive a refrigerator having a COP of 5, what is the heat input into the engine for each MJ removed from the cold body by the refrigerator? If this system is used as a heat pump, how many MJ of heat would be available for heating for each MJ of heat input to the engine?   [10]

OR

5. A block of iron weighing 100 kg and having a temperature of 100^0C is immersed in 50 kg of water at a temperature of 20^0C, what will be the change of entropy of the combined system of iron and water? Specific heats of iron and water are 0.45 kJ/kg K and 4.18 kJ/kg K respectively.   [10]

6. A rigid closed tank of volume 3 m^3 contains 5 kg of wet steam at a pressure of 200 kPa. The tank is heated until the steam becomes dry saturated. Determine the final pressure and the heat transfer to the tank.   [10]

OR

7. Write down the van der Waals equation of state. How does it differ from the ideal gas equation of state? What is force of cohesion? What is co-volume 8. 0.5 kg of helium and 0.5 kg of nitrogen are mixed at 20^0C and at a total pressure of 100 kPa. Find (a) the volume of the mixture, (b) the partial volumes of the components, (e) the partial pressures of the components, (d) the mole fractions of the components, (e) the specific heats c_p and c_v of the mixture, and (f) the gas constant of the mixture.   [10]

8. A gaseous mixture consists of 1 kg of oxygen and 2 kg of nitrogen at a pressure of 150 kPa and a temperature of 20^0C. Determine the changes in internal energy, enthalpy and entropy of the mixture when the mixture is heated to a temperature of 100^0C (a) at constant volume, and (b) at constant pressure.   [10]

OR

9.a) Explain what do you understand by evaporative cooling.
  b) Calculate the amount of heat removed per kg of dry air if the initial condition of air is 35^0C, 70% RH, and the final condition is 25^0C, 60% RH.   [5+5]

10.a) Explain the effect of superheat and subcooling on the vapour compression cycle.
  b) What do you understand by dry and wet compression? Which is preferred and why?   [5+5]

OR

11. An engine working on the Otto cycle has an air standard cycle efficiency of 56% and rejects 544 kJ/kg of air. The pressure and temperature of air at the beginning of compression are 0.1 MPa and 60^0C respectively. Compute (a) the compression ratio of the engine (b) the work done per kg of air, (c) the pressure and temperature at the end of compression, and (d) maximum pressure in the cycle.   [10]

---ooOoo---

Code No: 123BP

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
DATA STRUCTURES
(Common to CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
        Part A is compulsory which carries 25 marks. Answer all questions in Part A.
        Part B consists of 5 Units. Answer any one full question from each unit.
        Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a)	Define and List types of Arrays.	[2]
b)	Explain types of Linked Lists.	[3]
c)	Discuss about recursion and its implementation.	[2]
d)	Explain the ADT for Deque.	[3]
e)	Write about Properties of Binary Trees.	[2]
f)	Write about Directed & Undirected graphs.	[3]
g)	Write the C logic for Binary Search.	[2]
h)	Explain in brief about Insertion Sort.	[3]
i)	Write short note on Red Black Tree.	[2]
j)	Write the C Logic for Knuth-Morris-Pratt algorithm.	[3]

PART-B
(50 Marks)

2.a)	Write about Asymptotic Notations.	
b)	Discuss about linked representation of Sparse Matrix.	[5+5]
	OR	
3.a)	What is Performance Analysis? Explain the Techniques.	
b)	Explain about Singly Linked Lists Operations.	[5+5]
4.a)	Explain Evaluation of Postfix expression using Stack.	
b)	Write a program to implement Queue Operations.	[5+5]
	OR	
5.a)	Discuss about Circular queues operations.	
b)	Write a C program to implement stack using singly linked list.	[5+5]
6.a)	Describe Binary Tree traversals with examples.	
b)	Write a C Program to implement DFS.	[5+5]
	OR	
7.a)	Explain about Graph Representation methods.	
b)	Explain the Binary Tree operations with an example.	[5+5]

8.a) Write a C Program for Linear Search.
  b) Explain Collision Resolution Methods.   [5+5]

OR

9.a) Differentiate between Linear and Binary Search Methods.
  b) Write a program for Quick Sort.   [5+5]

10.a) Explain about AVL Tree with an example.
   b) Give the examples for types of Tries.   [5+5]

OR

11.a) Write about Splay Tree with an example.
   b) Discuss about Binary Search Tree operations.   [5+5]

---ooOoo---

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
PROBABILITY THEORY AND STOCHASTIC PROCESSES
(Common to ECE, ETM)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) A box contains nine cards numbered through 1 to 9, and B contains five cards numbered through 1 to 5. If a box is chosen at random, and a card is drawn which even numbered, what is the probability for the card to be from box A. [2]

b) Let a die be weighted such that the probability of getting numbers from 2 to 6 is that number of times of probability of getting a1. When the die thrown, what is the probability of getting an even or prime number occurs. [3]

c) Find the CDF of a random variable X, uniform over (-3, 3). [2]

d) The density of a random variable X is given as $f(x)= K[U(x)-U(x-4)]+0.25\delta(x-2)$. Find the probability of $X \leq 3$. [3]

e) X and Y are discrete random variables and their joint occurrence is given as

X\Y	1	2	3
1	1/18	1/9	1/6
2	1/9	1/18	1/9
3	1/6	1/6	1/18

Find the Conditional Mean of X, given Y=2. [2]

f) X and Y are two uncorrelated random variables with same variance. If the random variables U=X+ kY and V=X+(σx/σy)Y are uncorrelated, find K. [3]

g) State and prove the Periodicity Property of Auto Correlation function of a Stationary Random Process. [2]

h) If X(t) is a Gaussian Random Process with a mean 2 and exp $(-0.2|\tau|)$. Find the Probability of $X(1) \leq 1$. [3]

i) Verify that the cross spectral density of two uncorrelated stationary random processes is an impulse function. [2]

j) The output of a filter is given by Y(t)=X(t+T)+X(t-T), where X(t) is a WSS process, power spectral density $S_{xx}(w)$, and T is a constant. Find the power spectrum of Y(t). [3]

PART-B
(50 Marks)

2.a) Consider the experiment of tossing two dice simultaneously. If X denotes the sum of two faces, find the probability for $X \leq 6$.

b) A fair coin is tossed 4 times. Find the probability for the longest string of heads appearing to be three as a result of the above experiment.

c) In certain college, 25% of the boys and 10% of the girls are studying Mathematics. The girls constitute 60% of the student body. If a student is selected at random and studying mathematics, determine the probability that the student is a girl. [3+3+4]

OR

3.a) Coin A has a probability of head =1/4 and coin B is a fair coin. Each coin is flipped four times. If X is the number of heads resulting from coin and Y denotes the same from coin B, what is the probability for X=Y?

b) A dice is thrown 6 times. Find the probability that a face 3 will occur at least two times. [6+4]

4.a) Find the Moment generating function of a uniform random variable distribute over (A, B) and find its first and second moments about origin, from the Moment generating function.

b) A random variable X has a mean of 10 and variance of 9. Find the lower bound on the probability of (5<X<15). [5+5]

OR

5.a) Find the Moment generating function of a random variable X with density function

$$f(x) = \begin{cases} x, & for\ 0 \le x \le 1 \\ 2-x, & for\ 1 \le x \le 2 \\ 0, & else\ where \end{cases}$$

b) If X is a Gaussian random variable $N(m, \sigma^2)$, find the density of Y=PX+Q, where P and Q are constants. [5+5]

6.a) If $X_1, X_2, X_3, ----- X_n$ are 'n' number of independent and Identically distributed random variables, such that $X_k = 1$ with a probability 1/2; = -1 with a probability 1/2. Find the Characteristic Function of the random Variable Y= $X_1+X_2+X_3+ --- + X_n$.

b) If Independent Random Variables X and Y both of zero mean, have variance 20 and 8 respectively, find the correlation coefficient between the random Variables X+Y and X-Y. [5+5]

OR

7.a) Let X=Cosθ and Y=Sinθ, be two random variables, where θ is also a uniform random variable over (0,2π). Show that X and Y are uncorrelated and not independent.

b) If X is a random variable with mean 3 and variance 2, verify that the random Variables 'X' and Y= -6X+22 are orthogonal. [6+4]

8.a) X(t) is a random process with mean =3 and Autocorrelation function $R_{xx}(\tau) = 10.[\exp(- 0.3|\tau|)+2]$. Find the second central Moment of the random variable Y=X(3)-X(5).

b) X(t)=2ACos(Wct+2θ) is a random Process, where 'θ' is a uniform random variable, over (0,2π). Check the process for mean ergodicity. [5+5]

OR

9.a) A Random Process X(t)=A.Cos (2π fc t), where A is a Gaussian Random Variable with zero mean and unity variance, is applied to an ideal integrator, that integrates with respect to 't', over (0,t). Check the output of the integrator for stationarity.

b) A random Process is defined as X(t)=3.Cos(2πt+Y), where Y is a random Variable with p(Y=0)=p(Y=π)=1/2. Find the mean and Variance of the Random Variable X(2). [5+5]

10.a) Find and plot the Autocorrelation function of (i) Wide band white noise
(ii) Band Pass White noise.
   b) Derive the expression for the Cross Spectral Density of the input Process X(t) and the output process Y(t) of an LTI system in terms of its Transfer function. [5+5]

OR

11.a) Compare and contrast Auto and cross correlations.
   b) If $Y(t) = A.Cos(w_0 t + \theta) + N(t)$, where '$\theta$' is a uniform random variable over $(-\pi, \pi)$, and N(t) is a band limited Gaussian white noise process with PSD=K/2. If 'θ' and N(t) are independent, find the PSD of Y(t). [4+6]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL MACHINES – I
(Electrical and Electronics Engineering)
Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Explain briefly about Faradays law of electromagnetic induction.   [2]
  b) Explain about the main aim of electromechanical energy conversion device.
                                                                                [3]
  c) List the classification of DC machines based on methods of excitation.   [2]
  d) Explain the importance of commutator in DC generators.   [3]
  e) Differentiate between ideal and delayed commutation.   [2]
  f) Enumerate the reasons for paralleling DC generators.   [3]
  g) Explain the significance of magnetization characteristics.   [2]
  h) What do you understand by Back emf or counter emf?   [3]
  i) Explain the role of protective devices in DC machines.   [2]
  j) Explain why a DC series motor should never run unloaded.   [3]

PART-B
(50 Marks)

2.   Explain in detail about the singly-excited system with a neat schematic and also
      list the assumptions made.   [10]

OR

3.a) Define field energy and co-energy and explain their significance.
  b) Derive the equation for the magnetic stored energy for singly excited magnetic
     system.   [5+5]

4.a) Derive the emf equation of a DC machine.
  b) A long-shunt compound generator delivers a load current of 50 A at 500 V, and
     the resistances of armature, series field and shunt fields are 0.05Ω, 0.03Ω, and
     255Ω respectively. Calculate the generated emf and the armature current. Allow
     1.5V per brush for contact drop.   [5+5]

OR

5.a) Explain in detail about the armature reaction and further list the effects of
     armature reaction.
  b) Explain the purpose of using compensating windings in dc machines.   [5+5]

6. Two D.C shunt generators running in parallel supply a load current of 2800A. The emfs induced in the first and the second generators are 515 V and 545V respectively. These generators have armature resistances of 0.022Ω and 0.044Ω and shunt field resistances of 130Ω and 150Ω respectively, determine: a) Terminal voltage and b)output current of each machine. [10]

OR

7.a) Discuss the process of self – excitation in a dc machine. What condition must be fulfilled for the machine to self excite.

b) What is the importance of an equalizer? And when must it be used? [5+5]

8.a) List and explain the different types of DC motors along with supporting formulae

b) A 250V shunt motor on no load runs at 1000 rpm and takes 5A. The total armature and shunt field resistance are respectively 0.2Ω and 250 Ω. Calculate the speed when loaded and taking a current of 50 A, if the armature reaction weakens the field by 3%. [5+5]

OR

9.a) Derive the Torque equation of a DC machine

b) A10 HP, 230V shunt motor takes an armature current of 6A from the 230 V line at no load and runs at 1200 rpm. The armature resistance is 0.25Ω. Determine the speed and torque when the armature takes 36A with the same flux. [5+5]

10.a) Explain the working of Three point starter with a neat diagram

b) A 200 V, shunt motor develops an output of 17.158KW when taking 20.2KW. The field resistance is 50Ω and an armature resistance 0.06Ω. What is the efficiency and power input when the output is 7.46 KW? [5+5]

OR

11. Explain the procedure of Heat-run test (or) regenerative test on two similar dc shunt machines with a neat diagram and required formulae. [10]

---oo0oo---

Code No: 113AB

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
THERMODYNAMICS
(Common to ME, AE, AME, MSNT)
Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
                                                 (25 Marks)

1.a) Show that heat is a path function. [2]
  b) Show that energy is a property of a system. [3]
  c) What are the causes of irreversibility of a process? [2]
  d) Why is the second law called a directional law of nature? [3]
  e) What do you understand by the degree of superheat and the degree of subcooling? [2]
  f) Show that for an ideal gas, $c_p - c_v = R$. [3]
  g) How is the partial pressure in a gas mixture related to the mole fraction? [2]
  h) What is an adiabatic saturation process? [3]
  i) Why is the COP of a gas cycle refrigeration system low? [2]
  j) Define m.e.p. [3]

PART-B
                                                 (50 Marks)

2. A gas of mass 1.5 kg undergoes a quasi-static expansion which follows a relationship p=a+bV, where a and b are constants. The initial and final pressures are 1000 kPa and 200 kPa respectively and corresponding volumes are 0.20 m^3 and 1.20 m^3. The specific internal energy of the gas is given by the relation

                        u=1.5 pv-85 kJ/kg

    where p is the kPa and v is in m^3/kg. Calculate the net heat transfer and the maximum internal energy of the gas attained during expansion. [10]

OR

3. A reciprocating air compressor takes in 2 m^3/min at 0.11 MPa, 20^{0}C which it delivers at 1.5 MPa, 111^{0}C to an after cooler where the air is cooled at constant pressure to 25^{0}C. The power absorbed by the compressor is 4.15 kW. Determine the heat transfer in (a) the compressor, and (b) the cooler. State your assumptions. [10]

4. Using an engine of 30% thermal efficiency to drive a refrigerator having a COP of 5, what is the heat input into the engine for each MJ removed from the cold body by the refrigerator? If this system is used as a heat pump, how many MJ of heat would be available for heating for each MJ of heat input to the engine? [10]

OR

5. A block of iron weighing 100 kg and having a temperature of 100^0C is immersed in 50 kg of water at a temperature of 20^0C, what will be the change of entropy of the combined system of iron and water? Specific heats of iron and water are 0.45 kJ/kg K and 4.18 kJ/kg K respectively. [10]

6. A rigid closed tank of volume 3 m^3 contains 5 kg of wet steam at a pressure of 200 kPa. The tank is heated until the steam becomes dry saturated. Determine the final pressure and the heat transfer to the tank. [10]

OR

7. Write down the van der Waals equation of state. How does it differ from the ideal gas equation of state? What is force of cohesion? What is co-volume 8. 0.5 kg of helium and 0.5 kg of nitrogen are mixed at 20^0C and at a total pressure of 100 kPa. Find (a) the volume of the mixture, (b) the partial volumes of the components, (c) the partial pressures of the components, (d) the mole fractions of the components, (e) the specific heats c_p and c_v of the mixture, and (f) the gas constant of the mixture. [10]

8. A gaseous mixture consists of 1 kg of oxygen and 2 kg of nitrogen at a pressure of 150 kPa and a temperature of 20^0C. Determine the changes in internal energy, enthalpy and entropy of the mixture when the mixture is heated to a temperature of 100^0C (a) at constant volume, and (b) at constant pressure. [10]

OR

9.a) Explain what do you understand by evaporative cooling.
 b) Calculate the amount of heat removed per kg of dry air if the initial condition of air is 35^0C, 70% RH, and the final condition is 25^0C, 60% RH. [5+5]

10.a) Explain the effect of superheat and subcooling on the vapour compression cycle.
 b) What do you understand by dry and wet compression? Which is preferred and why? [5+5]

OR

11. An engine working on the Otto cycle has an air standard cycle efficiency of 56% and rejects 544 kJ/kg of air. The pressure and temperature of air at the beginning of compression are 0.1 MPa and 60^0C respectively. Compute (a) the compression ratio of the engine (b) the work done per kg of air, (c) the pressure and temperature at the end of compression, and (d) maximum pressure in the cycle. [10]

---ooOoo---

Code No: 113BZ

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL MACHINES – I
(Electrical and Electronics Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Explain briefly about Faradays law of electromagnetic induction. [2]
 b) Explain about the main aim of electromechanical energy conversion device. [3]
 c) List the classification of DC machines based on methods of excitation. [2]
 d) Explain the importance of commutator in DC generators. [3]
 e) Differentiate between ideal and delayed commutation. [2]
 f) Enumerate the reasons for paralleling DC generators. [3]
 g) Explain the significance of magnetization characteristics. [2]
 h) What do you understand by Back emf or counter emf? [3]
 i) Explain the role of protective devices in DC machines. [2]
 j) Explain why a DC series motor should never run unloaded. [3]

PART-B
(50 Marks)

2.   Explain in detail about the singly-excited system with a neat schematic and also list the assumptions made. [10]

OR

3.a) Define field energy and co-energy and explain their significance.
 b) Derive the equation for the magnetic stored energy for singly excited magnetic system. [5+5]

4.a) Derive the emf equation of a DC machine.
 b) A long-shunt compound generator delivers a load current of 50 A at 500 V, and the resistances of armature, series field and shunt fields are 0.05Ω, 0.03Ω, and 255Ω respectively. Calculate the generated emf and the armature current. Allow 1.5V per brush for contact drop. [5+5]

OR

5.a) Explain in detail about the armature reaction and further list the effects of armature reaction.
 b) Explain the purpose of using compensating windings in dc machines. [5+5]

6. Two D.C shunt generators running in parallel supply a load current of 2800A. The emfs induced in the first and the second generators are 515 V and 545V respectively. These generators have armature resistances of 0.022Ω and 0.044Ω and shunt field resistances of 130Ω and 150Ω respectively, determine: a) Terminal voltage and b)output current of each machine. [10]

OR

7.a) Discuss the process of self – excitation in a dc machine. What condition must be fulfilled for the machine to self excite.

b) What is the importance of an equalizer? And when must it be used? [5+5]

8.a) List and explain the different types of DC motors along with supporting formulae

b) A 250V shunt motor on no load runs at 1000 rpm and takes 5A. The total armature and shunt field resistance are respectively 0.2Ω and $250\ \Omega$. Calculate the speed when loaded and taking a current of 50 A, if the armature reaction weakens the field by 3%. [5+5]

OR

9.a) Derive the Torque equation of a DC machine

b) A10 HP, 230V shunt motor takes an armature current of 6A from the 230 V line at no load and runs at 1200 rpm. The armature resistance is 0.25Ω. Determine the speed and torque when the armature takes 36A with the same flux. [5+5]

10.a) Explain the working of Three point starter with a neat diagram

b) A 200 V, shunt motor develops an output of 17.158KW when taking 20.2KW. The field resistance is 50Ω and an armature resistance 0.06Ω. What is the efficiency and power input when the output is 7.46 KW? [5+5]

OR

11. Explain the procedure of Heat-run test (or) regenerative test on two similar dc shunt machines with a neat diagram and required formulae. [10]

---oo0oo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
DATA STRUCTURES
(Common to CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)	Define and List types of Arrays.	[2]
b)	Explain types of Linked Lists.	[3]
c)	Discuss about recursion and its implementation.	[2]
d)	Explain the ADT for Deque.	[3]
e)	Write about Properties of Binary Trees.	[2]
f)	Write about Directed & Undirected graphs.	[3]
g)	Write the C logic for Binary Search.	[2]
h)	Explain in brief about Insertion Sort.	[3]
i)	Write short note on Red Black Tree.	[2]
j)	Write the C Logic for Knuth-Morris-Pratt algorithm.	[3]

PART-B

(50 Marks)

2.a)	Write about Asymptotic Notations.	
b)	Discuss about linked representation of Sparse Matrix.	[5+5]

OR

3.a)	What is Performance Analysis? Explain the Techniques.	
b)	Explain about Singly Linked Lists Operations.	[5+5]

4.a)	Explain Evaluation of Postfix expression using Stack.	
b)	Write a program to implement Queue Operations.	[5+5]

OR

5.a)	Discuss about Circular queues operations.	
b)	Write a C program to implement stack using singly linked list.	[5+5]

6.a)	Describe Binary Tree traversals with examples.	
b)	Write a C Program to implement DFS.	[5+5]

OR

7.a)	Explain about Graph Representation methods.	
b)	Explain the Binary Tree operations with an example.	[5+5]

8.a) Write a C Program for Linear Search.
  b) Explain Collision Resolution Methods.   [5+5]

OR

9.a) Differentiate between Linear and Binary Search Methods.
  b) Write a program for Quick Sort.   [5+5]

10.a) Explain about AVL Tree with an example.
  b) Give the examples for types of Tries.   [5+5]

OR

11.a) Write about Splay Tree with an example.
  b) Discuss about Binary Search Tree operations.   [5+5]

---ooOoo---

Code No: 113BT

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
PROBABILITY THEORY AND STOCHASTIC PROCESSES
(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) A box contains nine cards numbered through 1 to 9, and B contains five cards numbered through 1 to 5. If a box is chosen at random, and a card is drawn which even numbered, what is the probability for the card to be from box A. [2]

b) Let a die be weighted such that the probability of getting numbers from 2 to 6 is that number of times of probability of getting a1. When the die thrown, what is the probability of getting an even or prime number occurs. [3]

c) Find the CDF of a random variable X, uniform over (-3, 3). [2]

d) The density of a random variable X is given as $f(x)= K[U(x)-U(x-4)]+0.25\delta(x-2)$. Find the probability of $X \leq 3$. [3]

e) X and Y are discrete random variables and their joint occurrence is given as

X\Y	1	2	3
1	1/18	1/9	1/6
2	1/9	1/18	1/9
3	1/6	1/6	1/18

Find the Conditional Mean of X, given Y=2. [2]

f) X and Y are two uncorrelated random variables with same variance. If the random variables $U=X+ kY$ and $V=X+(\sigma x/\sigma y)Y$ are uncorrelated, find K. [3]

g) State and prove the Periodicity Property of Auto Correlation function of a Stationary Random Process. [2]

h) If X(t) is a Gaussian Random Process with a mean 2 and exp $(-0.2|\tau|)$. Find the Probability of $X(1) \leq 1$. [3]

i) Verify that the cross spectral density of two uncorrelated stationary random processes is an impulse function. [2]

j) The output of a filter is given by $Y(t)=X(t+T)+X(t-T)$, where X(t) is a WSS process, power spectral density $S_{xx}(w)$, and T is a constant. Find the power spectrum of Y(t). [3]

PART-B
(50 Marks)

2.a) Consider the experiment of tossing two dice simultaneously. If X denotes the sum of two faces, find the probability for $X \leq 6$.

b) A fair coin is tossed 4 times. Find the probability for the longest string of heads appearing to be three as a result of the above experiment.

c) In certain college, 25% of the boys and 10% of the girls are studying Mathematics. The girls constitute 60% of the student body. If a student is selected at random and studying mathematics, determine the probability that the student is a girl. [3+3+4]

OR

3.a) Coin A has a probability of head $=1/4$ and coin B is a fair coin. Each coin is flipped four times. If X is the number of heads resulting from coin and Y denotes the same from coin B, what is the probability for X=Y?

b) A dice is thrown 6 times. Find the probability that a face 3 will occur at least two times.   [6+4]

4.a) Find the Moment generating function of a uniform random variable distribute over (A, B) and find its first and second moments about origin, from the Moment generating function.

b) A random variable X has a mean of 10 and variance of 9. Find the lower bound on the probability of (5<X<15).   [5+5]

OR

5.a) Find the Moment generating function of a random variable X with density function

$$f(x) = \begin{cases} x, & for\ 0 \le x \le 1 \\ 2-x, & for\ 1 \le x \le 2 \\ 0, & else\ where \end{cases}$$

b) If X is a Gaussian random variable $N(m, \sigma^2)$, find the density of Y=PX+Q, where P and Q are constants.   [5+5]

6.a) If $X_1, X_2, X_3, - - - - - X_n$ are 'n' number of independent and Identically distributed random variables, such that $X_k = 1$ with a probability 1/2; $= -1$ with a probability 1/2. Find the Characteristic Function of the random Variable Y= $X_1+X_2+X_3+ - - - + X_n$.

b) If Independent Random Variables X and Y both of zero mean, have variance 20 and 8 respectively, find the correlation coefficient between the random Variables X+Y and X-Y.   [5+5]

OR

7.a) Let X=Cosθ and Y=Sinθ , be two random variables, where θ is also a uniform random variable over (0,2π). Show that X and Y are uncorrelated and not independent.

b) If X is a random variable with mean 3 and variance 2, verify that the random Variables 'X' and Y= -6X+22 are orthogonal.   [6+4]

8.a) X(t) is a random process with mean =3 and Autocorrelation function $R_{xx}(\tau) =10.[\exp(- 0.3|\tau|)+2]$. Find the second central Moment of the random variable Y=X(3)-X(5).

b) X(t)=2ACos(Wct+2θ) is a random Process, where 'θ' is a uniform random variable, over (0,2π). Check the process for mean ergodicity.   [5+5]

OR

9.a) A Random Process X(t)=A.Cos (2π fc t) , where A is a Gaussian Random Variable with zero mean and unity variance, is applied to an ideal integrator, that integrates with respect to 't', over (0,t). Check the output of the integrator for stationarity.

b) A random Process is defined as X(t)=3.Cos(2πt+Y), where Y is a random Variable with p(Y=0)=p(Y=π)=1/2.Find the mean and Variance of the Random Variable X(2).   [5+5]

10.a) Find and plot the Autocorrelation function of (i) Wide band white noise
(ii) Band Pass White noise.
   b) Derive the expression for the Cross Spectral Density of the input Process $X(t)$ and the output process $Y(t)$ of an LTI system in terms of its Transfer function.
[5+5]

OR

11.a) Compare and contrast Auto and cross correlations.
   b) If $Y(t) = A.Cos(w_0 t+\theta)+N(t)$, where '$\theta$' is a uniform random variable over $(-\pi,\pi)$, and $N(t)$ is a band limited Gaussian white noise process with PSD$=K/2$. If 'θ' and $N(t)$ are independent, find the PSD of $Y(t)$.
[4+6]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, November/December - 2017

THERMODYNAMICS

(Common to ME, AE, AME)

Time: 3 hours   Max. Marks: 75

Answer any five questions

All questions carry equal marks

- - -

1.a) Distinguish between the terms of Change of State, Path, and Process.
  b) What is reversibility and irreversibility? List out the causes of irreversibility.
  c) What is the difference between the universal gas constant and a characteristic gas Constant?   [5+5+5]

2.a) What is the standard fixed point in thermometry? Define it.
  b) What is PMM 1? Why is it impossible?   [8+7]

3.a) How is entropy related to molecular disorder in a system?
  b) Explain Kelvin-plank and Clausius Statements.
  c) Establish the inequality of Clausius.   [5+5+5]

4.a) What is the critical state? Explain the terms critical pressure, critical temperature and critical volume of water?
  b) Derive Clausius – Clapeyron equation for pure substance. State its significance.
                                                                                [8+7]

5.a) What is the physical significance of the two constants that appear in the van der Waals Equation of state?
  b) A reversible adiabatic process begins at p_1 = 10 bar, t_1 = 300^{0}C and ends with p_2=1 bar. Find the specific volume and the work done per kg of fluid if (i) the fluid is air and (ii) the fluid is steam.   [7+8]

6.a) What do you understand by sensible heat load and latent heat load?
  b) An air – water vapour mixture at 25^{0}C and 1 bar has a relative humidity of 50%. Determine: (i) The Partial pressure of steam; (ii) The dew point temperature; (iii) The density of each constituent; (iv) The specific humidity.   [7+8]

7.a) Mention the merits and demerits of the Stirling and Ericsson cycles.
  b) An air standard dual cycle has a compression ratio of 16, and compression begins at 1 bar, 50^{0}C. The maximum pressure is 70 bar. The heat transferred to air at constant pressure is equal to that at constant volume. Estimate (i) the pressures and temperatures at the cardinal points of the cycle, (ii) the cycle efficiency, and (iii) the m.e.p. of the cycle, C_v = 0.718 kJ/kg K, C_p = 1.005 kJ/kg K.   [7+8]

8.a) Explain the effect of superheat and sub-cooling on the vapour compression cycle.
  b) Describe the ideal Rankine cycle with neat diagrams. What are the different ways to improve the cycle efficiency.   [7+8]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
PROBABILITY THEORY AND STOCHASTIC PROCESSES
(Common to ECE, ETM)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) Explain how the concept of probability can be applied in communication system.
 b) State and prove the total probability theorem.
 c) Calculate correct and error transmission probabilities of binary symmetric channel using Baye's theorem by assuming your own values.   [5+5+5]

2.a) Explain the applications of all types of continuous and discrete random variables.
 b) Find the probability of getting sum in random experiment of rolling two dice. Find, plot and obtain the expression for both PDF and CDF?   [7+8]

3.a) Obtain the expression for all statistical parameters and explain the significance in analyzing communication systems.
 b) Define mean, variance and skew of binomial random variable.   [8+7]

4.a) State and prove the all properties of joint PDF and CDF.
 b) Find the expression for PDF of sum of two independent variables.   [7+8]

5.a) State and prove the all properties of correlation and covariance.
 b) Find constant 'C', correlation and covariance of a two random variables 'X' and 'Y' having joint PDF

$$f_{xy}(x, y) = \begin{cases} C(2x + y); & 0 < X < 2 \text{ and } 0 < Y < 3 \\ 0; & \textit{Else where} \end{cases}$$

Is 'X' and 'Y' are independent.   [7+8]

6.a) State and prove any 'THREE' properties of Auto Correlation Function(ACF). And also explain their significance.
 b) Mean and ACF of random process X(t) is given by 6 and $R_{XX}(\tau) = 36 + 25\,e^{-t}$

i) Is first order stationary   ii) Find the total power of X(t)
iii) Is Ergodic   iv) Is Wide Sense Stationary
v) Has periodic components   vi) Find AC power of X(t).   [7+8]

7.a) Derive the relation between input and output PSDs of LTI system.
 b) A random process X(t) whose ACF is given by $R_{XX}(\tau) = 4\,e^{-2|\tau|}$ is applied to a

system with transfer function $H(\omega) = \dfrac{1}{(2 + j\omega)}$. Find out mean value, ACF, PSD

and total power of output random process Y(t).   [7+8]

8.a) Define noise. Explain different types of noise generated in communication system.

b) With help of noise figure, explain why noise generated in first stage should be minimum in cascade amplifiers. [7+8]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
DIGITAL LOGIC DESIGN
(Computer Science and Engineering)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) Represent decimal number 8620 in:
    i) BCD   ii) Excess-3 code
    iii) 2421 code   iv) As a binary number.
  b) Perform the subtraction of the given binary numbers using 2's complement
    i) 110110-100111   ii) 1011.11-101.0.   [8+7]

2.a) Implement the AND, OR, Ex-OR, NOR by using NAND gates only.
  b) Implement the following Boolean function using basic logic gates
    $F(A,B,C) = \Pi M (0,2,4,5,6)$.   [8+7]

3. Using Map method simplify the following expression and implement Logic circuit
after minimization $F(P, Q, R, S) = \sum m (0, 1, 4, 8, 9, 10) + d(2, 11)$.   [15]

4. Explain the operation of 3 to 8 line decoder with the help of a truth table and realize
4×16 decoder by using 2×4 decoders.   [15]

5.a) Briefly explain the design procedure for sequencial circuits.
  b) Write the HDL code for JK Flip flop.   [8+7]

6.a) Write a HDL program for simple up – counter.
  b) Explain the working of serial-in parallel-out shift register with a diagram. [7+8]

7.a) Explain different types of memory. Explain Error detection and error correction of
ROM.
  b) Write short notes on programmable array.   [8+7]

8.a) Define race concept and explain about race-free state assignment hazards.
  b) Compare synchronous and asynchronous sequential logic circuits.   [8+7]

---ooOoo---

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
PROCESS ENGINEERING PRINCIPLES
(Biotechnology)
Time: 3 hours   Max. Marks: 75
Answer any five questions
All questions carry equal marks
- - -

1.a) Distinguish Unit Operations and Unit Processes with examples.
  b) Discuss transport phenomenon principles momentum, mass and heat transfer principles in bio-processing with examples.   [7+8]

2.a) What do you mean by equations of state for gases? Discuss briefly the virial equation of state.
  b) Define Ideal gas law? Write the applications of ideal gas law.   [8+7]

3. As shown in Figure below, a pump draws a solution of specific gravity 1.84 from a storage tank through 3-in. (75 mm) Schedule 40 steel pipe. The efficiency of the pump is 60 percent. The velocity in the suction line is 3 ft/sec (0.914 m/s). The pump discharges through a 2-in. (50 mm) Schedule 40 pipe to an overhead tank. The end of the discharge pipe is 50 ft. (15.2 m) above the level of the solution in the feed tank. Friction losses in the entire piping system are 10 ft-lb$_f$/lb (29.9 J/Kg). What pressure must the pump develop? What is the power of the pump? Use conversion factor 1 hp=550 ft-lb$_f$/s and assume necessary if require in the problem.   [15]
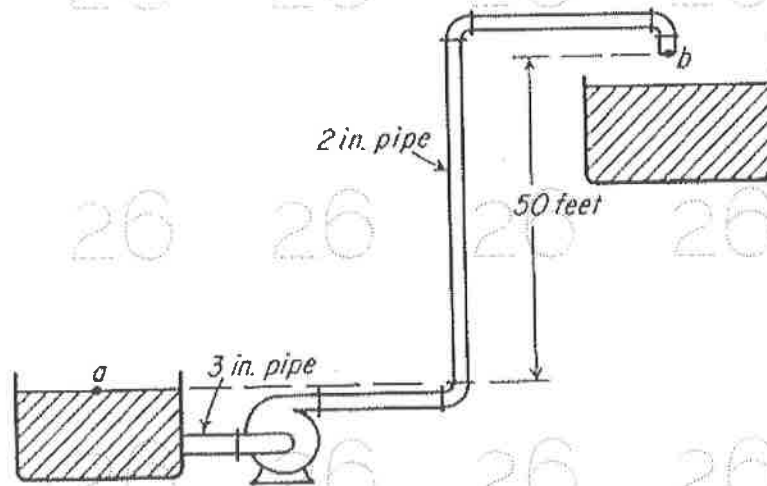
Figure: Flow diagram

4.a) Define Newton's Law of Viscosity? Explain the dependence of viscosity with temperature and pressure citing at least one realistic example
  b) Predict the viscosity of the following gas mixture at 1 atm and 293 K from the given data on the pure components at 1 atm and 293 K is shown in Table. [7+8]

Table: data of

Species	Mole fraction, x	Molecular weight, M	Viscosity, μ_i (gm/cm.sec)
CO_2	0.133	44	1462×10^{-7}
O_2	0.039	32	2031×10^{-7}
N_2	0.828	28	1754×10^{-7}

Viscosity species

5.a) Discuss briefly the laminar and turbulent flow in boundary layers.

b) Derive Hagen-Poiseullie equation and explain its significance. [8+7]

6.a) Define Drag. Distinguish wall and form drag.

b) Draw schematically the wall drag and form drag on immersion body and explain the drag coefficient importance.

c) Define settling/terminal velocity? Write expression for terminal velocity and discuss the importance of each individual term. [5+5+5]

7.a) What are the major differences between compressors and blowers? Discuss the working principles.

b) With a diagram explain briefly the working principle of orifice meter. [8+7]

8.a) What do you mean by pump priming? Discuss briefly about centrifugal pumps.

b) Write short notes:
i) diaphragm pumps
ii) peristaltic pumps. [7+8]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRICAL MACHINES – I
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 80

Answer any five questions
All questions carry equal marks
- - -

1.a) Explain the principle of energy conversion of electromechanical system.
  b) Two parallel plates of each of area $2m^2$ are separated by a distance "g". The electric field intensity between plates is 5×10^6/m, a value equal to break down strength of the air. Find the force between two plates using both energy and co-energy methods.
  [8+8]

2.a) Write the differences between lap and wave windings of DC machines and Explain simplex windings and multiplex windings.
  b) Derive EMF equation of DC shunt generator.   [8+8]

3.a) Derive the expressions for Ampere turns per pole for demagnetizing and cross magnetizing effect.
  b) Write short notes on different types of commutation methods of d.c. generator.
  [8+8]

4.a) Explain magnetization characteristics of shunt wound dc generators and discuss about how to find critical field resistance and critical speed of DC genrator.
  b) What are the causes of failure to build – up voltage in DC Generators and explain the remedy for DC Shunt Generator.   [8+8]

5.a) Explain Load characteristics of shunt wound, Series wound and compound wound DC generators.
  b) Write the conditions for parallel operation of DC generators.   [8+8]

6.a) Explain principle of operation of DC motor and derive the torque equation of DC motor.
  b) Draw the different characteristics of d.c motors.   [8+8]

7.a) Explain speed control of DC motors by Armature voltage and field flux control Methods.
  b) Explain need of starter for Motors and describe three point starter with neat diagram.
  [8+8]

8.a) Explain hopkinson's test on DC machines.
  b) A brake test on a DC shunt motor gave the following results: Tensions 4.5 kg and 0.5 kg., radius of pulley = 12 cm, speed = 1200 RPM, V = 200 V, I_L = 3.7 Amp. Find the output torque, output power and efficiency.   [8+8]

---ooOoo---

Code No: 233AE

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Pharmacy II Year I Semester Examinations, November-2017
PHARMACEUTICAL ANALYSIS –I

Time: 3hours   Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question
carries 10 marks and may have a, b, c as sub questions.

PART- A   (25 Marks)

1.a) Name various types of acid base titrations.   [2]
  b) Express the following result in correct number of significant figures:
      $0.041 \times 9.0567 \times 0.07654 \times 2.986 \times 0.22222222 = ?$
      $258.10 + 0.066 + 0.382466 + 93.6544 + 0.259 = ?$ [3]
  c) Name any two masking and demasking agents.   [2]
  d) List the precautions to be taken while preparing perchloric acid.   [3]
  e) Name indicator and reference electrode for complexometric and precipitation titrations.
                                                                                  [2]
  f) Explain the conductometric titration curve for strong acid Vs strong base.   [3]
  g) Write two examples for strong and weak adsorbents used in column chromatography.
                                                                                  [2]
  h) List the factors affecting Rf in Paper chromatography.   [3]
  i) List the interferences in flame photometry.   [2]
  j) Write physical methods of moisture content determination in brief.   [3]

PART-B   (50 Marks)

2.a) Define Accuracy and Precision.
  b) Assay results of content of Paracetamol in given 500 mg Crocin tablets are as follows.
      As an analyst, justify which method is better for routine analysis.   [2+8]

Trial No.	Method A	Method B
1	500.00 mg	498.80 mg
2	493.80 mg	501.90 mg
3	490.00 mg	504.00 mg
4	505.80 mg	489.80 mg
5	488.10 mg	498.90 mg
6	504.10 mg	500.10 mg

                                        OR
3.a) What are redox indicators? Classify them examples.
  b) Explain the principle and a brief procedure in the assay of boric acid.   [5+5]

4.a) Explain types of edetate titrations.
  b) Explain the theory underlying non aqueous titration.
  c) Write the reasons for co-precipitation.   [5+3+2]
                                        OR
5.a) Explain the precipitation from homogeneous solution.
  b) Explain the principle and a brief procedure in the assay of sodium benzoate as per IP.
                                                                                [5+5]

6.a) Explain the working of Calomel electrode.
  b) List the applications of polarography and amperometry.   [5+5]

OR

7.a) List the demerits of dropping mercury electrode.
  b) Write the merits and demerits of potentiometric titration over conventional titrations.
                                                                          [5+5]

8.a) Write the advantages of chromatographic separation methods over other separation methods.
  b) Explain compositions of Silica Gel-G, H, and P.   [5+5]

OR

9.a) Explain the general methods for the preparation of TLC plates.
  b) Explain method and use of 3D paper chromatography.   [5+5]

10.a) Explain the instrumentation for low range turbidometer.
   b) Explain chemical methods for the moisture content determination.   [5+5]

OR

11.a) Enlist the applications of Polarometry.
   b) Explain standard addition method for the quantitative determination of sodium using flame photometer.
   c) Write differences between nephelometer and turbidometer.   [3+3+4]

--ooOoo--

Code No: 223AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Pharmacy II Year I Semester Examinations, November-2017
PHARMACEUTICAL ORGANIC CHEMISTRY - II

Time: 3hours   Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A   (25 Marks)

1.a) Write the preparation of indole.   [2]
  b) Write the preparation of iso-quinoline.   [3]
  c) Explain two reactions of pyrimidine.   [2]
  d) Explain method of preparation of pyrazole and oxazole.   [3]
  e) Define relative configuration and give its importance.   [2]
  f) Explain optical activity, chirality and notations.   [3]
  g) Explain the chemical structure of uric acid and theobromine.   [2]
  h) Explain oxidation reactions with suitable examples.   [3]
  i) Explain the reaction mechanism of Wittig reaction.   [2]
  j) Explain the reaction mechanism of Lossen rearrangement.   [3]

PART - B   (50 Marks)

2. Write in detail about nomenclature, structure and chemical reactions of acridine and pyridine.   [10]

OR

3. Explain in detail about nomenclature, structure and chemical reactions of any three 5 membered ring systems with one hetero atom.   [10]

4. Write preparation and chemical reactions of any three six membered ring systems with two hetero atoms.   [10]

OR

5. Write preparation and chemical reactions of any three fused ring systems with two heteroatoms.   [10]

6. Explain in detail about enantiomers, meso compounds and racemic mixture with relevant examples.   [10]

OR

7. Explain in detail geometrical isomerism with suitable examples and write a note on plane polarized light.   [10]

8. Write in detail about the nomenclature, structure and aromatic character of polynuclear aromatic hydrocarbons.   [10]

OR

9. Discuss about theophylline and its pharmaceutical significance, Write in detail about structure of DNA and RNA.   [10]

10. Explain the mechanism and applications of Birch reduction and curtius rearrangement in detail. [10]

OR

11. Explain the mechanism and applications of any two named reactions in detail. [10]

--ooOoo--

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
METALLURGY AND MATERIALS SCIENCE
(Common to ME, MCT, MSNT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
                                               (25 Marks)

1.a) Find the packing efficiency in HCP lattice. [2]
   b) Lattice parameter of a FCC crystal is $3.61 A^0$ calculate atomic density in (111), (110) and (100) planes. [3]
   c) What is the necessity of Alloying? [2]
   d) Distinguish between Intermetallic Compound and Electron compound. [3]
   e) What is congruent melting phase? [2]
   f) Define allotropy and give examples. [3]
   g) What is ASTM-grain size number? What is its importance? [2]
   h) Distinguish between ordered and disordered solid solution. [3]
   i) What is coring and how it can be minimized? [2]
   j) What are the general requirements of a reinforcing phase? [3]

PART- B
                                               (50 Marks)

2.a) What is an interstitial solid solution, name the five elements which commonly form interstitial solid solutions?
   b) What is a grain size? What is a fine grained and coarse-grained material? [5+5]

OR

3.a) What is crystal system and explain the Brevais lattices?
   b) Write explanatory notes ASTM grain size measuring methods. [5+5]

4. Write a note on Transformations of solid state. [10]

OR

5. Draw and explain the phase diagram where two components are completely soluble in both liquid and solid state with suitable examples. [10]

6.a) What is the effect of alloying elements on Fe-Fe$_3$C diagram?
   b) Draw the TTT diagrams and explain the different cooling rates. [5+5]

OR

7.a) What is hardenability and how it is measured?
   b) Differentiate between Hardening and Tempering. [5+5]

8.a) What is cast Iron and explain the classification of cast irons?
   b) Differentiate between Cu alloys and Al alloys with respect to properties, heat treatment, composition and microstructure. [5+5]

OR

9.a) Draw and Explain the Cu-Zn phase diagram.
   b) Write short notes on Ti alloys. [5+5]

10. Enumerate the characteristics, properties and applications of Polymers.   [10]

OR

11. Write Short notes on:
     a) Metal ceramic mixtures.
     b) C- Composites.   [5+5]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
METALLURGY AND MATERIALS SCIENCE
(Common to ME, MCT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Find the packing efficiency in HCP lattice. [2]
  b) Lattice parameter of a FCC crystal is $3.61 A^0$ calculate atomic density in (111), (110) and (100) planes. [3]
  c) What is the necessity of Alloying? [2]
  d) Distinguish between Intermetallic Compound and Electron compound. [3]
  e) What is congruent melting phase? [2]
  f) Define allotropy and give examples. [3]
  g) What is ASTM-grain size number? What is its importance? [2]
  h) Distinguish between ordered and disordered solid solution. [3]
  i) What is coring and how it can be minimized? [2]
  j) What are the general requirements of a reinforcing phase? [3]

PART- B
(50 Marks)

2.a) What is an interstitial solid solution. name the five elements which commonly form interstitial solid solutions?
  b) What is a grain size? What is a fine grained and coarse-grained material? [5+5]

OR

3.a) What is crystal system and explain the Brevais lattices?
  b) Write explanatory notes ASTM grain size measuring methods. [5+5]

4.   Write a note on Transformations of solid state. [10]

OR

5.   Draw and explain the phase diagram where two components are completely soluble in both liquid and solid state with suitable examples. [10]

6.a) What is the effect of alloying elements on $Fe-Fe_3C$ diagram?
  b) Draw the TTT diagrams and explain the different cooling rates. [5+5]

OR

7.a) What is hardenability and how it is measured?
  b) Differentiate between Hardening and Tempering. [5+5]

8.a) What is cast Iron and explain the classification of cast irons?
  b) Differentiate between Cu alloys and Al alloys with respect to properties, heat treatment, composition and microstructure. [5+5]

OR

9.a) Draw and Explain the Cu-Zn phase diagram.
  b) Write short notes on Ti alloys. [5+5]

10. Enumerate the characteristics, properties and applications of Polymers. [10]

OR

11. Write Short notes on:
    a) Metal ceramic mixtures.
    b) C- Composites. [5+5]

---ooOoo---

Code No: 123BR

<div style="text-align:right">**R15**</div>

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
BASIC ELECTRICAL ENGINEERING
(Common to CSE, IT)

Time: 3 Hours
Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) State the Superposition theorem.   [2]
 b) A conductor is 50 m long. It has a cross – sectional area of 2 mm^2 while it offers a resistance of 10 Ω. Find the conductivity of the material.   [3]
 c) How does inductance and capacitance will behave when an alternating sinusoidal voltage is applied to them.   [2]
 d) A coil has an inductance of 50 mH and negligible resistance. Find its reactance at 100 Hz.   [3]
 e) What are the conditions to be fulfilled to work as step up transformer?   [2]
 f) Distinguish between Ideal and a practical transformer.   [3]
 g) Explain the principle of operation of DC Generator.   [2]
 h) What is the difference between a separately excited and a self excited generator?   [3]
 i) List the advantages of Moving coil instruments.   [2]
 j) List the necessary purpose of providing the controlling torque in indicating Instrument.   [3]

PART-B
(50 Marks)

2.a) State and explain Kirchhoff's current law and Kirchhoff's Voltage law.
 b) Find the equivalent capacitance of the system across terminals a-b shown in the figure 1.   [5+5]
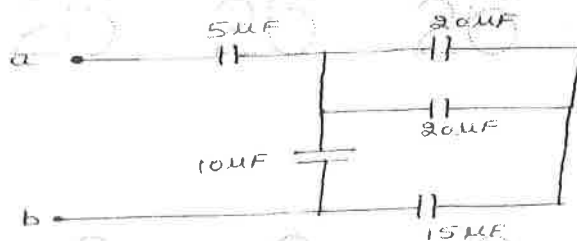

Figure: 1
OR

3.a) Explain the process followed for Star (Y) – Delta (Δ) transformation.
 b) Find the Thevenin's equivalent for the network shown in figure 2 across R_L. [5+5]
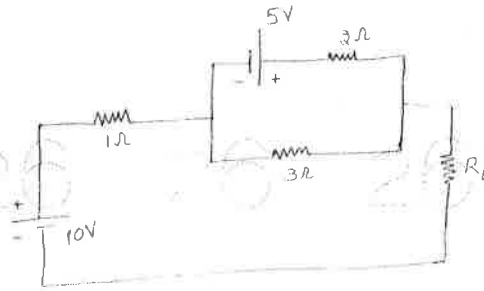
Figure: 2

4.a) How do you generate alternating emf and explain the terms phase angle and Amplitude.

b) Find the average and rms of the waveform shown in the figure 3.　　　[5+5]
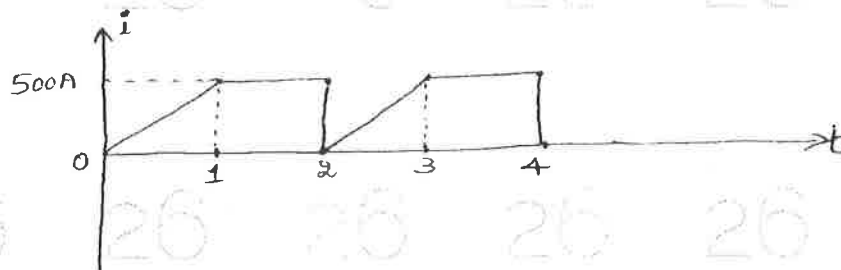

Figure: 3

OR

5.a) Explain the terms with respect to Alternating Quantity: i) Average value ii) Form factor.

b) A voltage of 400 V is applied to a series circuit containing a resistor, an inductor and a capacitor. The respective voltages across the components are 250 V, 200 V and 180 V and the current is 5 A. Determine the phase angle of the current. [5+5]

6.a) Explain the principle of operation of a transformer.

b) Define the term Regulation and derive the expression for regulation of a transformer.　　　[5+5]

OR

7.a) Explain in detail about Core type and shell type transformers.

b) A 200 KVA single – phase transformer has 1000 turns in the primary and 600 turns on the secondary. The primary winding is supplied from a 440 V, 50 Hz source. Find the i) Secondary voltage at no load and ii) Primary and secondary currents at the full load.　　　[5+5]

8.a) Distinguish between the short shunt and long shunt compound generators.

b) A 4 pole lap wound DC Generator has 680 conductors; a flux of 30 mWb per pole driven at 550 rpm. Find the generated emf.　　　[5+5]

OR

9.a) Explain in detail about lap and wave windings in DC Machines.

b) A three phase, 50 Hz, 6- pole induction motor runs at 950 rpm. Calculate:
i) the synchronous speed ii) the slip and iii) frequency of the rotor emf.　　　[5+5]

10.a) Explain the different methods of generating Damping torque and explain them with neat sketches.
   b) List the different types of errors that occur in Moving iron instruments and how can we compensate them.   [5+5]

OR

11.a) Explain in detail about Indicating, Integrating and recording electrical instruments with an example of each type.
   b) With a neat sketch explain the working of Repulsion type moving iron instrument.   [5+5]

---ooOoo---

Code No: 123AH

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, November/December - 2017
MATHEMATICS – III
(Common to EEE, ECE, EIE, ETM)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Solve $\left(D^4 + 13D^2 - 36\right)y = 0$. [2]

  b) Find the P.I of $\left(D^2 - 4\right)y = \cos 2x$. [3]

  c) Prove that $P_n^1(1) = \frac{1}{2}n(n+1)$. [2]

  d) Prove that $\int x J_0^2(x)\,dx = \frac{1}{2}x^2\left[J_0^2(x) - J_1^2(x)\right]$. [3]

  e) If $u = e^x(x\cos y - y\sin y)$ then find analytic function of $f(z)$. [2]

  f) Evaluate $\int_0^{1+i} (x^2 - iy)\,dz$ along the path $y = x^2$. [3]

  g) Expand $f(z) = \frac{z+3}{z(z^2 - z - 2)}$ for $|z| > 2$. [2]

  h) Find the residue of $f(z) = \frac{e^z}{(z-1)^2}$ at the singular point. [3]

  i) Find the fixed points of $w = \frac{3z - 2}{z + 1}$. [2]

  j) Prove that $w = \frac{1}{z}$ is circle preserving. [3]

PART-B

(50 Marks)

2.a) Solve $(D+2)(D-1)^2 = e^{-2x} + 2\sinh x$.

  b) Solve $(1+x)^2\frac{d^2y}{dx^2} - (1+x)\frac{dy}{dx} + y = 4\cos\log(1+x)$. [5+5]

OR

3. Obtain the series solution of the equation $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + (x^2 - 4)y = 0$ [10]

4.a) Prove that $\int_{-1}^{1} P_m(x)P_n(x)dx = \begin{cases} 0 & if\ m \neq n \\ \dfrac{2}{2n+1}, & if\ m = n \end{cases}$

   b) Show that $\dfrac{2}{5}P_3(x) + \dfrac{3}{5}P_1(x) = x^3$. [5+5]

OR

5.a) Prove that $\dfrac{d}{dx}\left[J_n^2(x) + J^2_{n+1}(x)\right] = 2\left[\dfrac{n}{x}J_n^2(x) - \dfrac{(n+1)}{x}J^2_{n+1}(x)\right]$.

   b) Show that $\left[J_{\frac{1}{2}}(x)\right]^2 + \left[J_{-\frac{1}{2}}(x)\right]^2 = \dfrac{2}{\pi x}$. [5+5]

6.a) Prove that the function of $f(z)$ defined by

   $f(z) = \dfrac{x^3(1+x) - y^3(1-i)}{x^2 + y^2}, z \neq 0$

   $= 0, \qquad\qquad z = 0$

   is continuous and C – R equations at the origin, yet $f'(0)$ does not exist.

   b) If $f(z)$ is an analytic function of z, prove that $\left(\dfrac{\partial^2}{\partial x^2} + \dfrac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$. [5+5]

OR

7.a) Evaluate $\int_c \dfrac{z+4}{z^2+2z+5}dz$ where c is the circle.

   i) $|z+1-i| = 2$

   ii) $|z+1+i| = 2$

   b) State and prove Cauchy's inequalities. [5+5]

8.a) State and prove residue theorem.

   b) Evaluate $\int_0^{\pi} \dfrac{ad\theta}{a^2 + \sin^2\theta} (a > 0)$. [5+5]

OR

9.a) Evaluate $\int_0^{\infty} \dfrac{dx}{x^4 + a^4} (a > 0)$.

   b) Prove that $\int_0^{\infty} \dfrac{\sin mx}{x}dx = \dfrac{\pi}{2}$. [5+5]

10.a) Plot the image of $1 < |z| < 2$ under the transformation $w = 2iz + 1$.

   b) Find the graph of the region $\dfrac{-\pi}{2} < x < \dfrac{\pi}{2}$, $1 < y < 2$ under the mapping $w = \sin z$. [5+5]

OR

11.a) Find the image of the region in the z-plane between the lines $y = 0$ and $y = \dfrac{\pi}{2}$ under the transformation $w = e^z$.

   b) Find the bilinear transformation which maps the points $\infty, i, 0$ in the z-plane into $-1, -i, 1$ in the w-plane. [5+5]

--ooOoo--

Code No: 113BR

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
BASIC ELECTRICAL ENGINEERING
(Common to CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
       Part A is compulsory which carries 25 marks. Answer all questions in Part A.
       Part B consists of 5 Units. Answer any one full question from each unit.
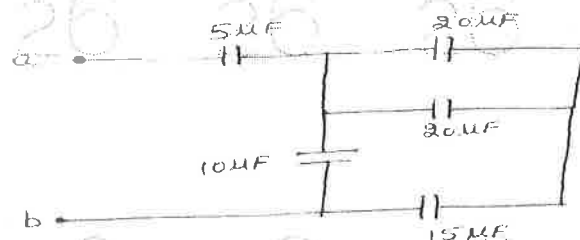   Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) State the Superposition theorem.   [2]
  b) A conductor is 50 m long. It has a cross – sectional area of 2 mm^2 while it offers a
      resistance of 10 Ω. Find the conductivity of the material.   [3]
  c) How does inductance and capacitance will behave when an alternating sinusoidal
      voltage is applied to them.   [2]
  d) A coil has an inductance of 50 mH and negligible resistance. Find its reactance at
      100 Hz.   [3]
  e) What are the conditions to be fulfilled to work as step up transformer? [2]
  f) Distinguish between Ideal and a practical transformer.   [3]
  g) Explain the principle of operation of DC Generator.   [2]
  h) What is the difference between a separately excited and a self excited generator?
                                                                              [3]
  i) List the advantages of Moving coil instruments.   [2]
  j) List the necessary purpose of providing the controlling torque in indicating
      Instrument.   [3]

PART-B

(50 Marks)

2.a) State and explain Kirchhoff's current law and Kirchhoff's Voltage law.
  b) Find the equivalent capacitance of the system across terminals a-b shown in the
      figure 1.   [5+5]

Figure: 1
OR

3.a) Explain the process followed for Star (Y) – Delta (Δ) transformation.
  b) Find the Thevenin's equivalent for the network shown in figure 2 across R$_L$. [5+5]
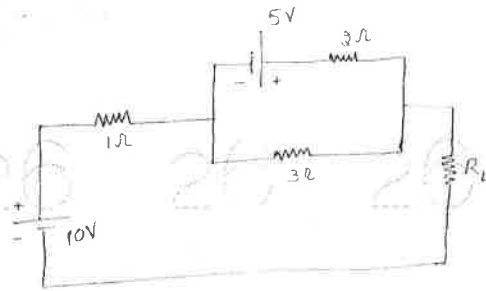
Figure: 2

4.a) How do you generate alternating emf and explain the terms phase angle and Amplitude.

b) Find the average and rms of the waveform shown in the figure 3.　　　[5+5]
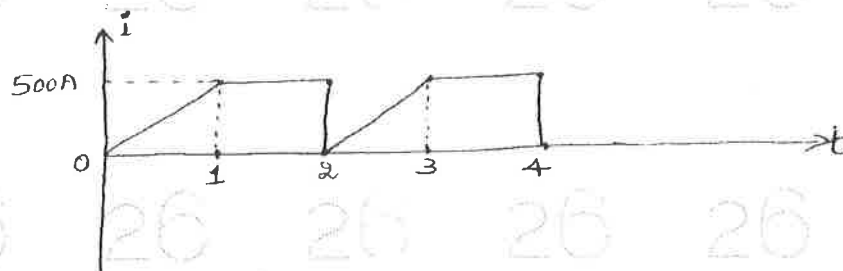

Figure: 3

OR

5.a) Explain the terms with respect to Alternating Quantity: i) Average value ii) Form factor.

b) A voltage of 400 V is applied to a series circuit containing a resistor, an inductor and a capacitor. The respective voltages across the components are 250 V, 200 V and 180 V and the current is 5 A. Determine the phase angle of the current. [5+5]

6.a) Explain the principle of operation of a transformer.

b) Define the term Regulation and derive the expression for regulation of a transformer.　　　[5+5]

OR

7.a) Explain in detail about Core type and shell type transformers.

b) A 200 KVA single – phase transformer has 1000 turns in the primary and 600 turns on the secondary. The primary winding is supplied from a 440 V, 50 Hz source. Find the i) Secondary voltage at no load and ii) Primary and secondary currents at the full load.　　　[5+5]

8.a) Distinguish between the short shunt and long shunt compound generators.

b) A 4 pole lap wound DC Generator has 680 conductors; a flux of 30 mWb per pole driven at 550 rpm. Find the generated emf.　　　[5+5]

OR

9.a) Explain in detail about lap and wave windings in DC Machines.

b) A three phase, 50 Hz, 6- pole induction motor runs at 950 rpm. Calculate:
i) the synchronous speed ii) the slip and iii) frequency of the rotor emf.　　　[5+5]

10.a) Explain the different methods of generating Damping torque and explain them with neat sketches.

b) List the different types of errors that occur in Moving iron instruments and how can we compensate them. [5+5]

OR

11.a) Explain in detail about Indicating, Integrating and recording electrical instruments with an example of each type.

b) With a neat sketch explain the working of Repulsion type moving iron instrument. [5+5]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, November/December - 2017
MATHEMATICS – III
(Common to EEE, ECE, EIE, ETM, AGE)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)   Solve $(D^4 + 13D^2 + 36)y = 0$.   [2]

b)   Find the P.I of $(D^2 + 4)y = \cos 2x$.   [3]

c)   Prove that $P_n^1(1) = \frac{1}{2}n(n+1)$.   [2]

d)   Prove that $\int x J_0^2(x)dx = \frac{1}{2}x^2\left[J_0^2(x) - J_1^2(x)\right]$.   [3]

e)   If $u = e^x(x\cos y - y\sin y)$ then find analytic function of $f(z)$.   [2]

f)   Evaluate $\int_0^{1+i} (x^2 - iy)dz$ along the path $y = x^2$.   [3]

g)   Expand $f(z) = \frac{z+3}{z(z^2 - z - 2)}$ for $|z| > 2$.   [2]

h)   Find the residue of $f(z) = \frac{e^z}{(z-1)^2}$ at the singular point.   [3]

i)   Find the fixed points of $w = \frac{3z-2}{z+1}$.   [2]

j)   Prove that $w = \frac{1}{z}$ is circle preserving.   [3]

PART-B

(50 Marks)

2.a)   Solve $(D+2)(D-1)^2 = e^{-2x} + 2\sinh x$.

b)   Solve $(1+x)^2\frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} + y = 4\cos\log(1+x)$.   [5+5]

OR

3.   Obtain the series solution of the equation $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + (x^2 - 4)y = 0$ [10]

4.a) Prove that $\int_{-1}^{1} P_m(x)P_n(x)dx = \begin{cases} 0 & \text{if } m \neq n \\ \dfrac{2}{2n+1}, & \text{if } m = n \end{cases}$

b) Show that $\dfrac{2}{5}P_3(x) + \dfrac{3}{5}P_1(x) = x^3$. [5+5]

OR

5.a) Prove that $\dfrac{d}{dx}\left[J_n^2(x) + J_{n+1}^2(x) \right] = 2\left[\dfrac{n}{x} J_n^2(x) - \dfrac{(n+1)}{x} J_{n+1}^2(x) \right]$.

b) Show that $\left[J_{\frac{1}{2}}(x) \right]^2 + \left[J_{-\frac{1}{2}}(x) \right]^2 = \dfrac{2}{\pi x}$. [5+5]

6.a) Prove that the function of $f(z)$ defined by

$f(z) = \dfrac{x^3(1+x) - y^3(1-i)}{x^2 + y^2}, z \neq 0$

$= 0, \qquad z = 0$

is continuous and C – R equations at the origin, yet $f'(0)$ does not exist.

b) If $f(z)$ is an analytic function of z, prove that $\left(\dfrac{\partial^2}{\partial x^2} + \dfrac{\partial^2}{\partial y^2} \right)|f(z)|^2 = 4|f'(z)|^2$. [5+5]

OR

7.a) Evaluate $\int_c \dfrac{z+4}{z^2 + 2z + 5} dz$ where c is the circle.

i) $|z+1-i| = 2$

ii) $|z+1+i| = 2$

b) State and prove Cauchy's inequalities. [5+5]

8.a) State and prove residue theorem.

b) Evaluate $\int_0^\pi \dfrac{a d\theta}{a^2 + \sin^2 \theta} (a > 0)$. [5+5]

OR

9.a) Evaluate $\int_0^\infty \dfrac{dx}{x^4 + a^4} (a > 0)$.

b) Prove that $\int_0^\infty \dfrac{\sin mx}{x} dx = \dfrac{\pi}{2}$. [5+5]

10.a) Plot the image of $1 < |z| < 2$ under the transformation $w = 2iz + 1$.

b) Find the graph of the region $\dfrac{-\pi}{2} < x < \dfrac{\pi}{2}, 1 < y < 2$ under the mapping $w = \sin z$. [5+5]

OR

11.a) Find the image of the region in the z-plane between the lines $y = 0$ and $y = \dfrac{\pi}{2}$ under the transformation $w = e^z$.

b) Find the bilinear transformation which maps the points $\infty, i, 0$ in the z-plane into $-1, -i, 1$ in the w-plane. [5+5]

--ooOoo--

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
METALLURGY AND MATERIALS SCIENCE
(Common to ME, MCT, AME)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Find the packing efficiency in HCP lattice. [2]
   b) Lattice parameter of a FCC crystal is $3.61A^0$ calculate atomic density in (111), (110) and (100) planes. [3]
   c) What is the necessity of Alloying? [2]
   d) Distinguish between Intermetallic Compound and Electron compound. [3]
   e) What is congruent melting phase? [2]
   f) Define allotropy and give examples. [3]
   g) What is ASTM-grain size number? What is its importance? [2]
   h) Distinguish between ordered and disordered solid solution. [3]
   i) What is coring and how it can be minimized? [2]
   j) What are the general requirements of a reinforcing phase? [3]

PART- B
(50 Marks)

2.a) What is an interstitial solid solution, name the five elements which commonly form interstitial solid solutions?
   b) What is a grain size? What is a fine grained and coarse-grained material? [5+5]

OR

3.a) What is crystal system and explain the Brevais lattices?
   b) Write explanatory notes ASTM grain size measuring methods. [5+5]

4. Write a note on Transformations of solid state. [10]

OR

5. Draw and explain the phase diagram where two components are completely soluble in both liquid and solid state with suitable examples. [10]

6.a) What is the effect of alloying elements on $Fe-Fe_3C$ diagram?
   b) Draw the TTT diagrams and explain the different cooling rates. [5+5]

OR

7.a) What is hardenability and how it is measured?
   b) Differentiate between Hardening and Tempering. [5+5]

8.a) What is cast Iron and explain the classification of cast irons?
   b) Differentiate between Cu alloys and Al alloys with respect to properties, heat treatment, composition and microstructure. [5+5]

OR

9.a) Draw and Explain the Cu-Zn phase diagram.
   b) Write short notes on Ti alloys. [5+5]

10. Enumerate the characteristics, properties and applications of Polymers. [10]

OR

11. Write Short notes on:
   a) Metal ceramic mixtures.
   b) C- Composites. [5+5]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
BASIC ELECTRICAL ENGINEERING
(Common to CSE, IT)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) State and explain Ohm's Law. Also explain its limitations.
  b) Three resistors 4 ohms, 6 ohms, and 12 ohms are connected in parallel. If the total current taken by three resistances is 12 A, find voltage across and current through each resistor.   [7+8]

2.a) State and explain Thevenin's theorem.
  b) Determine the equivalent resistance between the terminals X and Y of the circuit shown in figure 1 using star-delta transformation. All resistance values are in ohms.   [7+8]
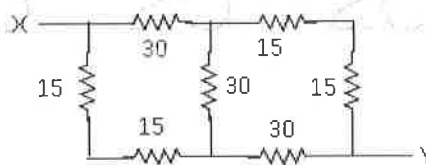

Figure: 1

3.a) The resistance of a coil is 140 Ω and its inductance 0.85 H. Determine current, power factor and circuit impedance when the coil is connected to 120 V, 50 Hz supply.
  b) Find average and RMS values of half-wave rectified sine wave shown in figure 2.   [6+9]
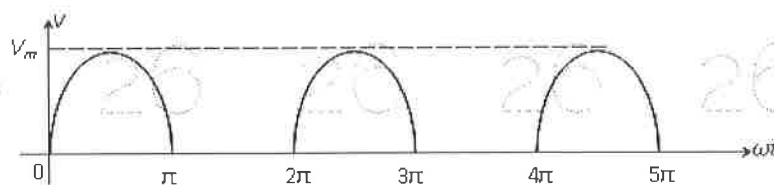

Figure: 2

4.a) What is voltage regulation of a transformer and develop an expression for calculating the voltage regulation in the transformer?
  b) A 175 kVA 6600/440V, 50 Hz single phase transformer has 100 turns on secondary. Calculate (i) value of full load primary and secondary currents (ii) the number of turns on primary (iii) The maximum value of flux.   [8+7]

5.a) Describe the construction of a DC generator and explain what materials are used for each component of the machine.

b) An 8-pole lap connected armature has 960 conductors, a flux of 40 milli-Wb per pole and a speed of 400 rpm. Determine the e.m.f generated. [9+6]

6.a) Derive an expression for the torque developed by a DC motor.

b) A 400 V, DC motor takes 5 A at no load. Its armature and field resistances are 0.5 Ω and 200 Ω. Calculate the efficiency when motor takes 40 A on full load. [8+7]

7.a) Explain the construction and principle of operation of induction motor.

b) A 3 phase, 6 pole, 50 Hz induction motor has a slip of 1% at no load and 3% at full load. Find (i) No load speed (ii) Full load speed. [9+6]

8.a) Explain the basic requirements of an instrument for measurement of electrical quantity.

b) Describe the construction and principle of operation of a moving iron type voltmeter. [7+8]

---ooOoo---

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
BASIC ELECTRICAL AND ELECTRONIC ENGINEERING
(Biotechnology)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) Derive an expression for energy stored in inductor circuit.
  b) Three equal resistances of value R ohms are connected in delta fashion. If this is reduced by an equivalent Y-connection with resistances R1, R2 and R3. what are the values of R1, R2 and R3 in terms of R? [7+8]

2.a) Explain the sinusoidal response of series RC circuit and derive necessary expressions.
  b) A 50 Hz sinusoidal voltage V=310 sinωt is applied to an RL series circuit. If the magnitude of resistance is 5Ω and that of inductance is 0.2H.
  i) Calculate the RMS value of steady state current and relative phase angle.
  ii) Obtain the expression for the instantaneous current.
  iii) Compute the effective magnitude and phase of voltage drop appearing across each circuit element. [7+8]

3.a) With a neat schematic diagram, explain the measurement of three-phase power using two watt meters.
  b) Two wattmeters are connected to measure power input to a 3-phase circuit indicate 2500 W and 500W respectively. Find the power factor of the circuit. [8+7]

4.a) Explain the principle of operation and applications of DC motor.
  b) Derive from first principles an expression for the emf induced in a DC generator. [7+8]

5.a) What are the advantages and disadvantages of PMMC instruments?
  b) Describe the construction and working of PMMC instrument. [7+8]

6. What is a rectifier? Explain the operation of half wave rectifier with a neat circuit diagram. [15]

7.a) Discuss the characteristics of UJT.
  b) What is feedback? What is negative feedback? Discuss its use in control. [7+8]

8. Explain the working of the following:
  a) R-S Flip flops   b) A to D converters   [7+8]

---ooOoo---

Code No: 53007

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
MATHEMATICS-III
(Common to EEE, ECE, EIE, ETM)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a)   If m, n are positive then prove that $\frac{\beta(m,\ n+1)}{n} = \frac{\beta(n+1,\ m)}{m} = \frac{\beta(m,\ n)}{m+n}$.

  b)   If m_1, m_2 are roots of $J_n(x) = 0$, then prove that $\int_0^1 x J_n(m_1 x) J_n(m_2 x)\, dx = 0$.
                                                                                          [8+7]

2.a)   Prove that $\int_{-1}^1 (P_n')^2 dx = n(n+1)$.

  b)   Show that $\frac{\sqrt{1-x^2}}{1-2xt+t^2} = \sum_1^\infty U_{n+1}(x) t^n$.   [7+8]

3.a)   If $f(z)$ is analytic at z_0, prove that it must be continuous at z_0. Give an example to show that the converse is not true.

  b)   If $\tan \log(x+iy) = a + ib$, where $a^2 + b^2 \neq 1$, prove that $\tan \log(x^2+y^2) = \frac{2a}{1-a^2-b^2}$.
                                                                                          [8+7]

4.a)   State and prove Cauchy integral formula.

  b)   If $F(a) = \int_c \frac{3z^2+7z+1}{z-a}\, dz$ where c is the circle $|z|=2$. Find the values of F(1), F(3), F''(1-i).   [7+8]

5.a)   Evaluate $\oint_c \frac{dz}{z^2+6iz}$ where c is the circle $|z| = 1$.

  b)   Evaluate $\int_c \frac{z\,secz}{(1-z^2)}\, dz$ where c is the ellipse $4x^2 + 9y^2 = 9$.   [7+8]

6.   Evaluate $\int_0^{2\pi} \frac{sin^2\theta}{a+bcos\theta}\, d\theta$; $(a > b > 0)$.   [15]

7.a)   Show that every bilinear transformation maps the circles in the z-plane onto the circles in the w-plane.

  b)   Determine the region of the w-plane into which the first quadrant of z-plane is mapped by the transformation $w = z^2$.   [7+8]

8.a)   Show that every complete graph is regular.

  b)   If G = (V, E) be an undirected graph with 'e' edges. Then prove that the sum of the degrees of all the vertices of the graph is twice the number of edges.   [7+8]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
METALLURGY AND MATERIAL SCIENCE
(Common to ME, AME)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- - -

1.a) Explain the effect of grain size on the properties of metals and alloys.
  b) Explain about metallic bonds in metals. [8+7]

2.a) Explain in detail about the types of solid solution.
  b) Write short notes on intermediate alloy phases. [8+7]

3.a) Construct an isomorphous phase diagram by cooling curves method.
  b) Explain about the reaction taking place in Fe-Fe_3C Phase diagram. [8+7]

4.a) Distinguish between white cast iron and grey cast iron.
  b) Explain the properties and applications of alloy cast iron. [8+7]

5.a) Explain briefly about pack carburizing.
  b) Construct the TTT diagram for mild steels. [7+8]

6. Classify copper alloys. Explain the properties and application of some important alloys of copper. [15]

7.a) Define nano materials. Explain the properties of nano materials compare with conventional materials.
  b) What are cermets? Explain the properties of cermets. [8+7]

8.a) Differentiate between MMC and C-C composites.
  b) Explain with neat sketch any one manufacturing technique of composites. [7+8]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, November/December - 2017

ELECTRO MAGNETIC FIELDS

(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 80

Answer any five questions
All questions carry equal marks

- - -

1.a) State and explain Maxwell's first law.
 b) An infinitely long line charge oriented parallel to Z-axis carries a uniformly distributed charge of density $0.1\,\mu C/m$ It is situated at x=1m,y= -5 m. Determine the electric field $\vec{E}$ at (-1,-1,5) m.   [8+8]

2.a) An electric dipole of 100 a_zpC-m is located at the origin. Find V and $\vec{E}$ at the points (0, 0, 10) and (1, $\pi/3$, $\pi/2$).
 b) Derive Laplace's equation.   [8+8]

3.a) Derive the expressions for dielectric-dielectric boundary conditions.
 b) For current density J= 10 z $\sin^2$ $\varphi\overrightarrow{a_r}$ A/m^2, find the current through the cylindrical surface r = 2, $1 \le z \le 5\,m$.   [8+8]

4.a) Derive the expression for magnetic field intensity due a long current carrying conductor using Biot-savart's law.
 b) A triangular current loop of each side 1m carries a current 10A.Find the magnetic field intensity at its centroid.   [8+8]

5.a) State Ampere circuital law. Using Ampere-circuital law determine the magnetic field intensity due a long current carrying conductor.
 b) Find the magnetic field intensity at the centre of a square loop of each side 1m carrying a current of 10 A. The loop lies in z = 0 plane. Use Ampere-circuital law.   [8+8]

6.a) What is magnetic dipole-moment? Explain.
 b) Derive the expression for force between two current elements. Two infinitely long current carrying conductors are carrying currents 10 A, 20 A respectively in opposite directions separated by 5m. Find the force on each other.   [8+8]

7.a) Derive the expression for magnetic field intensity of infinite sheet of current density K=k_y a_y from the concepts of vector magnetic potential.
 b) A toroidal core has a mean radius of $r_0 = 10$ cm and and a circular cross section of radius 1 cm. If the core is made up of steel (relative permeability 1000) and has a coil with 200 turns. Calculate the amount of current that will produce a flux of 0.5 m Wb in the core.   [8+8]

8.a) State and prove Poynting theorem.
 b) Explain the concept of displacement current.   [8+8]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
MATHEMATICS – IV
(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, MMT, AE, MIE, PTM, CEE, MSNT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Show that $f(z) = z + \bar{z}$ is not analytic any where in the complex plane. [2]

b) Write Cauchy-Remainn equations in Polar form. [3]

c) Find the residues at the poles of the function $f(z) = \dfrac{1}{(z+1)(z+2)}$. [2]

d) Expand $f(z) = Tanz$ in Taylor's series about the point z=0. [3]

e) Define Bilinear transformation. [2]

f) Define for a complex function: i) Isolated Singularity ii) Removable Singularity. [3]

g) If $f(x) = x^2$ in $[-\pi, \pi]$, find a_0 in Fourier series. [2]

h) State Fourier integral theorem. [3]

i) Write the one dimensional Heat equation in steady state. [2]

j) Classify partial differential equation $\dfrac{\partial^2 z}{\partial x^2} - 2\dfrac{\partial z}{\partial x} + \dfrac{\partial z}{\partial y} = 0$. [3]

PART-B
(50Marks)

2.a) Determine p so that the function $f(z) = \frac{1}{2}\log(x^2 + y^2) + Tan^{-1}(\frac{px}{y})$ is analytic.

b) Find the analytic function $f(z) = u + iv$ if $u - v = e^x[\cos y - \sin y]$. [5+5]

OR

3.a) Determine the analytical function whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2 = 1$. Also find the harmonic conjugate of this real part.

b) Prove that $\left[\dfrac{\partial^2}{\partial x^2} + \dfrac{\partial^2}{\partial y^2}\right]|f(z)|^2 = 4|f'(z)|^2$. [5+5]

4.a) Using Cauchy integral formula, find $\int_c \dfrac{e^{2z}}{(z+1)^3} dz$, where C is the curve $|z| = 2$.

b) Evaluate $\int(x^2 - iy^2)dz$ along a straight line from (0,0) to (0,1) and then from (0,1) to (2,1). [5+5]

OR

5. Find Laurent's series of $\dfrac{z}{(z-1)(z-2)}$ about:

   a) $|z| < 1$ b) $|z| > 1$ c) $1 < |z| < 2$ [10]

6. Evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5 - 4\cos\theta} d\theta$. [10]

OR

7. Find Mobius transformation that maps:
   a) $0, 1, \infty$ into $-5, -1, 3$, Find fixed points.
   b) $\infty, i, 0$ to $0, -i, \infty$. [5+5]

8. Find the Fourier series of $f(x) = e^{-x}$ in the interval(0.2π). Hence, deduce that
   $\frac{\pi}{2} \frac{1}{\sinh\pi} = \sum_{n=2}^{\infty} \frac{(-1)^n}{n^2 + 1}$ [10]

OR

9.a) Find the Fourier series for $f(x) = x + x^2$ in $-\pi < x < \pi$.

   b) Find the Fourier cosine transform of e^{-x^2} [5+5]

10. Solve $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}, u(0, y) = 8e^{-3y}$ by the method of separation of variables. [10]

OR

11. The ends of a uniform string of length $2l$ are fixed. The initial displacement is m $y(x.0) = 3x(2l - x), 0 < x < 2l$, while the initial velocity is zero, Find the displacement at any distance x from the end $x=0$ at any time 't'. [10]

---ooOoo---

Code No: 123AN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
PROBABILITY AND STATISTICS
(Common to ME, CSE, IT, MCT, AME, MIE, MSNT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

1.a) A continous Random variable has the p.d.f $f(x) = \begin{cases} Kxe^{-\lambda x} & if \ x \ge 0, \lambda \ge 0 \\ 0 & otherwise \end{cases}$

Determine K. [2]

b) If x is a Poisson variate such that $3P(x=4)=1/2P(x=2)+P(x=0)$. Find μ. [3]

c) Write the relation between correlation and regression coefficients. [2]

d) If the joint probability density function is $f(x,y) = \dfrac{x+y}{K}$, $x=1,2$; $y=1,2$ then find K.

[3]

e) A random sample of 500 Apples was taken from a large consignment of 60 were found to be bad, find the standard error. [2]

f) Among 100 students in a class, 60 people use ball pens. With 95% confidence, find the maximum error for true proportion. [3]

g) Define steady state of a queuing system. [2]

h) Define Explosive state. [3]

i) If $\begin{bmatrix} 0.5 & x \\ y & 0.124 \end{bmatrix}$ is Transition probability matrix, then find the values of x and y. [2]

j) Define limiting probability. [3]

PART- B

(50 Marks)

2.a) Let X be a random variable with the density function $f(x) = \begin{cases} x, & 0 < x < 1 \\ 0, & elsewhere \end{cases}$ Find the

moment generating function for X.

b) Suppose the weights of 500 male students are normally distributed with mean μ =150 with a standard deviation of 15. Find the number of students whose weights are Between 140 and 165. [5+5]

OR

3.a) Average number of accidents on any day on a national highway is 1.6. Determine the probability that the number of accidents is i) At least one ii) At the most one.

b) The marks obtained by 500 students is normally distributed with mean 65 % and Standard deviation 8%. Determine how many get more than 80%. [5+5]

4. The joint probability density function is given by

$$f(x,y) = \begin{cases} 10xy^2, & 0 < x < y < 1 \\ 0, & elsewhere \end{cases}$$

a) Marginal probability density function for X
b) Marginal probability density function for Y
c) Conditional P.D.F of X given Y
d) Conditional P.D.F of Y given X. [10]

OR

5. The marks obtained by 10 students in Mathematics and Statistics are given below. Find the Coefficient of correlation between the two subjects. [10]

Marks in Maths	75	30	60	80	53	35	15	40	38	48
Marks in Statistics	85	45	54	91	38	63	35	43	45	44

6. In a sample of 1000 students 500 use ball pen and in another sample of 3500 students 1400 use ball pens. Test the significance between the difference of two proportions at 5% level. [10]

OR

7. Two random samples are drawn from two normal populations are as follows.

Sample I 17   27 18 25 27 29 13 17

Sample II 16   16 20 27 26 25 21

Test whether two populations have been drawn from the same normal population.[10]

8. A fast food restaurant has one drive window. Cars arrive according to a poisson process. Cars arrive at the rate of 2 per 5 minutes. The service time per customer is 1.5 minutes. Determine:
a) The Expected number of customers waiting to be served,
b) The probability that the waiting line exceeds 10
c) Average waiting time until a customer reaches the window to place an order.
d) The probability that the facility is idle. [10]

OR

9. A ticket issuing office is being manned by a single server. Customer arrive to purchase tickets according to a Poisson distribution with a mean rate of 30 per hour. The time required to serve a customer has an exponential distribution with a mean of 90 seconds. Find:
a) Average number of customers in the system.
b) Average number of customers in the queue.
c) Average time a customer spending in the system. [10]

10. If the transition probability matrix is $\begin{bmatrix} 0.5 & 0.25 & 0.25 \\ 0.5 & 0 & 0.5 \\ 0.25 & 0.25 & 0.5 \end{bmatrix}$ and the initial probabilities

are $\left(\dfrac{1}{3},\dfrac{1}{3},\dfrac{1}{3}\right)$, then find:

a) the probabilities after three periods b) Equilibrium vector. [10]

OR

11. If the transition probability matrix of market shares of three brands A, B and C is

$\begin{bmatrix} 0.2 & 0.4 & 0.4 \\ 0.7 & 0.2 & 0.1 \\ 0.3 & 0.3 & 0.4 \end{bmatrix}$ and the initial market shares are 30%, 30% and 40%. Find:

a) The market shares in second and third periods
b) The limiting probabilities. [10]

---ooOoo---

Code No: 123BX

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
FLUID MECHANICS AND HYDRAULIC MACHINERY
(Electrical and Electronics Engineering)

Time: 3 Hours 　　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 75

Note: This question paper contains two parts A and B.
　　　　Part A is compulsory which carries 25 marks. Answer all questions in Part A.
　　　　Part B consists of 5 Units. Answer any one full question from each unit.
　　　　Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Write about stream tube with neat diagram. [2]
　b) Describe the absolute pressure and gauge pressure with neat diagram. [3]
　c) Give a classification of body forces on fluid. [2]
　d) Differentiate venture meter and nozzle meter. [3]
　e) Give list of types of hydropower plants. [2]
　f) Derive the thrust exerted by the jet in the direction normal to the stationary flat plate. [3]
　g) Mention the causes of cavitation in Francis turbine. [2]
　h) Differentiate Francis turbine and Kaplan turbine. [3]
　i) Define the hydraulic losses for centrifugal pump. [2]
　j) Differentiate manometric efficiency and overall efficiency of the centrifugal pump. [3]

PART-B

(50 Marks)

2.a) Define Viscosity. A plate having an area of 0.7 m^2 is sliding down the inclined plane at 45^0 to the horizontal with a velocity of 0.45 m/s. There is a cushion of fluid 2 mm thick between the plane and the plate. Find the viscosity of the fluid if the weight of the plate is 300 N.
　b) Differentiate rotational and irrotational flows. [7+3]

OR

3.a) An inverted U-tube is being used to measure the pressure between two points A and B in a pipe which is carrying oil of specific gravity 0.9. The column connected to point B stands 2m above the point at A. A commercial pressure gauge attached directly to the pipe at A reads 10 N/m^2, determine its reading when attached directly to the pipe at B.
　b) Differentiate steady and unsteady, uniform and non-uniform, laminar and turbulent, rotational and irrotational flows. [5+5]

4. The diameter of pipe bend is 0.4m at inlet and 0.2m at outlet and the flow is turned through 120^0 in a vertical plane. The axis at inlet is horizontal and the centre of the outlet section is 1m below the centre of inlet section. The total volume of fluid contained in the bend is 0.09m^3. Neglecting friction, calculate the magnitude and direction of force exerted on the bend by the water flowing through it at 0.4m^3/s when the inlet pressure is 140 kN/m^2. [10]

OR

5.a) Differentiate the Hydraulic Gradient Line and Total Energy Line.
  b) A pipe line carrying water has a diameter of 0.7m and is 1.8km long. To increase the delivery another pipe line of the same diameter is introduced parallel to the first pipe in the second half of its length. Find the increase in discharge if the total head loss in the both the cases is 10m. Assume =0.02 for all pipes. [3+7]

6. Consider the jet striking a moving symmetrical series of curved vanes at its centre. Derive the expression for force exerted by the jet on the wheel, work done and maximum efficiency. Draw neat figures. [10]

OR

7.a) Describe any four elements of hydropower plants.
  b) Differentiate storage and pondage.
  c) Explain the concept of pumped storage plants. [5+2+3]

8.a) A 1/3 scale model of Kaplan turbine is designed to operate at a head of 35m. The prototype produces 25 kW of power under a head of 40m when operating at a speed of 250 rpm. Find the speed, discharge and the power of the model. Assume the efficiency of the model and prototype is same at a value of 95%.
  b) Give classification of surge tanks with neat figures and mention their importance. [5+5]

OR

9.a) A Pelton wheel is working under a head of 55m and the discharge of 0.7 m^3/s. The mean bucket speed is 18 m/s. Find the overall efficiency and the power produced if the jet is deflected by the blades through the angle of 145^0. Assume the coefficient of velocity as 0.85 and mechanical efficiency as 85%.
  b) With a neat figure explain the governing mechanism of turbines. [5+5]

10. A centrifugal pump has an impeller of 80cm diameter and it delivers 1.1 m^3/s against a head of 70m. The impeller runs at 1000 rpm and its width at outlet is 8cm. If the leakage loss is 4% of the discharge, external mechanical loss is 10 kW and hydraulic efficiency is 82%, calculate the blade angle at outlet and overall efficiency. [10]

OR

11.a) Two homologous pumps A and B are to run at the same speed of 800 rpm. Pump A has an impeller of 40cm diameter and discharges 0.3 m^3/s of water under a net head of 40m. Determine the diameter of the impeller of pump B and its net head if it is to discharge 0.5 m^3/s.
  b) Describe about the main characteristic curves of the pump with neat sketches. [5+5]

---ooOoo---

Code No: 123AW

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
SIGNALS AND SYSTEMS
(Common to ECE, EIE)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each
question carries 10 marks and may have a, b, c as sub questions.
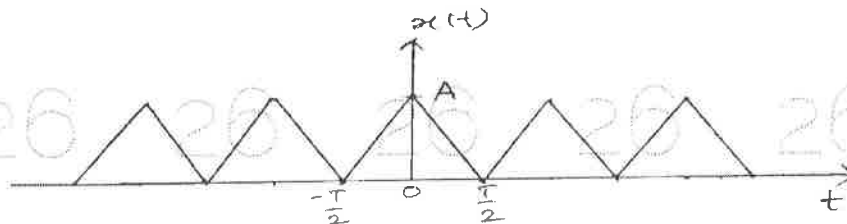
PART- A

(25 Marks)

1.a) If the Fourier series coefficient of x(t) is C_n, find the Fourier series coefficient of $x^*(t)$. [2]
  b) How do you approximate a signal using orthogonal functions? [3]
  c) What is Aliasing? [2]
  d) Determine the Fourier transform of $x(t) = e^{-at}$ $(\cos\Omega_o t)$ u(t). [3]
  e) Give the relationship between bandwidth and rise time of a signal. [2]
  f) The input and impulse response of continuous time systems are given below. Find the output of continuous time systems. $x(t) = e^{-3t}$ u(t), h(t) = u(t-1) [3]
  g) Write the relationship between autocorrelation function and power density spectrum. [2]
  h) State the properties of cross-correlation. [3]
  i) Define ROC of Z transform. [2]
  j) Let X(s)=L{x(t)}, Determine the initial value, x(0) and the final value, x(∞), for the following signal using initial value and final value theorems.
  X(s) = 7s+6 / (s(3s+5)) [3]

PART-B

(50 Marks)

2.a) Derive from the basics, how any continuous time signal x(t) can be represented as an integral of impulses.
  b) Discuss the orthogonality in complex signals. [5+5]

OR

3. Determine the exponential form of the Fourier series representation of the signal shown below. [10]

4. State and prove sampling theorem for low pass band limited signal and explain the process of reconstruction of the signal from its samples. [10]

OR

5.a) Determine the Hilbert transform for $x(t) = \cos(\omega t)$.

b) Find the Fourier transform of $x(t) = \begin{cases} e^{-|t|}; & for -1 \leq t \leq 1 \\ 0; & otherwise \end{cases}$ [4+6]

6.a) Find the transfer function of the system governed by the following impulse response. $h(t) = u(t) + 0.5e^{-6t} u(t) \pm 0.2e^{-3t} \cos t\, u(t)$.

b) Check whether the following system is linear, casual and time invariant or not. $d^3y(t)/dt^3 + 4d^2y(t)/dt^2 + 5dy(t)/dt + 2y^2(t) = x(t)$. [5+5]

OR

7. Write short notes on the following.
(a) Ideal filters characteristics.
(b) Filter characteristics of a linear system. [5+5]

8.a) State and prove Parseval's power theorem for continuous time signals.
b) Perform the convolution of the following signals, by graphical method. [4+6]
$x_1(t) = e^{-3t} u(t)$, $x_2(t) = t\, u(t)$.

OR

9.a) How do you detect the periodic signals in the presence of noise?
b) Examine the close connection between the convolution and correlation. [8+2]

10.a) Compute the Laplace transform of $x(t) = e^{-b|t|}$ for the cases of b < 0 and b > 0.
b) Obtain the inverse Laplace transform of the function $X(s) = 1/(s^2+3s+2)$, ROC : $-2 < Re(s) < -1$. [5+5]

OR

11.a) Determine the Z-transform and sketch the pole zero plot with the ROC for the following Signal: $x(n) = (0.5)^n u(n) - (1/3)^n u[n]$.
b) Determine the inverse z-transform of $X(z) = 1/(1-1.5z^{-1} + 0.5z^{-2})$, where ROC : $|z| > 1.0$ [5+5]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
PROBABILITY AND STATISTICS
(Common to ME, CSE, IT, MCT, AME, MIE)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

1.a) A continous Random variable has the p.d.f $f(x) = \begin{cases} Kxe^{-\lambda x} & if \ x \geq 0, \lambda \geq 0 \\ 0 & otherwise \end{cases}$

Determine K.   [2]

b) If x is a Poisson variate such that 3P(x=4)=1/2P(x=2)+P(x=0). Find μ.   [3]

c) Write the relation between correlation and regression coefficients.   [2]

d) If the joint probability density function is $f(x, y) = \dfrac{x+y}{K}, x = 1, 2; y = 1, 2$ then find K.

[3]

e) A random sample of 500 Apples was taken from a large consignment of 60 were found to be bad, find the standard error.   [2]

f) Among 100 students in a class, 60 people use ball pens. With 95% confidence, find the maximum error for true proportion.   [3]

g) Define steady state of a queuing system.   [2]

h) Define Explosive state.   [3]

i) If $\begin{bmatrix} 0.5 & x \\ y & 0.124 \end{bmatrix}$ is Transition probability matrix, then find the values of x and y.   [2]

j) Define limiting probability.   [3]

PART- B

(50 Marks)

2.a) Let X be a random variable with the density function $f(x) = \begin{pmatrix} x, & 0 < x < 1 \\ 0, & elsewhere \end{pmatrix}$ Find the moment generating function for X.

b) Suppose the weights of 500 male students are normally distributed with mean $\mu = 150$ with a standard deviation of 15. Find the number of students whose weights are Between 140 and 165.   [5+5]

OR

3.a) Average number of accidents on any day on a national highway is 1.6. Determine the probability that the number of accidents is i) At least one ii) At the most one.

b) The marks obtained by 500 students is normally distributed with mean 65 % and Standard deviation 8%. Determine how many get more than 80%.   [5+5]

4. The joint probability density function is given by

$$f(x,y) = \begin{cases} 10xy^2, & 0 < x < y < 1 \\ 0, & elsewhere \end{cases}$$

a) Marginal probability density function for X
b) Marginal probability density function for Y
c) Conditional P.D.F of X given Y
d) Conditional P.D.F of Y given X. [10]

OR

5. The marks obtained by 10 students in Mathematics and Statistics are given below. Find the Coefficient of correlation between the two subjects. [10]

Marks in Maths	75	30	60	80	53	35	15	40	38	48
Marks in Statistics	85	45	54	91	38	63	35	43	45	44

6. In a sample of 1000 students 500 use ball pen and in another sample of 3500 students 1400 use ball pens. Test the significance between the difference of two proportions at 5% level. [10]

OR

7. Two random samples are drawn from two normal populations are as follows.

Sample I   17   27   18   25   27   29   13   17

Sample II   16   16   20   27   26   25   21

Test whether two populations have been drawn from the same normal population.[10]

8. A fast food restaurant has one drive window. Cars arrive according to a poisson process. Cars arrive at the rate of 2 per 5 minutes. The service time per customer is 1.5 minutes. Determine:
a) The Expected number of customers waiting to be served.
b) The probability that the waiting line exceeds 10
c) Average waiting time until a customer reaches the window to place an order.
d) The probability that the facility is idle. [10]

OR

9. A ticket issuing office is being manned by a single server. Customer arrive to purchase tickets according to a Poisson distribution with a mean rate of 30 per hour. The time required to serve a customer has an exponential distribution with a mean of 90 seconds. Find:
a) Average number of customers in the system.
b) Average number of customers in the queue.
c) Average time a customer spending in the system. [10]

10. If the transition probability matrix is $\begin{bmatrix} 0.5 & 0.25 & 0.25 \\ 0.5 & 0 & 0.5 \\ 0.25 & 0.25 & 0.5 \end{bmatrix}$ and the initial probabilities

are $\left(\frac{1}{3}, \frac{1}{3}, \frac{1}{3} \right)$, then find:

a) the probabilities after three periods b) Equilibrium vector.   [10]

OR

11. If the transition probability matrix of market shares of three brands A, B and C is

$\begin{bmatrix} 0.2 & 0.4 & 0.4 \\ 0.7 & 0.2 & 0.1 \\ 0.3 & 0.3 & 0.4 \end{bmatrix}$ and the initial market shares are 30%, 30% and 40%. Find:

a) The market shares in second and third periods
b) The limiting probabilities.   [10]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
FLUID MECHANICS AND HYDRAULIC MACHINERY
(Electrical and Electronics Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Write about stream tube with neat diagram.   [2]
  b) Describe the absolute pressure and gauge pressure with neat diagram.   [3]
  c) Give a classification of body forces on fluid.   [2]
  d) Differentiate venture meter and nozzle meter.   [3]
  e) Give list of types of hydropower plants.   [2]
  f) Derive the thrust exerted by the jet in the direction normal to the stationary flat
      plate.   [3]
  g) Mention the causes of cavitation in Francis turbine.   [2]
  h) Differentiate Francis turbine and Kaplan turbine.   [3]
  i) Define the hydraulic losses for centrifugal pump.   [2]
  j) Differentiate manometric efficiency and overall efficiency of the centrifugal
      pump.   [3]

PART-B

(50 Marks)

2.a) Define Viscosity. A plate having an area of 0.7 m^2 is sliding down the inclined
      plane at 45^0 to the horizontal with a velocity of 0.45 m/s. There is a cushion of
      fluid 2 mm thick between the plane and the plate. Find the viscosity of the fluid if
      the weight of the plate is 300 N.
  b) Differentiate rotational and irrotational flows.   [7+3]

OR

3.a) An inverted U-tube is being used to measure the pressure between two points A
      and B in a pipe which is carrying oil of specific gravity 0.9. The column
      connected to point B stands 2m above the point at A. A commercial pressure
      gauge attached directly to the pipe at A reads 10 N/m^2, determine its reading
      when attached directly to the pipe at B.
  b) Differentiate steady and unsteady, uniform and non-uniform, laminar and
      turbulent, rotational and irrotational flows.   [5+5]

4.   The diameter of pipe bend is 0.4m at inlet and 0.2m at outlet and the flow is
      turned through 120^0 in a vertical plane. The axis at inlet is horizontal and the
      centre of the outlet section is 1m below the centre of inlet section. The total
      volume of fluid contained in the bend is 0.09m^3. Neglecting friction, calculate the
      magnitude and direction of force exerted on the bend by the water flowing
      through it at 0.4m^3/s when the inlet pressure is 140 kN/m^2.   [10]

OR

5.a) Differentiate the Hydraulic Gradient Line and Total Energy Line.
  b) A pipe line carrying water has a diameter of 0.7m and is 1.8km long. To increase the delivery another pipe line of the same diameter is introduced parallel to the first pipe in the second half of its length. Find the increase in discharge if the total head loss in the both the cases is 10m. Assume =0.02 for all pipes.   [3+7]

6. Consider the jet striking a moving symmetrical series of curved vanes at its centre. Derive the expression for force exerted by the jet on the wheel, work done and maximum efficiency. Draw neat figures.   [10]

OR

7.a) Describe any four elements of hydropower plants.
  b) Differentiate storage and pondage.
  c) Explain the concept of pumped storage plants.   [5+2+3]

8.a) A 1/3 scale model of Kaplan turbine is designed to operate at a head of 35m. The prototype produces 25 kW of power under a head of 40m when operating at a speed of 250 rpm. Find the speed, discharge and the power of the model. Assume the efficiency of the model and prototype is same at a value of 95%.
  b) Give classification of surge tanks with neat figures and mention their importance.   [5+5]

OR

9.a) A Pelton wheel is working under a head of 55m and the discharge of 0.7 m^3/s. The mean bucket speed is 18 m/s. Find the overall efficiency and the power produced if the jet is deflected by the blades through the angle of 145^0. Assume the coefficient of velocity as 0.85 and mechanical efficiency as 85%.
  b) With a neat figure explain the governing mechanism of turbines.   [5+5]

10. A centrifugal pump has an impeller of 80cm diameter and it delivers 1.1 m^3/s against a head of 70m. The impeller runs at 1000 rpm and its width at outlet is 8cm. If the leakage loss is 4% of the discharge, external mechanical loss is 10 kW and hydraulic efficiency is 82%, calculate the blade angle at outlet and overall efficiency.   [10]

OR

11.a) Two homologous pumps A and B are to run at the same speed of 800 rpm. Pump A has an impeller of 40cm diameter and discharges 0.3 m^3/s of water under a net head of 40m. Determine the diameter of the impeller of pump B and its net head if it is to discharge 0.5 m^3/s.
  b) Describe about the main characteristic curves of the pump with neat sketches.   [5+5]

---ooOoo---

Code No: 113AW

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
SIGNALS AND SYSTEMS
(Common to ECE, EIE)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
        Part A is compulsory which carries 25 marks. Answer all questions in Part A.
        Part B consists of 5 Units. Answer any one full question from each unit. Each
        question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a)   If the Fourier series coefficient of x(t) is C_n, find the Fourier series coefficient of $x^*(t)$.   [2]
  b)   How do you approximate a signal using orthogonal functions?   [3]
  c)   What is Aliasing?   [2]
  d)   Determine the Fourier transform of $x(t) = e^{-at} (\cos\Omega_o t) u(t)$.   [3]
  e)   Give the relationship between bandwidth and rise time of a signal.   [2]
  f)   The input and impulse response of continuous time systems are given below. Find the
       output of continuous time systems. $x(t) = e^{-3t} u(t), h(t) = u(t-1)$ [3]
  g)   Write the relationship between autocorrelation function and power density spectrum.   [2]
  h)   State the properties of cross-correlation.   [3]
  i)   Define ROC of Z transform.   [2]
  j)   Let $X(s)=L\{x(t)\}$, Determine the initial value, x(0) and the final value, $x(\infty)$, for the
       following signal using initial value and final value theorems.
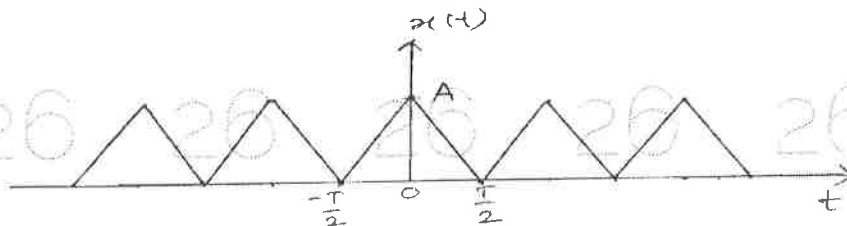 $X(s) = 7s+6 / (s(3s+5))$ [3]

PART-B

(50 Marks)

2.a)   Derive from the basics, how any continuous time signal x(t) can be represented as an
       integral of impulses.
  b)   Discuss the orthogonality in complex signals.   [5+5]

OR

3.   Determine the exponential form of the Fourier series representation of the signal
      shown below.   [10]

4. State and prove sampling theorem for low pass band limited signal and explain the process of reconstruction of the signal from its samples. [10]

OR

5.a) Determine the Hilbert transform for $x(t) = \cos(\omega t)$.

b) Find the Fourier transform of $x(t) = \begin{cases} e^{-|t|}; & for -1 \le t \le 1 \\ 0; & otherwise \end{cases}$. [4+6]

6.a) Find the transfer function of the system governed by the following impulse response.
$h(t) = u(t) + 0.5e^{-6t} u(t) + 0.2e^{-3t} \cos t \, u(t)$.

b) Check whether the following system is linear, casual and time invariant or not.
$d^3y(t)/dt^3 + 4d^2y(t)/dt^2 + 5dy(t)/dt + 2y^2(t) = x(t)$. [5+5]

OR

7. Write short notes on the following.
(a) Ideal filters characteristics.
(b) Filter characteristics of a linear system. [5+5]

8.a) State and prove Parseval's power theorem for continuous time signals.

b) Perform the convolution of the following signals, by graphical method. [4+6]
$x_1(t) = e^{-3t} u(t), x_2(t) = t \, u(t)$.

OR

9.a) How do you detect the periodic signals in the presence of noise?

b) Examine the close connection between the convolution and correlation. [8+2]

10.a) Compute the Laplace transform of $x(t) = e^{-b|t|}$ for the cases of b < 0 and b > 0.

b) Obtain the inverse Laplace transform of the function $X(s) = 1 / (s^2 + 3s + 2)$,
ROC : $-2 < Re(s) < -1$. [5+5]

OR

11.a) Determine the Z-transform and sketch the pole zero plot with the ROC for the
following Signal: $x(n) = (0.5)^n u(n) - (1/3)^n u[n]$.

b) Determine the inverse z-transform of
$X(z) = 1 / (1 - 1.5z^{-1} + 0.5z^{-2})$, where ROC : $|z| > 1.0$ [5+5]

---ooOoo---

Code No: 113AA

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
MATHEMATICS – II
(Common to CE, CHEM, MMT, AE, PTM, CEE)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
(25 Marks)

1.a) Define Divergence of a vector Field. [2]

b) Find curl $\left(xi + yj + zk\right)$ [3]

c) Write Euler's formulae for the Fourier series for $f(x)$ in the interval $\left(0, 2L\right)$. [2]

d) If $F(s)$ is the complex Fourier transform of $f(x)$, then prove that
$$F\left\{ f(x)\cos ax \right\} = \frac{1}{2}\left[F\left(s+a\right) + F\left(s-a\right)\right].$$ [3]

e) Prove that $\nabla = 1 - E^{-1}$. [2]

f) Write the normal equations to fit the second degree curve $y = a + bx + cx^2$. [3]

g) Find two points of xcosx+sinx=0 between which the root lies. [2]

h) Find the first iteration values of x, y and z for the equations
$20x + y - z = 17, 3x + 20y - z = 18, 2x - 3y + 20z = 25$, by Gauss-Seidel iteration method. [3]

i) Write Trapezoidal rule and Simpson's $1/3^{rd}$. [2]

j) Write the formula for K_1, K_2, K_3 and K_4 by Runge-kutta fourth order method, if
$$\frac{dy}{dx} = f(x,y) \ and \ y(x_0) = y_0.$$ [3]

PART-B
(50 Marks)

2. Verify Green's theorem in plane for $\oint_C\left[\left(x^2 - 2xy\right)dx + \left(x^2 y + 3\right)dy\right]$, Where C is
boundary of the region defined by $y^2 = 8x \ and \ x = 2$. [10]

OR

3. State Divergence theorem and Verify Divergence theorem for
$\overline{F} = \left(x^2 - yz\right)i + \left(y^2 - zx\right)j + \left(z^2 - xy\right)k$, Taken over the rectangular
parallelepiped $0 \le x \le a, \ 0 \le y \le b, \ 0 \le z \le c$. [10]

4.a) Given that $f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$. Find the Fourier series for $f(x)$.

Also deduce that $\dfrac{1}{1^2} + \dfrac{1}{3^2} + \dfrac{1}{5^2} + \dfrac{1}{7^2} + \cdots = \dfrac{\pi^2}{8}$.

b) Find the Fourier sine and cosine transform of $f(x) = e^{-ax}, a > 0, x > 0$. [5+5]

OR

5.a) Obtain the Fourier expansion of $f(x) = x \sin x$ as a cosine series in $(0, \pi)$.

b) Express $f(x) = \begin{cases} 1 & for\ 0 \le x \le \pi \\ 0 & for\ x > \pi \end{cases}$ as a Fourier sine integral and hence

evaluate $\displaystyle\int_0^\infty \dfrac{1 - \cos(\pi\lambda)}{\lambda} \sin(x\lambda)\, d\lambda$. [5+5]

6.a) Using Newton's forward formula compute $f(142)$ from the following table:

x	140	150	160	170	180
f(x)	3.685	4.854	6.302	8.076	10.225

b) By the method of least squares, find the straight line that best fits the following data: [5+5]

x	1	2	3	4	5	6
y	6	4	3	5	4	2

OR

7.a) Fit the curve of the form $y = ae^{bx}$ to the given data

x	77	100	185	239	285
y	2.4	3.4	7.0	11.1	19.6

b) Compute $f(27)$ Using Lagrange's formula from the following table: [5+5]

x	14	17	31	35
f(x)	68.7	64.0	44.0	39.1

8.a) Using bisection method, compute the real root of the equation $x^3 - 4x + 1 = 0$.

b) Solve by Gauss-Seidel iteration method, the equations
$10x + y - z = 11.19, x + 10y + z = 28.08, -x + y + 10z = 35.61$, correct to two
decimal places. [5+5]

OR

9.a) Determine the root of $x\, e^x - 2 = 0$ by method of false position.

b) Apply LU-decomposition method to solve the equations:
$10x + y + z = 12, 2x + 10y + z = 13, 2x + 2y + 10z = 14$. [5+5]

10.a) Evaluate $\int_0^1 e^{-x^2} dx$ by using Trapezoidal rule with $n = 10$.

b) Given that $\dfrac{dy}{dx} = 2 + \sqrt{xy}$, $y(1) = 1$. Find $y(2)$ in steps of 0.2 using the Euler's method. [5+5]

OR

11.a) Compute the value of $\int_{0.2}^{1.4} \left(\sin x - \log x + e^x \right) dx$ using Simpson's $\dfrac{3}{8}^{th}$ rule.

b) Find $y(0.1)$ by Taylor's series expansion when $\dfrac{dy}{dx} = x - y^2$, $y(0) = 1$. [5+5]

---ooOoo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
MATHEMATICS-II
(Common to CE, CHEM, MMT, AE, BT, PTM)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

1.a) Find the rank of the Matrix $\begin{bmatrix} 6 & 1 & -3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}$ by reducing it to the normal form.

b) Find whether the following system of equations are consistent. If so solve them.
$x + y + 2z = 4$, $2x - y + 3z = 9$, $3x - y - z = 2$ [7+8]

2. Verify Cayley Hamilton theorem and find the inverse of [15]
$\begin{bmatrix} 1 & 0 & 3 \\ 2 & -1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$

3.a) Prove that the Eigen values of a real skew symmetric matrix are either zero or purely imaginary.

b) Show that the matrix $\begin{bmatrix} 3 & 7-4i & -2+5i \\ 7+4i & -2 & 3+i \\ -2-5i & 3-i & 4 \end{bmatrix}$ is Hermitian. [7+8]

4. Reduce the quadratic form to the canonical form by orthogonal reduction
$3x^2 - 2y^2 - z^2 - 4xy + 8zx + 12yz$ [15]

5.a) Obtain the Fourier series for the function $f(x) = \cos x$ in $(-\pi, \pi)$
b) Find the half range cosine series for $f(x) = \pi x - x^2$ in $[0, \pi]$. [7+8]

6.a) Form the partial differential equation from
$$z = f\left(\frac{y}{x}\right) + y\, g(x)$$

b) Solve the partial differential equation
$\left(y^2 + z^2 - x^2\right)p - 2xyq + 2zx = 0$ [7+8]

7. Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ with boundary conditions $u(x, 0) = 3 \sin n\pi x$, $u(0, t) = u(1, t) = 0$, where, $0 < x < 1, t > 0$. [15]

8. Find the Fourier Transform of $F(x) = \begin{cases} 1 - x^2 & if \quad |x| < 1 \\ 0 & if \quad |x| > 1 \end{cases}$. Hence evaluate

$\int_0^\infty \left[\frac{x \cos x - \sin x}{x^3}\right] \cos \frac{x}{2} dx$. [15]

---oo0oo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
SIGNALS AND SYSTEMS
(Common to ECE, EIE)
Time: 3 hours   Max. Marks: 75
Answer any five questions
All questions carry equal marks
- - -

1.a) Explain how a function can be approximated by a set of orthogonal functions.
  b)   Illustrate different forms of complex exponential signal.   [7+8]

2.a) Discuss the concept of exponential Fourier series and derive the expressions for its coefficients.
  b)   Approximate a rectangular pulse of width T, amplitude A which is symmetric about origin using sin t, sin 2t, sin 3t and sin 4t.   [7+8]

3.a) Find the Fourier transform of $x(t) = u(2t)$, where $u(t)$ is the unit step function and plot its amplitude and phase spectra.
  b)   State and prove the following properties of Fourier Transform:
       i) Frequency shifting   ii) Convolution in frequency domain.   [7+8]

4.a) What is an ideal filter and find impulse response of an ideal Low Pass Filter?
  b)   Obtain the relationship between the bandwidth and rise time of ideal low pass filter.   [8+7]

5.a) State and prove the relation between convolution and correlation.
  b)   State the properities of autocorrelation function.
  c)   A signal $x(t)$ has energy E, calculate the energy of the signal $x(3t)$.   [5+4+6]

6.a) Explain in detail the types of sampling.
  b)   Explain the effects of under sampling.   [10+5]

7.a) State the properties of ROC of Laplace Transform.
  b)   Find the Laplace transform of the following signals:
       i) Impulse function
       ii) Unitstepfunction
       iii) A $\sin w_0 t\, u(t)$.   [5+5+5]

8.a) Distinguish between Fourier transform, Laplace transform and z transform.
  b)   Prove that the sequences $x_1(n) = a^n u(n)$ and $x_2(n) = -a^n u(-n-1)$ have the same $X(z)$ and differentially in ROC's. Plot their ROC's.   [5+10]

---ooOoo---

Code No: 53014

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
PROBABILITY AND STATISTICS
(Common to ME, CSE, AME, MIE, MSNT)

Time: 3 hours
Max. Marks: 75

Answer any five questions
All questions carry equal marks

- - -

1.a) An integer is chosen at random from the first 200 positive integers. What is the probability that the integer chosen is divisible by 6 or 8.

b) Let $f(x) = 3x^2$, when $0 \leq x \leq 1$ be the probability density function of a continuous random variable X. Determine a and b such that:
i) $P(X \leq a) = P(X > a)$ ii) $P(X > b) = 0.05$.   [7+8]

2.a) A manufacturer of pins knows that 2% of his product is defective. If he sells pins in boxes of 100 and guarantees that not more than 4 pins will be defective. What is the probability that a box will fail to meet the guaranteed quality.

b) Find the probability of getting 1 or 4 or 5 or 6 in throwing a die 5 to 7 times among 9 trials using normal distribution.   [8+7]

3.a) Discuss types of error of statistical hypothesis and give example.

b) A normal population has a mean 0.1 and a standard deviation of 2.1. Find the probability that the mean of simple sample of 900 members will be negative.   [7+8]

4.a) A biased coin was thrown 400 times and head resulted 240 times. Find the standard error of the observed proportion of heads and deduce that the probability of getting a head in a single throw of the coin lies almost certainly between 0.53 and 0.67.

b) The owner of a machine shop must decide which of two snack vending machines to install in his shop. If each is tested 250 times, the first machine fails to work 13 times and the second machine fails to work 7 times. Test at the 0.05 level of significance whether the difference between the corresponding sample proportions is significant.   [7+8]

5.a) If the weights of 8 envelopes in a post office are (in mg) 10, 12, 13, 14.5, 15, 12.6, 15.2 15. Find the 95% confidence limits.

b) Under quality improvement programme some teachers are trained by instruction methodology A and some by methodology B. In a random sample of size 10, taken from a large group of teachers exposed to each of these two methods, the following marks are obtained in an appropriate achievement test.
Method A   65 69 73 71 75 66 71 68 68 74
Method B   78 69 72 77 84 70 73 77 75 65
Assuming that populations sampled are approximately normally distributed has same variance. Test the claim that method B is more effective at 0.05 LOS. [7+8]

6. Twenty five pairs of value of variates X and Y led to the following results N = 25, $\sum x = 127$, $\sum y = 100$, $\sum x^2 = 760$, $\sum y^2 = 449$, $\sum xy = 500$. A subsequent scrutiny showed that two pairs of values were copied down as (8, 14) and (8, 6) instead of (8, 12) and (6, 8). Find correct value of r and correct lines of regression. [15]

7.a) Discuss about classification of queuing models.
  b) Show that for a single service station, Poisson arrivals and exponential service time, the probability that exactly n calling units are in the queuing system is $P_n = (1-\rho)\rho^n$, $n \geq 0$, where ρ is the traffic intensity. [7+8]

8. A gambler has Re.1. He bets Rs.0.5 at a time and wins Rs.0.5 with probability ½. He stops playing if he loses Re.1 or wins Rs.2.
   a) What is the transition probability matrix of the related Markov chain?
   b) What is the probability that he has lost his money at the end of 5 plays?
   c) What is the probability that the game lasts more than 7 plays? [15]

---oo0oo---

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
PULSE AND DIGITAL CIRCUITS
(Electrical and Electronics Engineering)

Time: 3 hours
Max. Marks: 80

Answer any five questions
All questions carry equal marks
- - -

1.a) Explain the operation of differentiator circuit and draw its output frequency response for step and ramp input.

b) Three low pass RC circuits are in cascade and isolated from one another by ideal buffer amplifiers. Find the expression for the output voltage as a function of time if the input is a step voltage. [8+8]

2.a) With the help of a neat circuit diagram, explain the working of an emitter-coupled clipper.

b) Design a diode clamper to restore a d.c level of +3 Volts to an input sinusoidal signal of peak value 10Volts. Assume drop across diode is 0.6 volts as shown in the figure. [6+10]
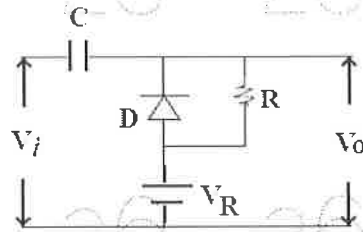
3.a) Explain the operation of Break down voltage consideration of transistor along with necessary circuit diagrams.

b) List out the applications of Transistor with examples. [10+6]

4.a) Derive an expression for the UTP and LTP of Schmitt trigger.

b) Design a collector coupled transistor mono stable multivibrator to produce a time delay of 100 μ sec. Use transistors have h_{FE} of 250. Use ±12 v sources, $V_{CE(sat)} = 0.3$ v, $V_{BE\ (sat)} = 0.7$ v and V_{BE} cutoff = 0v. [8+8]

5.a) Draw the circuit diagram of Transistor miller time base generator and explain its operation in detail.

b) Explain the concept of general features of a time base signal with examples. [8+8]

6.a) Draw the circuit diagram of Astable relaxation Sweep circuits and explain its operation.

b) Explain the concept of Frequency division in sweep circuit in detail. [8+8]

7.a) Draw the different Bi-directional sampling gates and explain its operation in detail.

b) Write few applications of sampling gates with examples. [8+8]

8.a) With the help of a neat circuit diagram for OR/NOR gate using ECL logic and explain its operation.

b) What is positive and negative logic system of a Logic gate? [10+6]

---ooOoo---

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Pharmacy II Year I Semester Examinations, November-2017
PHARMACEUTICAL ORGANIC CHEMISTRY - III

Time: 3hours   Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A   (25 Marks)

1.a) Write the reaction involved in the preparation of pyrrole from furan.   [2]
  b) How furan can be synthesized from furoic acid?   [3]
  c) Write the structure of 3- methyl oxazoline and 4-chloro pyridazine.   [2]
  d) Write any one method for the synthesis of thiazole.   [3]
  e) Define plane polarized light with example.   [2]
  f) Write about meso compounds.   [3]
  g) Define the term polynuclear aromatic compounds?   [2]
  h) Write the aromaticity of naphthalein.   [3]
  i) Write the mannich reation of indole -2-3 dione.   [2]
  j) Write the Birch reduction of 1-methoxy benzene.   [3]

### PART-B   (50 Marks)

2.a) Write the Paal-Knorr synthesis for the preparations of pyrrole with mechanism.
  b) Explain the resonance structures of pyrrole.   [10]
                                  OR
3.a) Write the steps involved for the preparation of indole from ortho nitrotolune.
  b) Give the mechanism of Skraup synthesis for Quinoline.   [10]

4.a) Establish the reaction of pyridazine, which involve the nucleophilic addition of Grignard reagent and organolithium compounds.
  b) Established the aromaticity of imidazole.   [10]
                                  OR
5.a) Establish the mechanism for the electrophilic reaction of thiazole.
  b) Give the cyclocondensation of orthophenylenediamine for the preparation of 1H-Benzo[d] imidazole.   [10]

6.a) Write a detail note on DL configurations.
  b) Point out the conditions of optical isomerism.   [10]
                                  OR
7.a) Explain optical isomerism of Lactic acid.
  b) Write the rules for using Fischer projections with examples.   [10]

8 a) Establish the resonance structures, nomenclature and aromatic characters of naphthacene.

b) Write the nomenclature, and pharmaceutical significance of following structures. [10]

i)

ii)
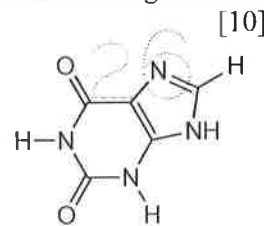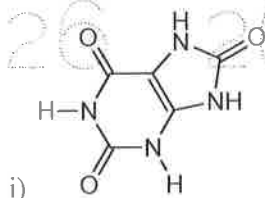
OR

9.a) Give a brief account of the structures of DNA and RNA.

b) Write about the aromaticity, oxidation and reduction reactions of phenanthrene. [10]

10.a) Give the detail mechanism and applications of Curtius rearrangement with suitable reaction

b) Write the reaction mechanism which involve the reaction of carboxylic acids, aldehydes or ketones with hydrazoic acid in the presence of a strong acid. [10]

OR

11.a) Write the reaction mechanism which involve the rearrangement of oximes to give N-substituted carboxylic amide.

b) Write the mechanism of the reduction of benzene by alkali metals in liquid ammonia in the presence of an alcohol. [10]

--ooOoo--

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Pharmacy II Year I Semester Examinations, November-2017
PHYSICAL PHARMACY – I

Time: 3hours   Max.Marks:75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each
question carries 10 marks and may have a, b, c as sub questions.

PART- A   (25 Marks)

1.a) Define the terms additive property and constitutive property.   [2]
  b) Define and write equation for dielectric constant.   [3]
  c) Define the terms Phase and Components.   [2]
  d) Write the limitations of Thermodynamics.   [3]
  e) Define the terms Molality and Mole fraction.   [2]
  f) A solution of Hydrochloric acid contains 20% Hydrochloric acid by weight.
     Calculate Molarity of the solution(Given specific gravity hydrochloric acid is
     1.120 gm/cc).   [3]
  g) Define acid and base as per Bronsted-Lowry theory.   [2]
  h) Calculate the pH of a solution of a drug whose concentration is 45 mg/ml and
     molecular mass is 176.1 g/mol and pKa of 4.17.   [3]
  i) Define the term Buffer and Buffer action.   [2]
  j) What is Buffer Capacity? Write its mathematical expression.   [3]

PART-B   (50 Marks)

2.a) Explain the importance of physical properties in pharmaceutical sciences.
  b) Explain the determination of refractive index using Abbe's refractometer. [5+5]
                                    OR
3.a) What is Molar refraction. Explain its importance in structural elucidation with one
     example.
  b) A solution containing 2 gm in 100 ml in ammonia buffer was placed in a 20 cm
     polarimeter tube. It gave an optical rotation of + 1.657°. Calculate the specific
     rotation of a drug.
  c) How the Dipole moment is expressed mathematically?   [5+3+2]

4.a) Write the Phase diagram for water system and explain the lines and curves in this.
  b) Write the applications of Phase diagrams.   [5+5]
                                    OR
5.a) Explain the Isolated and Open system of Thermodynamics in brief.
  b) State and explain the first law of thermodynamics. Explain the terms. [5+5]

6.a) Write the limitations of Raoult's Law of lowering vapor pressure.
  b) Derive an expression for the determination of Molecular Mass from depression of
     freezing point.   [5+5]
                                    OR

7.a) Explain the limitations of Arrhenius theory of electrolytic dissociation in brief.
  b) The osmotic pressure of 0.01 molar solution of calcium chloride and sucrose at 298.5 K are 0.785 atm and 0.234 atm respectively. Calculate van't Hoff i factor and degree of dissociation of Calcium chloride (1 atm = 101.3 kPa).   [5+5]

8.a) Derive an expression for the ionization constant of a weak base.
  b) Write the applications of dissociation constant.   [5+5]

OR

9.a) Explain the importance of pH in biological systems.
  b) Explain the colorimetric method to determine the pH.   [5+5]

10.a) Explain the factors influencing the pH of a buffer solution.
  b) Explain the importance of buffers in biological systems.   [5+5]

OR

11.a) What are isotonic and hypertonic solutions? Explain their importance.
  b) Explain Cryoscopic method.   [5+5]

--ooOoo--