Code No: 123BY

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, March - 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) State coulomb's law of electric charges? [2]
b) Derive an expression for field due to a hollow conducting sphere. [3]
c) Obtain Ohm's law in point form. [2]
d) Define electric dipole and dipole moment? [3]
e) State Biot-Savart's law. [2]
f) Derive an expression for MFI due to a straight current carrying filament. Use ampere circuital law. [3]
g) What are the applications of permanent magnets? [2]
h) Define self-inductance and Mutual inductance. [3]
i) State Faraday's laws of electromagnetic induction. [2]
j) Deduce an expression for Maxwell's fourth equation. [3]

PART-B

(50 Marks)

2.a) Find the electric Field at a point (1,-2, 1) m, if the potential is $V= 3x^2y+ 2yz^2+2xyz$.
b) Derive the expression for EFI due to a sheet of charge. [5+5]

OR

3.a) State and Explain the Gauss's law.
b) Derive an expression for electric field intensity in different region of a coaxial cable. Use Gauss Law. [5+5]

4.a) Derive an expression for Capacitance of Spherical Capacitor.
b) Obtain boundary conditions between Conductor and Dielectric interface. [5+5]

OR

5.a) What is the behavior of conductors in an electric field?
b) Deduce the expression for potential due to an electric dipole? [5+5]

6.a) Prove div(B)=0.
b) Derive an expression for MFI due to square current carrying wire at its centre. [5+5]

OR

7.a) Obtain MFI due to a infinite sheet of surface current density $K\,\bar{a}_z$.
b) Discuss point form of Ampere's circuital law. [5+5]

8.a) Obtain the expression for the inductance of a toroidal ring.

b) A coil of 500 turns is wounded in a closed iron ring of mean radius of 10cm and cross section area of $3cm^2$. Find the self inductance of the winding if the relative permeability of iron is 800? [5+5]

OR

9.a) Derive the Expressions for Scalar and Vector magnetic potentials.

b) Derive the expression for mutual inductance between a long, straight wire and rectangular loop lying in the same plane. [5+5]

10.a) State and Explain Faraday's laws of electromagnetic induction in integral and point forms.

b) A square coil with a loop area 0.01 m^2 and 50 turns is rotated about its axis at right angle to a uniform magnetic field B = 1T.Calculate the instantaneous value of emf induced in the coil when its plane is:
i) at right angle to the field
ii) in the plane of the field
iii) when the plane of coil is 45^0 to the field. [5+5]

OR

11.a) In a material for which $\sigma = 4.5V/m$ and $\varepsilon_r = 1$, the electric field intensity is E = 300 sin 10^9 t V_X V/m. Determine the conduction and displacement current densities and the frequency at which they have equal magnitude?

b) Derive an expression for Displacement current. [5+5]

---oo0oo---

Code No: 123CT

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) Using 10's complement subtract 72532 – 3250. [2]
b) State and prove the distributive property of Boolean algebra. [3]
c) Define sum of products and product of sum. [2]
d) Give the boolean expression for the following statement.
Y is a 1 only if A is 1 and B is 1 or if a is 0 or B is 0. [3]
e) What is a multiplexer? What is the function of multiplexer select inputs? [2]
f) What is a combinational logic circuit? Explain the design procedure for combinational circuits. [3]
g) What is a counter and what are the types of counters? [2]
h) Draw the logic diagram for SR latch using two NOR gates. [3]
i) How does static RAM cell differ from dynamic RAM cell? [2]
j) Give the difference between RAM and ROM. [3]

PART - B

(50 Marks)

2.a) Prove that $AB+(AC)'+AB'C(AB+C)=1$.
b) What is a Hamming code and encode data bits 0101 into a 7-bit even parity Hamming code. [5+5]

OR

3.a) Describe the floating point representation of numbers and determine the number of bits required to represent in floating point notation the exponent for decimal numbers in the range of $10^{\pm 86}$
b) Give the comparison between 9's complement and 10's complement and perform the following subtraction by using 9's complement method.
i) 18 - 06 ii) 39 – 23 [5+5]

4.a) Reduce the following function using K-Map Technique and implement using universal gate. $f(P, Q, R, S) = \Sigma m(0,1,4,8,9,10) + d(2,11)$
b) Design a logic circuits with inputs A,B,C so that output Y is high whenever A is zero or whenever B=C=1 [5+5]

OR

5.a) Realize the following function $Y = A + BC\bar{D}$ using NAND gates only.
b) Minimize the following multiple output function using K-map
$f_1 = \Sigma m(0,2,6,10,11,12,13) + d(3,4,5,14,15)$
$f_2 = \Sigma m(1,2,6,7,8,13,14,15) + d(3,5,12)$ [4+6]

6.a) What is a decoder? Construct a 4×16 decoder with two 3×8 decoders.

b) Implement the following boolean function using 8:1 multiplexer.

$f(A, B, C, D) = \bar{A}B\bar{D} + A\bar{C}D + \bar{B}CD + A\bar{C}\bar{D}$ [5+5]

OR

7.a) Explain a binary parallel adder with look a head carry scheme.

b) Design a combinational logic circuit with 3-input variables that will produce a logic 1 output when more than one input variables are logic 1. [5+5]

8.a) Design a 4-bit universal shift register and explain its operation?

b) Design a mealy type sequence detector to detect a serial input sequence of 101. [5+5]

OR

9.a) With the help of a neat block diagram explain the working of a JK Master-Slave flip-flop.

b) What are presettable counters? What is lockout of a counter? Show how to construct a MOD-13 counter using 74163 synchronous binary counter IC. [5+5]

10.a) Explain how a PLA is used for the realization of combinational function.

b) Describe the function of row-select decoder column-select decoder and output buffers in the ROM architecture. [5+5]

OR

11.a) Design binary to Gray and Gray to Binary converters in a single PLA

b) Design a memory decoder to select 1 number of 16KB EPROM IC and 1 number of 32KB RAM Ic. [5+5]

--ooOoo--

Code No: 124BU

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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 are the different binary codes? [2]
b) State and prove the Transposition theorem. [3]
c) Define Essential prime implicant. [2]
d) What is the procedure to design the combinational circuits? [3]
e) Differentiate between flip flop and Latches. [2]
f) What is race around condition? [3]
g) Give the advantages and disadvantages of Ring Counter. [2]
h) What do you mean by State table? [3]
i) How do you obtain the maximal compatibles from the merger table? [2]
j) What are features of ASM chart? [3]

PART-B

(50 Marks)

2.a) Perform the XS-3 subtraction for the following using 9's and 10's complement methods 96.235_{10}-125.68_{10}.
b) Implement the Hamming code if the receiver receives the data bits as 10100101. [5+5]

OR

3.a) How many logic gates are require implementing the following function.
F=AB′C+A′BCD+E′F′+ADF.
b) Obtain the SOP of A+BC′+ABD′+ABCD. [5+5]

4.a) Simplify the Boolean Expression $f = \sum m(0,1,2,5,6,7,9,11,12,13,14,15,17,21,27,29,31)$ in SOP and POS using mapping method.
b) Obtain the set of prime implicates from the Boolean Expression $f = \sum m(0,1,2,5,6,7,8,9,10,12,13,14,15)$ and realize into NAND logic. [5+5]

OR

5.a) Design code converter for 4bit BCD to 4bit XS-3.
b) The circuit receives 4 bit 5211 BCD code. Design the minimum circuit to detect the decimal numbers 1,2,3,6,7 and 8. Implement in universal logic. [5+5]

6.a) Draw and Explain the operation of pulse triggered SR flip flop.
b) Convert JK type flip flop to T type flip flop. [5+5]

OR

7.a) Discuss about timing and triggering considerations of the flip-flop and explain clock skew.
b) Compare and Contrast combinational and Sequential Circuits. [5+5]

8.a) Design a 4 bit synchronous counter using JK flip flops.
b) Design divided by 6 ripple down counter that counts down from 7 and use flip flops that are toggle on positive to negative transitions, and take outputs off the Q lead. [5+5]

OR

9.a) Design an asynchronous circuits that will pulses received on the N lines only after a complete positive pulse has been received on the M line.
b) Design pulse train generator to generate the sequence 1100010. [5+5]

10. A Clocked sequential circuit is defined by the following table.
a) Find equivalence classes using partition method.
b) Give proper assignment
c) Design the circuit using D type flip flop. [10]

PS	NS		OUT PUT	
	X=0	X=1	X=0	X=1
A	A	E	1	0
B	A	E	0	0
C	B	F	0	0
D	B	F	0	0
E	C	G	0	1
F	C	G	0	1
G	D	H	0	1
H	D	H	0	1

OR

11. Draw the ASM chart for the following state transitions. State from the initial state T1, then if XY=00 go to T2, if XY=01 go to T3 and design its control circuit using
a) D flip flop and Decoder
b) Input multiplexer and register.
c) Show the exit paths in an ASM block for all binary combinations of control variables X,Y and Z start from an initial state. [10]

---ooOoo---

R15

Code No: 123BK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
FLUID MECHANICS
(Common to CE, 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) Explain hydrostatic law. [2]
b) Explain vacuum pressure. [3]
c) Define steady and unsteady flow. [2]
d) Explain stream and velocity potential functions. [3]
e) List the assumptions of Euler's equation of motion. [2]
f) Write down the disadvantages of orifice meter. [3]
g) What is Magnus effect? [2]
h) Write a brief note on Prandtl contribution. [3]
i) List the characteristics of turbulent flow. [2]
j) Explain total energy line. [3]

PART - B

(50 Marks)

2.a) Define the following:
i) Atmospheric pressure
ii) Gauge pressure
iii) Vacuum pressure and
iv) Absolute pressure
b) What are mechanical gauges? Name three important mechanical gauges. [5+5]

OR

3.a) Define the following terms:
i) Total pressure, and
ii) Centre of pressure.
b) Derive expression for total pressure and centre of pressure for a vertically immersed surface. [5+5]

4. Find the velocity and acceleration at a point (1, 2, 3) after 1 sec, for a three dimensional flow given by $u = yz + t, v = xz - t, w = xy$ m/s. [10]

OR

5. Describe in detail the classification of flows given one example for each category. [10]

6. A 300 mm × 150 mm venturimeter is provided in a vertical pipeline carrying oil of specific gravity 0.9, flow being upward. The difference in elevation of the throat section and entrance section of the venturimeter is 300mm. The differential U- tube mercury manometer shows a gauge deflection of 250mm.Calculate:
a) The discharge of oil, and
b) The pressure difference between the entrance section and the throat section.
Take the co-efficient of meter as 0.98 and specific gravity of mercury as 13.6. [5+5]

OR

7. Discuss in detail the classification of orifices and notches. [10]

8. Define the following terms:
a) Laminar boundary layer
b) Turbulent boundary layer
c) Laminar sub layer
d) Boundary layer thickness. [10]

OR

9. How will you determine whether a boundary layer flow is attached flow, detached flow or on the verge of separation? [10]

10. Derive formulae for calculating loss of head due to:
a) Sudden enlargement and
b) Sudden contraction [5+5]

OR

11. Explain briefly the following with the help of a neat sketch:
a) Hydraulic gradient line (H.G.L)
b) Energy gradient line (E.G.L). [5+5]

--ooOoo--

Code No: 123BQ **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
DIGITAL LOGIC DESIGN AND COMPUTER ORGANISATION
(Information Technology)

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 about "Performance Measurement" of a computer.	[2]
b)	Convert the following binary numbers into its equivalent decimal. i) 0.1010 ii) 101.1101	[3]
c)	Simplify the expression using K-map. $F(X,Y,Z)=\sum m(1,2,4,7)$	[2]
d)	Design 3×8 Decoder using 2×4 Decoders.	[3]
e)	Draw the flow chart for addition of 2 fixed point binary numbers.	[2]
f)	Write short notes on "Big – endian".	[3]
g)	Write short notes on "Micro Program sequencing".	[2]
h)	Explain about Secondary storage devices in brief.	[3]
i)	Give the Advantages of Interrupt driven I/O.	[2]
j)	List out the functions of I/O Interface.	[3]

PART-B

(50 Marks)

2.a)	Explain in detail about bus structures.	
b)	Differentiate between multiprocessor and multi computers.	[5+5]
	OR	
3.a)	Convert $8620_{(10)}$ into i) BCD ii) Excess-3 iii) 2421 iv) Binary.	
b)	Explain about Signed binary numbers in detail.	[5+5]
4.a)	Realize 2 input XOR gate using only NAND gates.	
b)	Explain about JK Flip-Flop with a neat diagram.	[5+5]
	OR	
5.	Explain about Universal Shift Register with a neat diagram.	[10]
6.	Explain Booth's multiplication algorithm in detail.	[10]
	OR	
7.	List IA-32 Processors. Explain the register structure of IA-32 Pentium processor.	[10]

8.a) Distinguish between microprogrammed control and hardwired control.
b) Explain how data transfer takes place between memory and a processor. [5+5]

OR

9.a) Explain in detail RAM and ROM chips.
b) Define Virtual memory and explain its memory organization. [5+5]

10. Explain in detail about USB architecture. [10]

OR

11. Explain about DMA controller in detail with a neat diagram. [10]

---oo0oo---

Code No: 113AP

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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 Kirchoff's laws. [2]
b) Compare spring control instruments with gravity controlled instruments. [3]
c) Mention few applications of DC series motor. [2]
d) What is the use of a starter for d.c motor? [3]
e) What is meant by synchronous impedance? Write its expression. [2]
f) Define regulation and efficiency of a transformer. Write the expressions. [3]
g) State the differences between half wave and full wave rectifiers. [2]
h) List out applications of SCR. [3]
i) Define sensitivity. What are its units? [2]
j) What is the purpose of trigger circuit in CRO? [3]

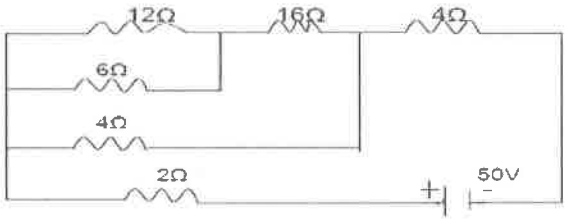
PART-B

(50 Marks)

2.a) Three resistances R_{ab}, R_{bc} and R_{ca} are connected in delta connection, derive the expressions for equivalent star connection.
b) Explain the working principle and constructional details of M.I instrument. [4+6]

OR

3.a) For the circuits shown in figure, calculate total resistance, total current and also total power dissipated.



b) Explain the operation principle of permanent magnet moving coil instrument. [5+5]

4. Discuss in detail the working of three point starter with neat circuit diagram. [10]

OR

5.a) Explain the principle of operation of DC generator.
b) Explain about the different types of DC motors. [6+4]

6.a) Discuss the principle of operation of a Single phase transformer.
b) Sketch the torque- slip characteristics of induction motor and explain. [6+4]

OR

7.a) Show that the maximum efficiency in a transformer occurs when its variable loss is equal to constant loss.
b) Discuss about the principle of operation of 3-phase Induction motor. [4+6]

8. Justify how a transistor performs amplification. Draw the characteristics of PNP transistor and explain them in detail. [10]

OR

9. Draw the circuit diagram and explain the operation of full wave rectifier using center tap transformer and bridge rectifier respectively. Obtain the expression for peak inverse voltage in each case. [10]

10.a) Derive the expression for magnetic field deflection sensitivity of CRT.
b) Discuss about the various applications of CRO. [6+4]

OR

11. Explain in detail the principle of working of CRT with the help of a neat diagram. [10]

---ooOoo---

Code No: 113AU

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) Explain the Space charge region. [2]
b) Explain the operation of p-n junction biased in the reverse direction. [3]
c) Define Peak Inverse Voltage. [2]
d) Explain the harmonic components in rectifier. [3]
e) Write the complete expression for IC for any VC and IE. [2]
f) Explain the basewidth modulation. [3]
g) Why a capacitive coupling used to connect signal source to an amplifier. [2]
h) Explain the thermal instability. [3]
i) What is Pinchoff Voltage? [2]
j) Define transconductance gm and drain resistance of a FET. [3]

PART-B

(50 Marks)

2.a) Explain about the Current components in a p-n diode.
b) Sketch the piecewise linear characteristics of a diode. What are the approximate cutin voltages for silicon and germanium? [5+5]

OR

3.a) Obtain the static and dynamic resistances of the p-n junction germanium diode, if the temperature is 27^0 C and I_o=1μA for an applied forward bias of 0.2 V. Assume =1.38×10^{-23} J/°k.
b) Define diffusion and transition capacitance of p-n junction diode. Prove that diffusion capacitance is proportional to current I. [5+5]

4.a) Explain about L section Filters.
b) A full-wave single phase rectifier employs a pi- section filter consisting of two 4 μF capacitances and a 20 H choke. The transformer voltage to the center tap is 300 V rms. The load current is 500 mA. Calculate the dc output voltage and the ripple voltage. The resistance of the choke is 200Ω. [5+5]

OR

5.a) Draw and explain the Thevenin's model for Full-wave rectifier.
b) Explain the Voltage regulation using Zener Diode. [5+5]

6.a) Differentiate between NPN and PNP transistors.
b) Explain the input and output characteristics of the transistor in CC configuration with diagrams. How do you obtain from these? [3+7]

OR

7.a) Draw the circuit diagram of a pnp junction transistor in CE configuration and describe its characteristics.
b) Compare CB and CC configurations. [5+5]

8.a) Explain the DC and AC load Line analysis.
b) Draw and explain the Fixed Bias Circuit. Explain why the circuit is unsatisfactory if the transistor is replaced by another of same type. [5+5]

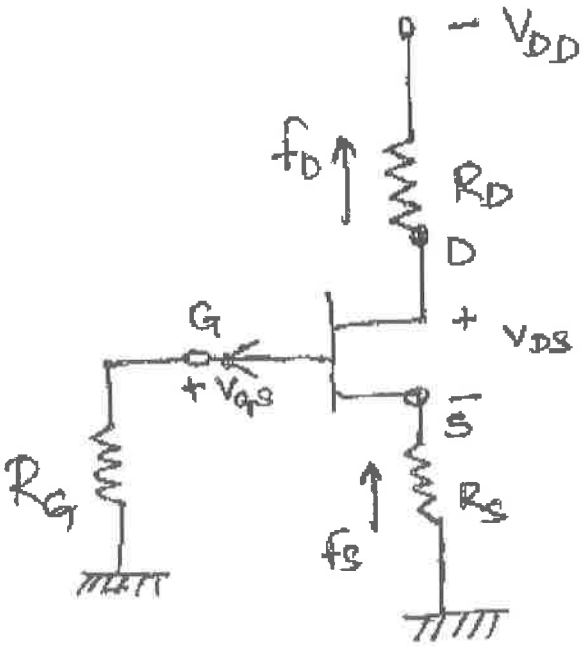
OR

9.a) Draw and explain the Voltage Divider Biasing.
b) Explain the Thermal runaway. [5+5]

10.a) Explain the JFET Small signal Model.
b) Explain the MOSFET characteristics in enhancement mode. [5+5]

OR

11.a) Explain the FET Common Drain Amplifier.
b) A P-channel FET has $V_P = 4V$ and $I_{DSS} = 12mA$. For the figure, determine R_D and R_S so that $I_D=4$ mA and $V_{DS}=6V$. V_{DD} is 12 V. [5+5]



---ooOoo---

Code No: 53011 **R09**

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

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

Answer any five questions
All questions carry equal marks

- - -

1.a) Derive an expression for the electric field intensity due to an infinite length line charge along the z-axis at an arbitrary point Q (x, y, z).
b) State and explain Coulomb's Law.
c) Prove that electric field intensity is negative gradient of potential. [8+3+4]

2.a) Derive the expression for torque developed on dipole placed in a electric field.
b) Derive Poisson's and Laplace's equations from the fundamentals. [7+8]

3.a) Derive the boundary conditions between a conductor and a dielectric.
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 $\varepsilon_r = 2$ and 6 mm thickness is placed on the lower plate leaving an air gap of 4mm thick between it and upper plate. If 100V is applied across the capacitor, find D, E, and V in Teflon and air.
c) Explain the Ohm's law in point form. [5+5+5]

4.a) State and explain Biot-Savart's law and derive the expression for the magnetic field at a point due to an infinitely long conductor carrying current.
b) Derive the expression for magnetic field intensity at the center of a circular wire carrying current 'I'. [8+7]

5.a) State and explain the Ampere's circuital law.
b) A square loop 10 cm on a side has 500 turns that are closely and tightly wound and carries a current of 120 A. Determine the magnetic flux density at the centre of the loop.
c) A current sheet $K_1 = 10\vec{a}_z$ A/m lies in the x=4 m plane and second sheet $K_2 = -8\vec{a}_z$ A/m is at x=-5m. Find $\overline{H}$ in all regions. [5+5+5]

6.a) Derive the expression for force between two long parallel current carrying conductors placed in a magnetic field.
b) A current filament carrying 10 A in z direction lies along the entire z axis in free space. A rectangular loop connecting A (0,2,0) to B(0,2,3) to C(0,7,3) to D(0,7,2) to A (0,2,0) lies in the x = 0 plane. The loop current is 5 mA and it flows in the z-direction in the AB segment. Find forces on side AB and on side DA. [8+7]

7.a) Derive the expression for scalar magnetic potential.
b) Use the Neumann's formulae for the calculation of mutual inductances between a long current carrying conductor and a square loop.
c) Derive the expression for energy density in a magnetic field. [5+5+5]

8.a) Derive the Maxwell's equations in point and integral form for time varying fields.

b) A parallel plate capacitor with plate area of 4 cm^2 and plate separation of 3 mm has a voltage 500 sin 10^3t volts applied to its plates. Calculate the displacement current, assuming $\varepsilon = 3\varepsilon_0$. [8+7]

---ooOoo---

R09

Code No: 53005

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, March - 2017

FLUID MECHANICS

(Civil Engineering)

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

Answer any five questions

All questions carry equal marks

\- - -

1.a) A simple manometer is used to measure the pressure of oil (sp.gr. = 0.8) flowing in a pipe line. Its right limb is open to the atmosphere and left limb is connected to the pipe. The centre of the pipe is 9 cm below the level of mercury (sp.gr. = 13.6) in the right limb. If the difference of mercury level in the two limbs is 15 cm, determine the absolute pressure of the oil in the pipe in N/mm^2.

b) State and explain the hydrostatic law for the fluid motion and explain the importance and applications. [8+7]

2.a) Derive an expression for the force exerted by static fluid on a submerged vertical plane surface and the distance of centre of pressure from the free surface of liquid.

b) A triangular plate of base 3 m and height 4.5m which is immersed in such a way that a plan (top view) of the plate makes an angle of 30^0 with the free surface of the water. The base of the plate is parallel to free surface of water at a depth of 3.5 m from free surface of water. Determine (i) the total pressure; (ii) the position of centre of pressure from the surface of the water. [7+8]

3.a) Derive the continuity equation for the three dimensional fluid flows from the first principles.

b) Check if $\phi = x^2 - y^2 + y$ represents the velocity potential for 2-dimensional irrotational flow. If it does, then determine the stream function ψ. [7+8]

4.a) Write the Navier Stokes equations for the momentum equation for two dimensional fluid flow field and discuss the important applications.

b) A pipe of 300 mm diameter conveying 0.30 m^3/s of water has a right angled bend in a horizontal plane. Find the resultant force exerted on the bend if the pressure at inlet and outlet of the bend are 24.525 N/cm^2 and 23.544 N/cm^2. [7+8]

5.a) The velocity distribution in the boundary layer is given by the following equation. $u/U_\infty = 2\,(y/\delta) - (y/\delta)^2$. Where δ being boundary layer thickness. Then calculate (i) Displacement thickness, (ii) Momentum thickness, and (iii) Energy thickness.

b) Explain the importance of Magnus effect to understand the drag and lift for the submerged objects. [8+7]

6.a) What do you understand about Reynold's experiments? Explain the results of Reynold's experiments with the help of graph and represent the laminar and turbulent flow parts on the graph.

b) A total of 12 litres per second of oil is pumped through two pipes in parallel, one 12 cm in diameter and the other 10 cm in diameter, both pipes are 1000 m long. The specific gravity of the oil is 0.97 and the kinematic viscosity of the oil is 9 cm^2 per second. Calculate the flow rate through each pipe and the power of the pump. [7+8]

7.a) Derive an expression for the loss of head due to sudden contraction in a pipe. Sketch the flow pattern and show how the hydraulic gradient and total energy line vary as the flow takes place through the contraction.

b) Two water reservoirs A and B are connected to each other through a 50 m long, 2.5 cm diameter cast iron pipe with a sharp-edged entrance. The pipe also involves a swing check valve and a fully open gate valve. The water level in both reservoirs is the same, but reservoir A is pressurised by compressed air while reservoir B is open to the atmosphere. If the initial flow rate through the pipe is 1.5 l/s, determine the absolute air pressure on top of reservoir A. Take the water temperature to be 25^0C. [7+8]

8.a) How to estimate the discharge over stepped notch? Derive the corresponding equation.

b) In a venturimeter of dimensions 15 cm×10 cm, the oil flows upwards at the rate of 1000 lpm. The throat section is 12 cm above the inlet. Specific gravity of the oil is 0.8 and the viscosity is 1.0 poise. What will be the pressure difference (between Inlet & Throat)? [7+8]

---ooOoo---

Code No: 53013

R09

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

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

Answer any five questions
All questions carry equal marks

1.a) What is an Ecosystem? Give the classification of ecosystem.
b) Distinguish between food chain and food web. [8+7]

2.a) Write the benefits and problems associated with dams.
b) What are the merits of Solar energy and bio-gas? [8+7]

3.a) What is biodiversity? What are its values?
b) Write the in-situ measures of conservation of biodiversity. [7+8]

4.a) What is Air Pollution? Distinguish between Primary and Secondary air pollutants?
b) What are the occupational health hazards in mining? [8+7]

5. What are the global impacts of air pollution? [15]

6.a) Describe what is EIA.
b) Explain Overlay method of EIA. [7+8]

7.a) Write the salient features of Water (Prevention and Control of Pollution) Act 1974.
b) What is Solid Waste Management? Explain. [8+7]

8.a) Write the human impact on Environment.
b) What is Sustainable Development? Explain. [7+8]

---ooOoo---

Code No: 123AM **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
SURVEYING
(Common to CE, 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)	What are the objectives of plane and geodetic surveying?	[2]
b)	What are different classifications of surveying?	[3]
c)	Differentiate between Level line and Horizontal line.	[2]
d)	What is reciprocal levelling? Give the use and advantages of it.	[3]
e)	What do you mean by prismoid?	[2]
f)	What are the merits of computation of area using Simpson's rule?	[3]
g)	What are the various types of theodolite?	[2]
h)	What is Trigonometrical leveling? How is it carried out?	[3]
i)	What is the principle of stadia tacheometry?	[2]
j)	Differentiate between simple and compound curves	[3]

Part - B

(50 Marks)

2.a) Explain the principle and working of Electronic Distance Measurements (EDM).

b) The area of the plan of an old survey plotted to a scale of 10 m to 1 cm now measures as 90.5 cm^2 as found by a planimeter. The plan is found to have shrunk so that a line originally 10 cm long now measures 9.5 cm only. A note on the plan also states that the 20 m chain used was 9 cm too short. Find the true area of the survey. [5+5]

OR

3.a) Differentiate between
i) Surveyor's compass and Prismatic compass ii) Declination and Dip
iii) Fore bearing and Back bearing iv) Meridian and Bearing.

b) The bearings of the lines of a traverse are given below. Correct the bearings for local attraction, if any, find the included angles. [5+5]

Line	Fore bearing	Back bearing
AB	$S36^0$ 15′E	$N36^0$ 15′W
BC	$S44^0$ 30′W	$N45^0$ 30′E
CD	$N71^0$ 45′W	$S71^0$ 00′E
DE	$N14^0$ 00′E	$S14^0$ 30′W
EA	$N61^0$ 15′E	$S61^0$ 00′W

4.a) What are the various methods of levelling? Describe them briefly.

b) A gradient of 1 in 400 falling from elevation 67.45 m was set out by driving pegs at 100m intervals with the top of pegs on the required gradient. After a time it was suspected that some of the pegs had been disturbed and the following observations were taken for checking their elevations. List the errors in the levels of the pegs, if any. [5+5]

Station	B.S.	I.S.	F.S.	R.L.	Remarks
1	1.76			64.13	B.M.
2	2.64		0.720		
3	1.96		1.420		
4		0.93			Peg 1
5		1.20			Peg 2
6		1.50			Peg 3
7		1.76			Peg 4
8		2.03			Peg 5
9		2.30			Peg 6
10	0.69		2.59		Peg 7
11		0.95			Peg 8
12		1.23			Peg 9
13		1.52			Peg10
14	0.61		1.21		
15			1.72		B.M.

OR

5.a) Describe the various characteristics and uses of contour lines.

b) Explain direct and indirect methods of contouring. What are the methods of interpolating contours and how is the interpolation done? [5+5]

6.a) State various methods of computation of areas and Derive the formula for Simpson's rule. What are its limitations?

b) The latitudes and departures of the lines of a closed traverse are given below. Calculate the area of the traverse. [5+5]

Line	Northing	Southing	Easting	Westing
AB		157.2	154.8	
BC	210.5		52.5	
CD	175.4			98.3
DA		228.7		109.0

OR

7.a) Draw the sketch of a two level section and derive an expression for the area of cross-section.

b) The centre line of a proposed road of formation width 12 m. is to fall at a slope of 1 in 100 from chainage 50m to chainage 150m. The existing ground levels on the centre line at chainage 50m, 100m and 150m are 71.62m, 72.34m, and 69.31m respectively and the ground slopes at 1 in 3 perpendicular to the proposed centre line. If the centre line formation level at chainage 50m is 71.22m and side slopes are to be 1 in 1 in cutting and 1 in 2 in filling, find the volumes of cut and fill between chainages 50m and 150m. [5+5]

8.a) How is a closed traverse checked in the field? What do you mean by "Balancing a traverse"?

b) The following data was obtained during a theodolite traversing:

Line	Length (m)	Included angle
AB	186	$\angle A = 118^0 20'$
BC	164	$\angle B = 82^0 10'$
CD	303	$\angle C = 137^0 00'$
DE	162	$\angle D = 73^0 44'$
EA	240	$\angle E = 128^0 36'$

Balance the traverse and also find the independent coordinates of the various stations if the bearing of the line AB is $30^0 25'$. [5+5]

OR

9.a) What are the Principles of Electronic Theodolite?

b) A straight tunnel is to be run between two points A and B whose independent coordinates are:

Station	Northing	Easting
A	0	0
B	3014	256
C	1764	1398

It is desired to sink a shaft at D, the mid-point of AB. It is not possible to measure along AB directly. Therefore, D is to be fixed from C, another point whose independent coordinates are known. Calculate the

i) Independent coordinates of D

ii) Length and bearing of CD.

iii) Angle ACD, given the W.C.B. of AC is $38^0 35'$. [5+5]

10.a) What are the elements of a simple circular curve? What are unit and sub chords?

b) What is degree of a curve and give its relationship with the radius of the curve.

c) Derive an expression for Rankine's deflection angle and explain the setting out a simple curve by Rankine's deflection angle method. [4+3+3]

OR

11.a) Derive distance equation for staff vertical condition and explain the role of anallactic lens in stadia tacheometry.

b) The following set of readings refers to observations in a tacheometric survey from station B on stations A, C, and D in clock-wise direction.

Staff station	Vertical angle	Horizontal circle reading	Stadia hair readings
A		$301^0 10'$	
C	$-5^0 12'$	$152^0 56'$	1.044,2.283,3.522
D	$+2^0 30'$	$205^0 06'$	0.645,2.376,4.110

The line BA has a bearing of 58°46' and the instrument constants are 100 and 0. Find the slope of the line CD and its bearing. [5+5]

---ooOoo---

Code No: 123BT **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) Define Random variable. [2]
b) Write about the continuous and mixed random variables. [3]
c) Mention the difference between the Variance and Skew. [2]
d) Write about the Rayleigh density and distribution function. [3]
e) Explain the equal and unequal distributions. [2]
f) Write about linear transformations of Gaussian random variables. [3]
g) Mention the properties covariance. [2]
h) Show that $S_{xx}(\omega) = S_{xx}(-\omega)$. [3]
i) State wiener-Khinchin relation. [2]
j) Express the relationship between power spectrum and autocorrelation. [3]

PART - B

(50 Marks)

2.a) Discuss the mutually exclusive events with an example.
b) Define probability, set and sample spaces. [5+5]

OR

3. Write the classical and axiomatic definitions of Probability and for a three digit decimal number chosen at random, find the probability that exactly K digits are greater than and equal to 5, for $0 < K < 3$. [10]

4.a) Obtain the relationship between probability and probability density function.
b) Find the moment generating function of the random variable whose moments are $m_r = (r + 1)!2^r$. [5+5]

OR

5.a) Write about Chebychev's inequality and mention about its characteristic function.
b) Determine the moment generating function about origin of the Poisson distribution. [5+5]

6.a) Differentiate between the marginal distribution functions, conditional distribution functions and densities.
b) Given the transformation y= cos x where x be a uniformly distributed random variable in the interval $(-\pi, \pi)$. Find $f_y(y)$ and E[y]. [5+5]

OR

7. Let X be a random variable defined, Find E [3X] and $E[X^2]$ given the density function as

$$f_x(x) = \begin{cases} (\pi/16)\cos(\pi x/8), & -4 \le x \le 4 \\ 0, & elsewhere \end{cases}$$ [10]

8.a) State and prove properties of cross correlation function.

b) If the PSD of X(t) is $S_{xx}(\omega)$. Find the PSD of dx(t)/dt. [5+5]

OR

9. A random process Y(t) = X(t)- X(t +τ) is defined in terms of a process X(t). That is at least wide sense stationary.

a) Show that mean value of Y(t) is 0 even if X(t) has a non Zero mean value.

b) If Y(t) = X(t) +X(t + τ) find E[Y(t)] and σY^2. [5+5]

10. The auto correlation function of a random process X(t) is $R_{XX}(\tau) = 3+2 \exp(-4\tau^2)$.

a) Evaluate the power spectrum and average power of X(t).

b) Calculate the power in the frequency band $-1/\sqrt{2} \le \omega \le 1/\sqrt{2}$ [5+5]

OR

11. Derive the relation between PSDs of input and output random process of an LTI system. [10]

---ooOoo---

Code No: 123BP

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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)	What are the disadvantages of an array?	[2]
b)	Explain how to find the performance of an algorithm.	[3]
c)	What are the disadvantages of queue which is implemented using array and how to overcome it?	[2]
d)	Differentiate between doubly and circular linked lists.	[3]
e)	Explain how binary tree is represented using an array and linked list	[2]
f)	Explain the threaded binary tree with suitable example	[3]
g)	Define Hash Clashing.	[2]
h)	Compare Selection sort and Quick sort with an example.	[3]
i)	Write an algorithm to insert an element into the binary search tree.	[2]
j)	Explain the properties of Red-Black tree.	[3]

PART-B

(50 Marks)

2.a) Write a program to concatenate singly linked lists.
b) How two dimensional arrays are represented in memory? Also obtain the formula for calculating the address of any element stored in the array, in case of column major order. [5+5]

OR

3.a) Write a program to implement a sparse matrix.
b) How can we represent a polynomial in a linked list? [5+5]

4.a) Explain the Towers of Hanoi problem with an example.
b) Write a program to implement the operations of Queue. [5+5]

OR

5.a) Write a recursive procedure to compute the n^{th} Fibonacci number.
b) What are the applications of queue? [5+5]

6.a) Write an algorithm to find the components of a graph.
b) Define Priority Queue? Explain with an example. [5+5]

OR

7.a) Differentiate between BFS and DFS.
b) Define Binary tree. Explain the Binary tree representations with an example. [5+5]

8.a) Write an algorithm of Linear Search.

b) Sort the following list of elements by using Insertion Sort
15, 28,46, 10, 35, 54, 5, 17 [5+5]

OR

9.a) Insert the following list of elements into the hash table by using Linear Probing (size of the hash table is 10)
36, 48, 66, 27, 23, 87, 10, 12

b) Explain the Radix sort with an example. [5+5]

10.a) Construct the AVL tree of the following data
20, 40, 25, 18, 15, 5, 10, 46, 60

b) Draw the flow chart of splaying operations of splay tree. [5+5]

OR

11.a) Consider the string = "GCATCGCAGAGAGTATACAGTACG" and search string is "AGTATACA" by using the KMP algorithm.

b) What is trie? Explain the compressed trie with an example. [5+5]

---oo0oo---

Code No: 123BZ

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) Give an expression for force in a single excited machine. [2]
b) Differentiate between electric and magnetic circuit. [3]
c) Give the functions of Yoke and pole core in a D.C. Machine. [2]
d) Differentiate between Lap and Wave windings in a D.C. Machine. [3]
e) Define critical speed in D.C. Generators. Give its significance. [2]
f) Define critical resistance in D.C. Generators. Give its significance. [3]
g) Give the merits and demerits of Ward-Leonard speed control method. [2]
h) Give the importance of OLR and NVC in 3-point starter. [3]
i) Give the condition for maximum efficiency in a D.C. Motor. [2]
j) Enumerate the various losses in a D.C. Machine. [3]

PART – B

(50 Marks)

2.a) A steel ring has a mean diameter of 20cm, a cross section of $25cm^2$ and a radial air gap of 0.8mm cut across it. When excited by a current of 1A through a coil of 1000 turns wound on the ring core, it produces an air gap flux of 1mWb. Neglecting leakage and fringing, calculate
(i) relative permeability of steel and
(ii) total reluctance of the magnetic circuit.
b) State and explain the two kinds of power losses that occur when a magnetic material undergoes cyclic magnetization. [5+5]

OR

3.a) A straight conductor of 1.5m length carries a current of 40A.It is lying at right angles to a uniform magnetic flux density of 0.8T.
Find (i) the force developed on the conductor (ii) The power required to derive the conductor at a uniform speed of 25m/sec and (iii) the emf induced in the conductor.
b) Derive an expression for torque produced by doubly excited system. [5+5]

4.a) Derive the e.m.f. equation of a D.C. generator.
b) What is armature reaction? Explain with neat diagrams. [5+5]

OR

5.a) A separately excited dc generator running at 1000 rpm supplied 110A at 220V to a resistive load. If the load resistance remains constant, what will be the load current if the speed is reduced to 800 rpm? Armature resistance is 0.02Ω. Field current is unaltered. Assume a voltage drop of 1Vper brush. Ignore the effect of armature reaction.

b) Explain different methods to improve commutation in a d.c machine. [5+5]

6.a) Explain the procedure to obtain magnetization, external and internal characteristics of a series generator.

b) Explain the procedure to connect two series generators to share load in proportion. [5+5]

OR

7.a) Classify DC machines according to forms of excitation and draw its circuit diagram.

b) The relation between excitation current and emf generated by a DC shunt wound generator running on open circuit at 850 rpm is as follows:

Excitation (Amperes):	2	3	4	5	6
EMF (Volts):	68	87	100	109	112

The shunt field resistance is 22.2Ω. Find the voltage at the terminals of the machine when it runs at 850 rpm self excited. [5+5]

8.a) Explain the constructional details of a d.c motor with a neat sketch.

b) A DC motor takes an armature current of 110A at 480V. 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 0.05Wb. Calculate (i) speed (ii) Torque developed in the armature. [5+5]

OR

9.a) Explain the working of a 4 point starter.

b) Discuss different methods of speed control of a DC Motor. [5+5]

10.a) Explain the Swinburne's test with the help of a neat diagram to find out the efficiency of a DC machine. What are the main advantages and disadvantages of this test?

b) A 230V, 10 HP shunt motor takes a full load line current of 40 A. The armature and field resistances are 0.25Ω and 230Ω respectively. The total brush contact drop is 2V, and the core and the friction losses are 380W. Calculate the efficiency of the motor. Assume that the stray load loss is 1% of the rated output. [5+5]

OR

11.a) A field's test on two mechanically coupled DC series motors (with their field windings connected in series) gave the following test data: **Motor**: Armature current = 50A; Armature voltage = 500V; Field winding voltage drop = 38 V. **Generator:** Armature current = 38A; Armature voltage = 400V; Field winding voltage drop=36V. Resistance of each armature is 0.2 ohms. Calculate the efficiency of each machine at this load.

b) With a neat circuit diagram explain the Hopkinson's test. [5+5]

--ooOoo--

R13

Code No: 113AH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
MATHEMATICS – III
(Common to AGE, ECE, EEE, 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 the differential equation $x^2\frac{d^2y}{dx^2}-3x\frac{dy}{dx}+3y=0$. [2]

b) Define Regular singular point of a differential equation with example. [3]

c) Write Rodrigue's formula and Generating function of Legendre's polynomials. [2]

d) Show that $J_{\frac{1}{2}}(x)=\sqrt{\frac{2}{\pi x}}\sin x$. [3]

e) Show that the function $f(z)=e^z$ is entire. [2]

f) Evaluate, using Cauchy's integral formula $\int_C \frac{\log z}{(z-1)^3}dz$, where C is $|z-1|=\frac{1}{2}$. [3]

g) Determine the poles of the function $f(z)=\frac{z+1}{z^2(z-2)}$ and the residue at each pole. [2]

h) Find the Laurent series of $f(z)=\frac{(z-2)(z+2)}{(z+1)(z+4)}$, for $|z|>4$. [3]

i) Find the invariant points of the transformation $w=(z-i)^2$. [2]

j) Determine the image of the region $|z-3|=5$ under the transformation $w=\frac{1}{z}$. [3]

PART-B

(50 Marks)

2.a) Solve the differential equation $x^2\frac{d^2y}{dx^2}-3x\frac{dy}{dx}+5y=x^2\sin(\log x)$.

b) Apply the Frobenius method to solve ODE $x\frac{d^2y}{dx^2}+2\frac{dy}{dx}-xy=0$. [5+5]

OR

3.a) Solve the differential equation $(2x+5)^2\frac{d^2y}{dx^2}-6(2x+5)\frac{dy}{dx}+8y=6x$.

b) Apply the power series method to solve ODE $\frac{d^2y}{dx^2}+y=0$. [5+5]

4.a) Show that $\frac{d}{dx}\left[x^{-n}J_n(x)\right] = -x^n J_{n+1}(x)$.

b) Prove that $\int_{-1}^{1} P_m(x) P_n(x)\,dx = \frac{2}{2n+1}$, *if* $m = n$. [5+5]

OR

5.a) Prove that $(n+1)\,P_{n+1}(x) = (2n+1)\,x\,P_n(x) - n\,P_{n-1}(x)$.

b) Prove that $J_n(x) = \frac{x}{2n}\left(J_{n-1}(x) + J_{n+1}(x)\right)$. [5+5]

6.a) Show that both the real part and the imaginary part of any analytic function satisfy Laplace's equation.

b) Evaluate $\int_0^{3+i} z^2\,dz$ along the path the real axis to 3 and then vertically to $3+i$.

[5+5]

OR

7.a) Find the analytic function $f(z) = u + i\,v$ where $u = \frac{\sin 2x}{(\cosh 2y - \cos 2x)}$.

b) Derive the Cauchy-Riemann equations if $f(z)$ is expressed in polar coordinates. [5+5]

8. Use residue theorem to evaluate $\int_0^{2\pi} \frac{d\theta}{2 + \cos\theta}$. [10]

OR

9. Use residue theorem to evaluate $\int_{-\infty}^{\infty} \frac{dx}{(x^2+1)(x^2+9)}$. [10]

10.a) Determine and Plot the image of the region $-1 \le x \le 1$ and $-\pi \le y \le \pi$ under $w = e^z$.

b) Determine and Plot the image of the region $2 < |z| < 3$ and $|\arg z| < \frac{\pi}{4}$ under $w = z^2$. [5+5]

OR

11.a) Find and plot the rectangular region $0 \le x \le 2,\ 0 \le y \le 1$ under the transformation $w = \sqrt{2}\,e^{\frac{i\pi}{4}} z$.

b) Determine the bilinear transformation that maps the points $z_1 = -1$, $z_2 = i$, $z_3 = 1$ into the points $w_1 = 0$, $w_2 = i$, $w_3 = \infty$ respectively. [5+5]

---ooOoo---

Code No: 113BV

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to CE, 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)	Point out the natures of Managerial Economics.	[2]
b)	Define 'Law of demand' and point out its exceptions.	[3]
c)	What do you understand by 'Least cost combination of inputs'?	[2]
d)	State and explain Cobb-Douglas Production function.	[3]
e)	How are markets classified?	[2]
f)	What are the salient features of Sole Proprietorship?	[3]
g)	What is the significance of Capital?	[2]
h)	Bring out the different sources of raising capital.	[3]
i)	What is the importance of ratio analysis?	[2]
j)	List out the salient features of Du port Chart.	[3]

PART - B

(50 Marks)

2.a)	Define Managerial Economics and Explain its scope.	
b)	What is elasticity of demand? And explain its types.	[5+5]
	OR	
3.a)	Explain the governing factors of demand forecasting.	
b)	Describe any two methods of demand forecasting.	[5+5]
4.a)	Explain the meaning and relationships of Isoquants and Isocosts.	
b)	Briefly explain the laws of returns.	[5+5]
	OR	
5.a)	Explain the importance of break-even analysis and explain its assumptions and uses.	
b)	The fixed costs for year 1975-76 are Rs. 8, 00,000. Variable cost per unit is Rs. 40. The estimated sales for the period are valued at Rs. 20, 00,000. Each unit sells at Rs. 200. Find the break-even point.	[5+5]
6.a)	Explain the conditions of perfect competition.	
b)	Describe the price-output determination in perfect competition.	[5+5]
	OR	
7.a)	Explain the objectives of Pricing and write any two methods of Pricing.	
b)	Describe the importance of Public Enterprises and explain the salient features of departmental organizations and government corporations.	[5+5]

8.a) Describe types of capital and explain the estimation of fixed and working capital requirements.

b) Explain the meaning of trading forecast and explain the salient features of capital and cash budgets. [5+5]

OR

9.a) Explain the salient features of capital budgeting proposals.

b) The cash outflow and cash inflows of a certain project are given below:

Years	Cash outflows Rs.	Cash inflows Rs.
0	1,80,000	-
1	40,000	20,000
2		40,000
3		60,000
4		1,00,000
5		80,000

The scrap value at the end of 5th year is Rs. 30,000. The cost of capital is 12% calculate the net present value. [5+5]

10.a) Explain the importance of Double-entry book keeping.

b) Record the following transactions in proper books and post them into the ledger and draw out a trial balance: [2+8]

2004		Rs.
Jan. 1	Assets : Debtors: Ganpat Rai, Rs. 600 ; Shri Ram, Rs. 400 ; Furniture, Rs. 100. Liabilities : Creditors : General Trading Co., Rs. 400 ; Banwari Lal, Rs. 45.	
Jan. 2	Sold to Lekhraj	1,500
Jan. 3	Employed Sital Prasad as cashier, received from him security deposit	1,500
Jan. 6	Paid General trading Co. cash Discount allowed	390 10
Jan. 11	Ganpat Rai cleared his account less 5% cash discount	
Jan. 15	Bought of Banwari Lal goods	3,665
Jan. 19	Paid Insurance premium	86
Jan. 20	Received from Shri Ram cash Allowed him discount	212 8
Jan. 22	Sold goods to Ganpat Rai	86
Jan. 23	Sold goods to Shri Ram Paid rent to the godown	60 15
Jan. 25	Bought of General Trading Co. goods	945
Jan. 26	Returned to General Trading Co. defective goods Ganpat Rai returned damaged goods	45 16
Jan. 27	Banwari Lal gives us special allowance for certain defects in goods from them	50
Jan. 27	Goods sold to M/s Ravi Bros. on credit	100
Jan. 28	Received from Lalta Prasad amount previously written off as bad debts Proprietor took away goods for his private use	75 200
Jan. 29	Received cash from Shri Ram	180
Jan. 30	Sold goods to Lekhraj	400
Jan. 31	Rent due to landlord	170
Jan. 31	Paid for stationery	140

OR

11.a) Explain the importance of financial analysis and describe the salient features of liquidity and activity ratios.

b) What is capital structure ratio? And explain the significance of different profitability ratios. [5+5]

--ooOoo--

Code No: 113AQ

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
METALLURGY AND MATERIALS SCIENCE
(Common to AME, 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) What is electron compound? Give examples [2]
b) What is congruent melting intermediate phase? [3]
c) Define allotropy and give examples. [2]
d) Differentiate between spheroidal graphite cast Iron and gray cast Iron. [3]
e) Differentiate between hardness and hardenability. [2]
f) What are α-Stabilizers in titanium alloys. [3]
g) Differentiate between crystallized ceramics and cermets. [2]
h) What is the role of grain boundaries on the properties of metal / Alloys. [3]
i) What is Lever rule? [2]
j) What is pendulum annealing? [3]

PART - B

(50 Marks)

2.a) State Hume-Roothery's rules for the formation of substitutional solid solutions.
b) Differential between metal and alloy. [5+5]

OR

3.a) What is the necessity of Alloying?
b) Distinguish between Intermetallic compound and Electron compound.
c) Differentiate between grain and atom. [3+3+4]

4. Draw the Fe-Fe_3C Diagram and label all the points, lines, temperatures and reactions. [10]

OR

5.a) Apply the Lever rule to phase equilibrium in an alloy of 15% B and 85% A when a liquid of 45% B is in equilibrium with a solid solution of 95% A.
b) What is Isomorphous alloy system? Explain with suitable example. [5+5]

6.a) Gray cast Iron is brittle, in spite of having soft phase (i.e.) Ferrite and graphite in its micro structure, Explain with suitable reason.
b) Differentiate between white cast iron and malleable cast iron. [5+5]

OR

7. Draw the C-curves for 0.8%C steel and explain the phase transformations that occur on different cooling rates. [10]

8. Describe the composition, heat treatment and applications of the following metals:
   a) copper and its Alloys
   b) Titanium and its alloys [5+5]

OR

9. Explain how a TTT diagrams is constructed? What is its relation to CCT diagrams? Draw a TTT diagram for 0.4%C steel and identify the microstructural phases. [10]

10. Write short notes on
    a) Metal Matrix composites,
    b) Fibber reinforced composites. [5+5]

OR

11. Enumerate the characteristics, properties and applications of composites and polymers. [10]

---ooOoo---

Code No: 113BR

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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 and explain Kirchoff's current law. [2]
b) Four lamps are connected in parallel to a 100 V supply. The current taking by first three lamps are 1.9 A, 1. 3 A and 0.7 A .If the total supply current is 5A, calculate the resistance of all the lamps. [3]
c) An impedance of (30+j45) ohm in series with an impedance of (6-j7) ohm to a 60 V supply. Find the voltage across each impedance. [2]
d) Define the terms (i) peak factor (ii) form factor and (iii) rms value of alternating current. [3]
e) A 3300/300 V single phase 30kVA transformer has 1100 primary turns. Find (i) secondary turns (ii) secondary current when it supplies a load of 200 kW at 0.8 pf lagging. [2]
f) Define the terms (i) efficiency and (ii) regulation of a transformer. [3]
g) Draw well labelled connection diagrams to show shunt and series generators. [2]
h) Explain the principle of operation of three phase induction motor. [3]
i) Name different torques available in measuring instruments and write their significance. [2]
j) Write the classification of electrical measuring instruments. [3]

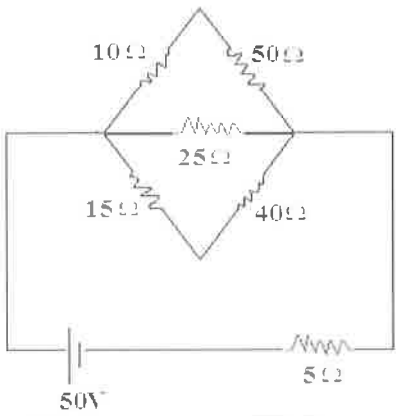
PART- B

(50 Marks)

2.a) State and explain superposition theorem.
b) The impedances AB= (30-j67) Ω, BC=(45+j56)Ω and AC=(35-j46) Ω are connected in delta form. Obtain its equivalent star circuit impedances. [5+5]

OR

3.a) State and explain Maximum power transfer theorem for DC circuits.
b) Calculate the current flowing through 25 Ω in the circuit shown below using Thevinin's Theorem. [5+5]



4.a) Obtain the average and rms values of a sinusoidal current wave.

b) A 23 ohm resistor connected in series with 5H inductor and further this circuit is connected in parallel with 3 μF capacitor. Find (i) the supply current (ii) current in each branch (iii) supply power if the supply voltage is $v(t) = 10\sin(2000t)$. [5+5]

OR

5. Find the rms value of the resultant current in a wire which carries simultaneously a direct current of 10 A and a sinusoidal alternating current with a peak value of 15 A. [10]

6.a) Describe the working principle of transformer and also deduce the expression for emf in secondary winding.

b) The no load current of a transformer is 5 A at 0.2 pf when supplied at 240 V, 50 Hz. The number of turns on the primary winding is 250. Determine the (i) maximum value of the flux in the core (ii) the core loss and (iii) magnetising current. [5+5]

OR

7.a) What is transformer? Differentiate between step up and step down transformers. Write the applications of step up and step down transformers.

b) A 200/400 V, 50 Hz single phase transformer on test gave the following readings:
OC (LV) 200 V, 0.7 A, 70 W
SC (HV) 15 V, 10 A, 80 W.
Find voltage regulation at 0.8 pf lagging at full load. [5+5]

8.a) A six pole machine has an armature with 90 slots and 8 conductors per slot and runs at 1000 rpm, the flux per pole is 0.05 Wb. Determine the induced emf if winding is lap connected winding.

b) How is back emf produced in a motor? Also derive an expression for back emf. [5+5]

OR

9.a) Derive the condition for maximum efficiency of a DC motor.

b) A six pole induction motor is fed from 50 Hz supply.If the frequency of rotor emf at full load is 2 Hz. Find full load speed and slip. [5+5]

10. With a neat diagram explain the operation of moving coil permanent type instruments. [10]

OR

11. With a neat diagram explain the operation of attraction type moving iron instrument. [10]

---ooOoo---

Code No: 53017 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, March - 2017
THERMODYNAMICS
(Common to AE, AME, ME)

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

Answer any five questions
All questions carry equal marks

- - -

1.a) What are the major reasons for the generation of irreversibilities? Explain the importance of studying about the irreversibility.

b) A gas undergoes two processes that are in series. The first process is an expansion that is carried out according to the law PV = constant, and the second process is a Constant pressure process that returns the gas to the initial volume of the first process. The start of the first process is at 400 kPa and 0.025 m^3 with the expansion to 200 kPa. Sketch the process on a P-V diagram, and determine the work of the combined process. [7+8]

2.a) Explain the corollaries of first law of thermodynamics along with the suitable examples.

b) The air speed of a turbo jet engine in flight is 270 m/s. The ambient air temperature is 15°C. Gas temperature at outlet of nozzle is 600°C. Corresponding enthalpy values for air and gas are respectively 26 and 912 kJ/kg. Fuel air ratio is 0.0190. Chemical energy of the fuel is 44.5 MJ/kg. Owing to incomplete combustion 5% of the chemical energy is not released in the reaction. Heat loss from the engine is 21 kJ/kg of air. Calculate the velocity of the exhaust jet. [7+8]

3.a) What do you understand by the term Claussius Inequality? Explain its significance.

b) An adiabatic turbine receives gas at 700 kPa and 1000 ^{0}C and discharges it at 150 kPa and 665 ^{0}C. The surrounding temperature is 25 ^{0}C. Determine the decrease in availability function, available energy and irreversibility. [8+7]

4.a) What is Mollier chart? How to understand the saturation properties from the chart? Explain.

b) Throttling colorimeter has steam entering to it at 10 MPa and coming out of it at 0.05 MPa and 100^{0}C. Determine dryness fraction of steam. [8+7]

5.a) Differentiate between throttling process and free expansion process along with their importance.

b) 0.3 m^3 of air at pressure 8 bar expands to 1.5 m^3 and a final pressure is 1.3 bar. Assuming the expansion to be polytropic, calculate the polytropic index, heat supplied and change of internal energy and entropy. [8+7]

6.a) A gaseous mixture in an engine cylinder has 14% CO_2; 13:5% O_2 and 72:5% N_2 by volume. The mixture at 1050^0C expands reversibly and according to the law $PV^{1.2}$ = constant to 7 times of its initial volume. Determine the work done and heat transfer per unit mass of the mixture. The average C_p values for CO_2, O_2, and N_2 are 1.27 kJ/kg K, 1.11 kJ/kg K and 1.196 kJ/kgK respectively.

b) Differentiate between specific humidity and relative humidity of moist air. [8+7]

7.a) Stirling cycle uses air at the beginning of the isothermal expansion the air is at 1000 K and 10 bar. The minimum pressure in cycle is 2 bar and at the end of the isothermal compression the volume is 60% of the maximum volume. Calculate the thermal efficiency of the cycle and the mean effective pressure.

b) Derive the equation for thermal efficiency and mean effective pressure for a diesel cycle from the p-v and T-s diagrams. [8+7]

8.a) Define Coefficient of Performance and derive the same for vapour compression refrigeration system.

b) How does the combined cycle work for the power generation? Which cycle is better suited for the topping part of the combined cycle? Why? [8+7]

--ooOoo--

Code No: 53012 **R09**

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

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

Answer any five questions
All questions carry equal marks

- - -

1.a) All practical energy conversion devices make use of the magnetic field as a coupling medium rather than an electric field. Discuss.
b) Find an expression for the magnetic force developed in a doubly excited magnetic system. [7+8]

2.a) Explain the following windings: (i) lap and wave windings (ii) simplex and duplex windings.
b) A 6 pole, 1500 rpm, wave wound D.C. Generator has 47 slots with 4 coil sides per slot, each coil having 3 turns. Flux per pole is 0.02Wb. Find the generated emf at rated speed at no load.
c) What are the two functions of a commutator in D.C. Machines? [7+5+3]

3.a) Define commutation. Explain the process of commutation in d.c generators with the help of neat sketches.
b) A 250 kW, 400 V, 6 pole d.c generator has 650 lap wound conductors. It is given a brush lead of 3 angular degrees (mech.) from the geometric neutral. Calculate the cross and demagnetizing turns per pole. Neglect the shunt field current. [8+7]

4.a) Discuss, what are the essential requirements for voltage build up in d.c shunt generators?
b) The open circuit characteristics of a d.c shunt generator at 800 r.p.m are given by the following data:

I_f (A)	0	0.2	0.4	0.7	1.2	1.8	3.2	5.4
E_a (V)	12	45	85	125	165	210	250	270

Determine the critical field resistance at 800 r.p.m. [8+7]

5.a) What are the conditions required to operate d.c generators in parallel? Discuss in detail.
b) Two d.c shunt generators are rated 230 kW and 150kW, 400 V. Their full load drops are 4% and 7% respectively. They are excited to no load voltages of 410 V and 420 V respectively. How will they share load of 1000A and the corresponding bus voltage? [7+8]

6.a) State the applications of dc shunt ,series and compound motors.
b) A 4 pole D.C. Motor is connected to a 500V D.C. supply and takes an armature current of 80A. The resistance of the armature circuit is 0.4Ω. The armature is wave wound with 522 conductors and the useful flux per pole is 0.025Wb. Calculate (i) the back e.m.f of the motor (ii) the speed of the motor and (iii) the torque developed by the armature. [5+10]

7.a) What are the advantages of field-flux control method over the armature circuit-resistance control method employed for the speed adjustment of D.C. motors?

b) Explain the constructional details and working principle of 3-point starter. [8+7]

8.a) Explain the procedure to conduct brake test on d.c shunt motor with neat circuit diagram.

b) In a test on a D.C. shunt generator, whose full load output is 200 KW at 250 V, the following figures were obtained.

i) With the machine at rest, a p.d. of 8 volts produced an armature current of 400 A.

ii) With the motor running at no-load and at rated speed, the line current was 36 A, the field current 12 amperes and the supply voltage 250 V. Obtain the generator efficiency at full load and half full load. [7+8]

---ooOoo---

Code No: 123AH

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 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) Find the particular integral of $x^2\frac{d^2y}{dx^2}-6x\frac{dy}{dx}+10y=x^2$. [2]

b) Find the indicial equation of $x^2y''-2xy'-(x^2-2)y=0$. [3]

c) Prove that $\int_{-1}^{1}P_2^2(x)dx=\frac{2}{5}$. [2]

d) Prove that $J_1(0)=0$. [3]

e) Find the value of 'a' if cosax sinhy is harmonic. [2]

f) Find the analytic function whose real part is xy. [3]

g) Find the residue of $\frac{2z+3}{z^2-z-2}$ at z = -1. [2]

h) Expand $\frac{1}{3-z}$ when $|z|>3$ as Laurent series. [3]

i) Prove that $w=C+z$ where C is a complex constant is conformal at all points. [2]

j) Find the fixed points of $\frac{z+i}{1+iz}$. [3]

PART-B

(50 Marks)

2. Solve the differential equation $x^2\frac{d^2y}{dx^2}-x\frac{dy}{dx}+2y=x\log x$. [10]

OR

3. Solve the differential equation in series $(1-x^2)\frac{d^2y}{dx^2}-2x\frac{dy}{dx}+2y=0$ around x = 0. [10]

4.a) Express x^2+x+1 in terms of Legendre Polynomials.

b) Prove that $\frac{d}{dx}\left(x^nJ_n(x)\right)=x^nJ_{n-1}(x)$. [5+5]

OR

5.a) Prove that $(2n+1)xP_n(x)=(n+1)P_{n+1}(x)+(n)P_{n-1}(x)$.

b) Prove that $J_4(x)=\left(\frac{48}{x^3}-\frac{8}{x}\right)J_1(x)+\left(1-\frac{24}{x^2}\right)J_0(x)$. [5+5]

6.a) Find the analytic function whose real part is e^{-x} (x sin y-y cos y).

b) Evaluate $\int_C \frac{dz}{(z-2)(z-4)}$ where C is $|z-3|=1/2$. [5+5]

OR

7.a) If f(z) is an analytic function then show that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$.

b) Evaluate $\int_C \frac{dz}{(z^2-4)(z+1)}$ where C is $|z|=3$. [5+5]

8. Evaluate $\int_0^{2\pi} \frac{d\theta}{2+\cos\theta}$ using residue theorem. [10]

OR

9. Evaluate using residue theorem $\int_{-\infty}^{\infty} \frac{x^2 dx}{(x^2+1)(x^2+4)}$. [10]

10.a) Under the transformation $w = \frac{z-i}{1-iz}$ find the image of the circle | z | = 1.

b) Find the image of $|z-3i|=3$ under the mapping $w=\frac{1}{z}$. [5+5]

OR

11.a) Find the image of the region bounded by the lines $x = 1$, $y = 1$, $x + y = 1$ under the transformation $w = z^2$.

b) Find the bilinear mapping which maps the points $z = \infty$, i, 0 into 0, i, ∞. [5+5]

---ooOoo---

R15

Code No: 123BR

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 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 Super position Theorem? [2]

b) What are Ideal and Practical sources? [3]

c) A 3μF capacitor is connected to a supply frequency of 1KHz and a current of $2.83\angle 90^0$ flows. Determine the supply voltage. [2]

d) The impedance of an electrical circuit is (30 -j50) ohms. Determine (i) the resistance, (ii) the capacitance, and (iii) the magnitude of the impedance, when the circuit is connected to a 240 V, 50 Hz supply. [3]

e) Define regulation of a transformer? [2]

f) Give the constructional details of a 1-ϕ transformer. [3]

g) What are different types of DC generators? [2]

h) What is slip and slip speed? [3]

i) State the materials used for:
i) Pointer and ii) Springs. [2]

j) Compare different damping torques required in measuring instruments? [3]

PART - B

(50 Marks)

2.a) Using Thevenin equivalent circuit for the circuit shown in figure 1 across x-y terminals, calculate the current flowing through the 5 Ω resistor.

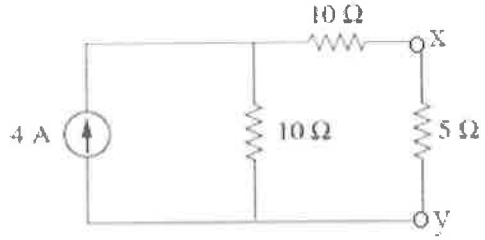


Figure: 1

b) Find the equivalent resistance R_{ab} in the circuit shown in figure 2. [7+3]

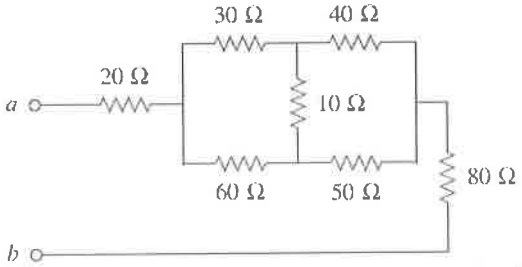


Figure: 2

OR

3.a) State and explain Kirchoff's laws.

b) Determine v_x for the circuit shown in figure 3.

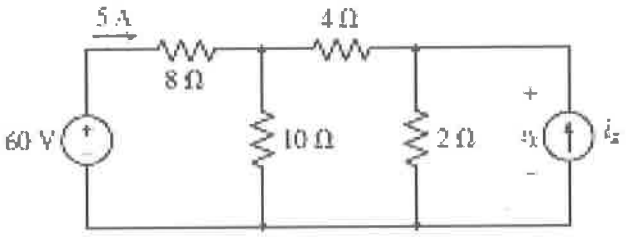


Figure: 3

c) Using Δ-Y or Y-Δ conversion, find the current I in the circuit shown in figure 4? [3+3+4]

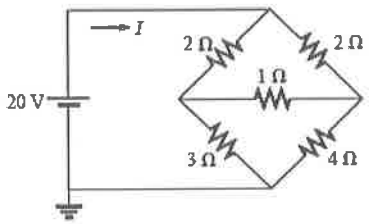


Figure: 4

4.a) Define the following with respect to sinusoidal quantity:
i) RMS Value ii) Average Value iii) Form factor iv) Peak factor.

b) A coil has a resistance of 4 Ω and an inductance of 9.55 mH. Calculate (i) the reactance, (ii) the impedance, and (iii) the current taken from a 240V, 50 Hz supply. Determine also the phase angle between the supply voltage and current. [4+6]

OR

5. Determine the average value, rms value and form factor of the current waveform in Figure 5. [10]

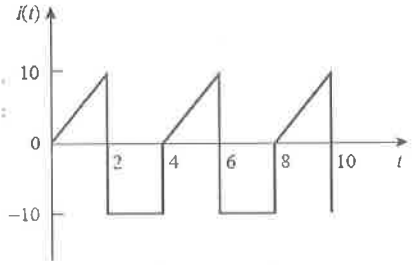


Figure: 5

6.a) A single – phase, 50 Hz transformer has 40 primary turns and 520 secondary turns. The cross- sectional area of the core is 270 cm^2. When the primary winding is connected to a 300 volts supply, determine (i) the maximum value of flux density in the core, and (ii) the voltage induced in the secondary winding.

b) Explain about various losses of Single phase transformer? How to minimize them? [5+5]

OR

7.a) Briefly explain different tests performed on transformer with suitable circuit diagrams.

b) A single-phase transformer is rated at 40 kVA. The transformer has full-load copper losses of 800W and iron losses of 500W. Determine the transformer efficiency at full load, 75 % of load and 0.8 power factor. [6+4]

8.a) Derive the torque equation of dc motor.

b) The stator of a 3-phase, 4-pole induction motor is connected to a 50 Hz supply. The rotor runs at 1455 rev/min at full load. Determine (i) the synchronous speed and (ii) the slip at full load. [6+4]

OR

9.a) Explain the operating principle of Three phase Induction motor.

b) A 10kW d.c shunt generator having an armature circuit resistance of 0.75Ω and a field resistance of 125 Ω, generates a terminal voltage of 250V at full load. Determine the efficiency of the generator at full load, assuming the iron, friction and wind age losses amount to 600W. [5+5]

10.a) How are measuring instruments classified?

b) Explain the construction and working of PMMC instrument. Derive the equation for deflection if the instrument is spring controlled. [4+6]

OR

11. Explain the construction and working of MI instrument with the help of a neat sketch. [10]

---ooOoo---

Code No: 123BV

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to CE, 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) What do you understand by 'Derived demand' and give an example. [2]
b) What are the criteria for choosing a good forecasting method? [3]
c) What are the different types of Isoquants? [2]
d) What efforts can contribute for widening the Angle of Incidence? [3]
e) What are 'External economies'? How do they influence cost? [2]
f) What are the limitations of 'Breakeven' theory? [3]
g) Why lot of importance is attached to Appraisal of long term investment decisions? [2]
h) Under what different conditions, Government can enter into business? [3]
i) How do you compute Earnings Per Share? [2]
j) What is a 'Contra entry'? Give suitable examples. [3]

PART-B

(50 Marks)

2. What are the determinants of Demand? State and explain the law of Demand with its assumptions and exceptions. [10]

OR

3. Why do business houses conduct demand forecasting before commencing production? Discuss in detail the various methods of forecasting potential demand for a product/service. [10]

4. Explain the concepts 'Average Physical Product' 'Total Physical Product' and 'Marginal Physical Product'. Show their relationship giving a hypothetical production schedule and diagrammatic representation. [10]

OR

5. How are costs classified? What relationship can you establish between them? Illustrate how Average cost be determined during short run and long run periods? [10]

6. How are Markets classified? Elaborate the characteristics of Monopolistic competition? Discuss how a competitor can reach optimum output level under conditions of Monopolistic competition. Use necessary diagrams. [10]

OR

7. What are the objectives of business under competitive conditions? Critically evaluate various forms of business enterprises in private sector in India. [10]

8. What do you understand by 'Working capital cycle'? What are its components? Discuss in detail the various factors that influence the volume of working capital needed by a manufacturing organization. [10]

OR

9. XYZ Ltd. intended to buy a machine at a cost of Rs. 1,00,000. Two alternative models, namely A and B are available at the same cost and life of 6 years. The expected annual cash flows are as follows:

Year end	Machine 'A' (Rs.)	Machine 'B' (Rs.)
1	45,000	25,000
2	38,000	22,000
3	30,000	40,000
4	25,000	52,000
5	19,000	27,000
6	12,000	11,000

Apply Payback method and Net present value method (discounting rate being 10%) and recommend the better option. [10]

10. Following is the Balance sheet of Anand as on 31st March, 2016.

Liabilities	Amount (Rs.)	Assets	Amount (Rs.)
10,000 Equity shares @Rs.10 each	1,00,000	Fixed Assets	2,00,000
Reserves	20,000	Stock	30,000
P & L A/c.	30,000	Debtors	30,000
6% Debentures	80,000	Cash balance	40,000
Trade creditors	50,000	---	------
Bills payable	20,000	-----	------
	3,00,000		**3,00,000**

You are required to calculate:
a) Debt-Equity ratio;
b) External Equities to Total Assets ratio
c) Fixed Assets to Netwoth ratio;
d) Equity ratio. [10]

OR

11. What are the objectives of preparing the Trial Balance? Explain the procedure to be followed for preparing final accounts on the basis of data given in a trial balance. [10]

---oo0oo---

Code No: 113AB

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 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) What is open system? Give suitable examples. [2]
b) What is path function? Explain. [3]
c) What is PMM of second kind? [2]
d) Write the two statements of second law of thermodynamics. [3]
e) What is dryness fraction? Explain. [2]
f) What do you mean by throttling? Which property remains constant during throttling? [3]
g) Define dry bulb temperature and wet bulb temperature. [2]
h) What is thermodynamic wet bulb temperature? Explain. [3]
i) Draw layout of Bell- Coleman cycle and indicate various components on it. [2]
j) Draw p-v and T-s plots for Atkinson cycle. [3]

PART-B

(50 Marks)

2. Explain the working of constant pressure gas thermometer with the help of a neat sketch. [10]

OR

3.a) Prove that internal energy is a property of the system.
b) Discuss in detail about quasi static process. [5+5]

4.a) Prove the equivalence of Kevin Plank and Clausius statements.
b) Derive Clausius inequality and explain the significance. [5+5]

OR

5.a) What do mean by thermodynamic potentials? Explain.
b) A cyclic heat engine operates between a source temperature of 1000 ^{0}C and a sink temperature of 40^0 C. Find the least rate of heat rejection per kW net output of the engine. [5+5]

6.a) Explain free expansion process.
b) Find internal energy of 1 kg of steam at 20 bar when
i) It is superheated, its temperature being 400 ^{0}C;
ii) it is wet, its dryness being 0.9 [5+5]

OR

7.a) 1 kg of air at a pressure of 8 bar and a temperature of 100 ^{0}C undergoes a reversible polytrophic process following the law $pv^{1.2} = constant$. If the final pressure is 1.8 bar determine:

i) The final specific volume, temperature and increase in entropy;

ii) The work done and heat transfer

Assume R= 0.287 kJ/kg K and γ=1.4.

b) Repeat (a) assuming the process to be irreversible and adiabatic between end states. [5+5]

8.a) Explain the method of evaluation of internal energy of gaseous mixture.

b) A vessel of 0.35 m^3 capacity contains 0.4 kg of carbon monoxide (molecular weight=28) and 1 kg of air at 20 ^{0}C. Calculate:

i) The partial pressure of each constituent

ii) The total pressure in the vessel.

The gravimetric analysis of air may be taken as 23.3% oxygen (molecular weight = 32) and 76.7% nitrogen (molecular weight = 28). [5+5]

OR

9.a) Derive the expression for enthalpy of moist air.

b) 0.004 kg of water vapour per kg of atmospheric air is removed and temperature of air after removing the water vapour becomes 20 ^{0}C. Determine:

i) Relative humidity ii) Dew point temperature.

Assume that condition of atmospheric air is 30 ^{0}C and 55% RH and pressure is 1.0132 bar. [5+5]

10. Explain Diesel cycle with the help of p-v and T-s plots. Derive the expressions for air standard efficiency and mean effective pressure. [10]

OR

11. Explain the working of Bell Coleman cycle and derive the expression for COP. [10]

---ooOoo---

Code No: 113AM

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, March - 2017
SURVEYING
(Common to CE, CEE, 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) Define forward bearing and backward bearing. [2]
b) List out the accessories in plane table surveying. [3]
c) Define Back sight and Fore sight in leveling. [2]
d) Differentiate between direct and indirect methods of contouring. [3]
e) List out the methods of finding areas by field notes. [2]
f) Differentiate between one level and two level sections. [3]
g) Define Face left and Face right in theodolite surveying. [2]
h) Describe the principle of electronic theodolite. [3]
i) Define simple curve and compound curve. [2]
j) State the kinds of GIS in surveying. [3]

PART-B
(50 Marks)

2.a) List out the principles of surveying.
b) Explain briefly about classification of survey based on objects of survey. [5+5]

OR

3.a) List out the methods of plane table surveying.
b) The bearings of the sides of a traverse ABCDE are given below. Compute the interior angles of the traverse. [5+5]

Line	Fore bearing	Back bearing
AB	110^0 15′	290^0 15′
BC	35^0 15′	215^0 15′
CD	276^0 30′	96^0 30′
DE	195^0 30′	15^0 30′
EA	131^0 15′	312^0 15′

4. The following readings were obtained in running a line of fly levels from a B.M. of elevation 162.350.

Back sight	2.850	1.690	2.075	1.720	0.955
Fore sight	2.325	1.575	2.340	1.855	

From the last position of the instrument, 6 pegs at 20 m intervals are to be set out on a uniform falling gradient of 1 in 50. The first peg is to have a RL of 162.220. Work out the staff readings required for setting the tops of the pegs on the given gradient and enter the result in a level book form. [10]

OR

5. What is contour and state the characteristics of contour with sketches. [10]

6. The following offsets were taken at 15 m intervals from a survey line to an irregular boundary line: 3.50, 4.30, 6.75, 5.25, 7.50, 8.80, 7.90, 6.40, 4.40 and 3.25 m. Calculate the area enclosed between the survey line, the irregular boundary line, and the first and last offsets by trapezoidal rule and simpson's rule. [10]

OR

7. An embankment of width 12 m and side slopes 1.5 to 1 is required to be made on a ground which is level in a direction transverse to the centre line. The central heights at 20 m intervals are as follows: 3.7, 2.6, 4.0, 3.4, 2.8, 3.0, and 2.2 m. Calculate the volume of earth work by the trapezoidal and prismoidal formula. [10]

8. List out the methods of measuring horizontal angles in theodolite surveying and also explain the methods with a neat sketch. [10]

OR

9 a) Define horizontal angle and vertical angle in theodolite surveying.

b) The observations were made on the top A of a flag AB on a hill from two instrument stations P and Q, 150 m apart, the stations P and Q being in the line with A. The angles of elevation of A at P and Q were 30^0 05′ and 17^0 52′ respectively. The staff reading upon the BM (RL = 311.25 m) were, respectively, 2.690 and 3.815 when the instrument was at P and Q, the telescope being horizontal. Determine the elevation of the foot B of the flag if AB is 4.5 m. [5+5]

10. Tabulate the necessary data to set out a right handed circular curve of 600 m radius to connect two straights intersecting at a chainage of 3605 m By rankine's method of deflection angles, the angle of deflection being 25^0 and peg interval is 30 m. [10]

OR

11.a) Describe about Total station and state its advantage over other methods of surveying.

b) State four uses and applications of GPS. [5+5]

---ooOoo---

Code No: 113BP

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) Compare singly and doubly linked linear lists. [2]
b) Write a recursive function in C to compute x^n where x and n are integers. [3]
c) Give the ADT specification of a stack. [2]
d) Write a C function for popping an integer item from a stack. Assume that stack is implemented as an array. [3]
e) Give the ADT specification of a max priority queue. [2]
f) Write a recursive function in C for the inorder traversal of a binary tree. Assume that binary tree is already created. Assume linked representation for binary tree. [3]
g) Sort the following list of integers in ascending order using insertion sort:
11, 41, 35, 10, -11
Show the contents of the list at the end of each pass. [2]
h) What is meant by a collision in hashing? List any two methods used for resolving collisions in hashing? [3]
i) Define a Red-Black tree. [2]
j) Write a function in C that returns the location of the smallest integer in a binary search tree of integers. Assume that binary search tree of integers is already created. Assume linked representation for the binary search tree. [3]

PART- B

(50 Marks)

2.a) Define the space complexity of a program.
b) Write a C function for deleting an integer element from doubly linked list of integer elements. Assume that the doubly linked list of integers is already created. [5+5]

OR

3.a) Explain with an example the linked representation of a sparse matrix.
b) Define the asymptotic notations (Big Oh, Omega and Theta) used in algorithm analysis. [5+5]

4.a) Write a C function for deleting an integer element from a circular queue of integers. Assume array representation for the circular queue.
b) Explain with an example how recursion is implemented using stack. [5+5]

OR

5.a) Show how to represent a deque (double ended queue) in a singly linked list.
b) Write functions in C which insert and delete integer elements at either end of the above deque. [5+5]

6.a) Give an example for a threaded binary tree.
b) Write a non recursive procedure for the preorder traversal of a binary tree. Assume that the binary tree of elements is already created. [5+5]

OR

7.a) Give an example for the adjacency list representation of a graph.
b) Write a procedure for the bfs of a graph. [5+5]

8.a) Write a recursive binary search function in C to search for an integer key in a sorted (ascending order) array of integers.
b) Compare the performance of binary search with linear search. [5+5]

OR

9.a) Write quick sort algorithm for sorting a list of integers in ascending order.
b) What is the time complexity of quick sort algorithm in the worst case? [5+5]

10.a) Define an AVL tree. Give an example for it.
b) Write a non recursive function in C to search for an integer key in a binary search tree of integers. Assume that the binary search tree of integers is already created. [5+5]

OR

11.a) What is a bottom-up splay tree?
b) Write a procedure for inserting an element into a B-tree. [5+5]

---ooOoo---

Code No: 113BT

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) Distinguish between Joint probability and conditional probability. [2]
b) Give the definition and Axioms of probability. [3]
c) Discuss exponential distribution. [2]
d) Find the skew for Gaussian distributed random variable. [3]
e) Explain conditional distribution function. [2]
f) Discuss joint Gaussian random variables. [3]
g) Distinguish deterministic and non deterministic processes. [2]
h) Explain the covariance matrix and its properties. [3]
i) Give the properties of cross power density spectrum. [2]
j) Discuss the spectral characteristics of a system function. [3]

PART-B

(50 Marks)

2.a) State and prove Baye's theorem.
b) In a hostel 60% of the students read Hindi news paper, 40% read English news paper and 20% read both Hindi and English news papers. A student is selected at random:
i) Find the probability that he reads neither Hindi nor English news papers.
ii) If he reads Hindi news paper, find the probability that he reads English news paper. [5+5]

OR

3.a) Define the following and give example for each of the following:
i) Discrete and continuous sample space ii) Mutually Exclusive event.
b) Two cards are drawn from a deck of 52-card deck (the first is not replaced).
i) Given the first card is a queen, what is the probability that a second card is also queen?
ii) Given the first card is a queen, what is the probability that a second card is a 7? [5+5]

4.a) What do you mean by probability density function? State and prove its properties.
b) Explain the Rayleigh distribution and density functions. [5+5]

OR

5.a) Find the moment generating function about the origin of the Poisson distribution.
b) Determine the moment generating function of a random variable with density function $f_x(x)=1/be^{-(x-a)/b}u(x)$. [5+5]

6.a) Two cards are drawn simultaneously (or successively without replacement) from a well shuffled pack of 52 cards. Find the mean, variance and standard deviation of the number of kings.

b) State central limit theorem for unequal distributions and explain. [5+5]

OR

7.a) Two random variables X_1, X_2 are related to Y as $Y=(X_1^2+X_2^2)^{1/2}$. Find the probability density function of Y in terms of joint density of X_1, X_2.

b) Determine the constant b such that the function

$$f_{xy}(x,y)=\begin{cases}3xy; & 0<x<1\\ 0; & otherwise\end{cases}$$ $0 < y < b$ is a valid joint density function. [5+5]

8.a) Explain the concept of Random process and Stationary process.

b) Distinguish between Auto correlation function and cross correlation function. State the properties of cross correlation function. [5+5]

OR

9.a) Explain classification of random process with neat sketches.

b) Prove that the power spectrum and Autocorrelation function of the random process form a Fourier Transform pair. [5+5]

10.a) State and prove any three properties of Power Spectral Density.

b) Find the output power density spectrum and output Auto correlation function for a system with $h(t) = e^{-t}$, for $t > 0$ as input with PSD $h_0/2$. [5+5]

OR

11.a) Derive the relation between input and output ACF of an LTI system with impulse response h(t).

b) Derive the properties of Cross-Power Density function. [5+5]

---ooOoo---

R09

Code No: 53002

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

BASIC ELECTRICAL AND ELECTRONIC ENGINEERING

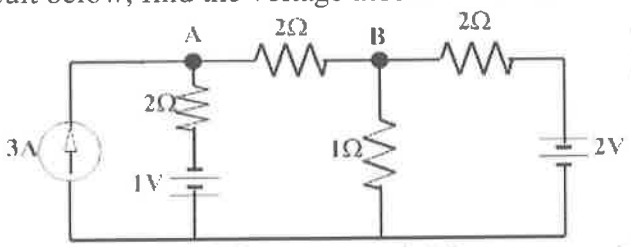
(Bio-Technology)

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

Answer any five questions
All questions carry equal marks

\- - -

1.a) Explain the applications of Kirchoff's law in network analysis.
b) In the circuit below, find the voltage across A and B. [8+7]



2.a) Define Average value. Obtain average value of a sinusoidal quantity.
b) The voltage phasor of a circuit is $10\angle 30^0\ V$ and the current phasor is $5\angle 45^0\ A$. Calculate the active and reactive powers in the circuit. [8+7]

3.a) Explain the analysis of balanced three phase delta connected systems in detail.
b) Three equal impedances, connected in star, take a power of 10kW when fed from 3-phase source. If load impedances are reconnected in delta, find the new power taken by the load? [8+7]

4.a) Explain the principle of operation of DC motors in detail.
b) Explain the constructional details of single phase induction motors in detail. [8+7]

5.a) Explain the working of an M-I ammeter. Draw the necessary circuit diagrams.
b) What is an energy meter? Explain its working in detail. [8+7]

6.a) Draw the Traic characteristics. Explain in detail.
b) Explain in detail about the differences between intrinsic and extrinsic semiconductors. [8+7]

7.a) Draw the CC configuration of Bipolar junction transistor and explain.
b) What are the applications of feedback? Explain with an example. [8+7]

8.a) Draw the logic diagram of Half adder and explain the operation.
b) What is a flip flop? Explain in detail about J-K flip flop. [8+7]

---ooOoo---

Code No: 53007 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

MATHEMATICS-III

(Common to ECE, EEE, EIE, ETM)

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

Answer any five questions
All questions carry equal marks

\- - -

1.a) Show that $\beta(m,n)=\dfrac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$.

b) Evaluate $\int_0^1 x^3\sqrt{1-x}\ dx$ using $\beta-\Gamma$ functions. [8+7]

2. Prove that $\int_{-1}^{1} p_m(x)p_n(x)dx=\begin{cases}0 & \text{if } m\neq n\\ \dfrac{2}{2n+1} & \text{if } m=n\end{cases}$. [15]

3.a) Show that $f(z)=e^z$ is analytic every where in the complex plane and find $f'(z)$.

b) Find the analytic function whose imaginary part is $\log(x^2+y^2)+x-2y$. [8+7]

4.a) State and prove cauchy's integral theorem.

b) Verify conuchy's theorem for the function $f(z)=3z^2+iz-4$, if 'C' is the square with vertices at $1\pm i$ and $-1\pm i$. [7+8]

5.a) Find Taylor's series expansion for the function $f(z)=\dfrac{1}{(1+z)^2}$ with centre at –i.

b) Find Laurent's series for $f(z)=\dfrac{1}{z^2(1-z)}$ and find the region of convergence. [8+7]

6.a) Determine the poles and residues of $f(z)=\dfrac{z^2}{(z+2)z(z-1)^2}$.

b) Evaluate $\int_c \dfrac{(2z+1)^2}{4z^3+3}dz$ Where C is the circle $|z|=1$ using residue theorem. [7+8]

7.a) Write about the transformation $w=\sin z$.

b) Find the bilinear transformation which transform the points $(\infty,i,0)$ in the z-plane into the points $(0, 1, \infty)$ in the ω-plane. [7+8]

8.a) Prove that if G is a simple graph with $n\geq 3$ and $d(v)\geq n/2$ for every vertex v of G then G is Hamiltonian.

b) Prove that a complete graph of five vertices K_5 is non planar. [8+7]

---ooOoo---

R09

Code No: 53018

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

METALLURGY AND MATERIAL SCIENCE

(Common to ME, MCT, AME)

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

Answer any five questions
All questions carry equal marks

- - -

1.a) Differentiate between ionic, covalent and metallic bonding with examples.
b) What is crystallization? Explain the cooling behavior of a metal while cooling from liquid to solid. [7+8]

2.a) Explain the governing rules for the formation of substitutional solid solutions.
b) Differentiate between intermetallic compounds and intermediate alloy phases. [7+8]

3. What are the different methods of construction of phase diagrams? And explain any one method in detail. [15]

4.a) What are tool steels? Explain their classification.
b) What would be the influence of each of the following alloying elements on the properties of a tool steel? chromium, tungsten, molybdenum, vanadium, silicon, manganese and cobalt. [7+8]

5.a) Explain the mechanism of heat removal during quenching.
b) Explain the importance of austenitizing temperature and homogeneity of austenite. [7+8]

6.a) Explain important properties of titanium.
b) Explain why the two-phase titanium alloys are stronger than the single phase alpha alloys.
c) Give at least two applications for alpha alloys, alpha-beta alloys and beta alloys of titanium. [5+5+5]

7.a) Explain the desirable characteristics of glasses.
b) What is the distinction between glass transition temperature and melting temperature?
c) The modulus of elasticity for titanium carbide (TiC) having 5vol % porosity is 30GPa. Compute the modulus of elasticity for the non-porous material. [5+5+5]

8.a) Name the three main divisions of composite material, and explain the distinguishing features of each.
b) What is a hybrid composite? List the important advantages of hybrid composites over normal fiber composites. [7+8]

---ooOoo---

Code No: W0124

R07

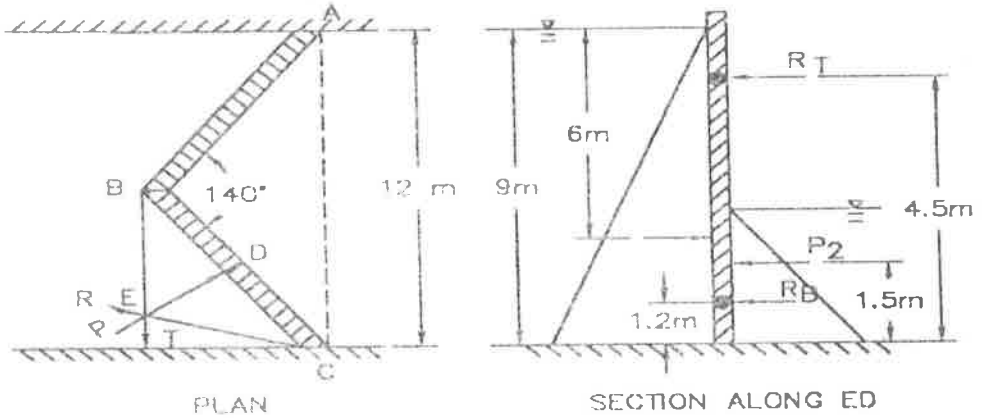
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
FLUID MECHANICS
(Civil Engineering)

Time: 3 hours **Max. Marks: 80**

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

1.a) Show that pressure varies linearly with elevation for an incompressible fluid.
b) Describe Bourden tube pressure gauge.
c) What are sensitive manometers? Describe one of them. [5+5+6]

2.a) Prove that Centre of pressure always lies below centre of gravity of the plane lamina immersed in fluid.
b) Two gates AB and BC of a lock chamber make an angle of 140^0 with each other in plan. Each gate is supported at one end by two hinges located at 12m and 6m above the bottom of the lock. The depth of water on two sides of the gates are 9m and 4.5m respectively. Find the net water pressure on each gate and the reaction at the top and bottom hinges. [8+8]



3.a) Check whether the following functions represent possible flow phenomenon of irrotational flow:
i) $\varphi = x^2-y^2 + y$ ii) $\varphi = \sin(x+y+z)$ iii) $\varphi = U \cos\theta/r$.
b) Given $u= (x^2y+z^2+2t)$, $v= (xy^2+z^2x^2+2t^2)$ and $w= (4xyz-3t)$. Find the acceleration in x- direction at (1,1,1) and t= 1 sec. Is the flow steady? Give reasons. [8+8]

4. The centre line of a tapered pipe AB carrying petrol (sp.gr.0.74) slopes upwards from A to B at an angle of 30^o to the horizontal. The distance A is 5 m and the diameter increase from 100 mm at A to 150mm at B. The pressure gauges are installed at A and B. find (a) the flow rate when the reading on the pressure gauges are equal, (b) the pressure difference across AB for the same rate of flow when the direction of taper is reversed. [16]

5.a) Define boundary layer thickness and momentum thickness.

b) A smooth two dimensional flat plate is exposed to a wind velocity of 360km/hr. If the laminar boundary layer exists up to a value of $R_{ex} = 2\times10^5$, find the maximum distance from the leading edge upto which the laminar boundary layer exists and its maximum thickness. Assume $v = 1.49 \times 10^{-5}$ m/s. [8+8]

6.a) Describe Prandtt's mixing length theory. Mention also the underlying assumptions made.

b) With a neat sketch, explain Reynold's experiment. [8+8]

7. Power is being supplied from a hydroelectric plant to an industry by means of three parallel pipes of 15 cm diameter. The pipe lines are 60km long and are laid horizontally. The pressure at inlet is maintained as 5000kPa and the efficiency of transmission obtained is 94%. If one of the pipes becomes unserviceable, what increase in pressure is required at the inlet end of pipe to supply same amount of power and what would be the efficiency of transmission under this condition? Take f = 0.03. [16]

8. Show that for incompressible fluid flowing through a venturimeter, the energy lost per unit weight of fluid in the convergent cone is given by $h_l = (1/C_v^2-1)\,(1- D^4_2/D^4_1)\,U^2_2/2g$ (with usual notation). [16]

---ooOoo---

Code No: 123AP

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to AME, CE, CEE, ME, MSNT, 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

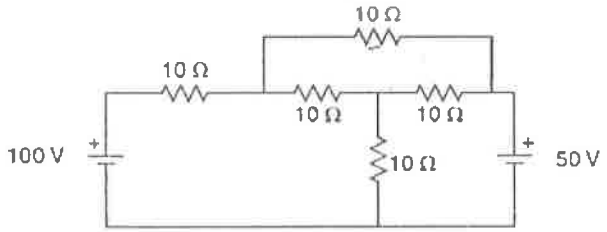
(25 Marks)

1.a) Define: i) Inductance and ii) Capacitance. [2]
b) Compare Moving coil with Moving iron instruments. [3]
c) Explain what happens when a dc motor is connected across an ac supply? [2]
d) Why starter is necessary for a dc motor? Give the relevant expressions. [3]
e) Why the transformer rating is expressed in KVA? [2]
f) State various applications of induction motor. [3]
g) Define holding current and latching current of SCR. [2]
h) The collector current is 2.9mA in a certain transistor. If the base current is 100μA, what is the value of α? [3]
i) Mention the names of the voltage and the electrode system that controls the brightness of the image of the names of the display on the screen of the CRO. [2]
j) State a few applications of a CRO in electronic circuits in laboratory. [3]

PART-B

(50 Marks)

2.a) Explain the constructional features of PMMC instrument with a neat sketch.
b) Find the currents flowing in all the resistances in the figure. [5+5]



OR

3.a) Three equal resistors each of R ohms are connected in delta. Derive the value of resistors in the equivalent star.
b) What are the essential requirements of measuring instruments? [5+5]

4.a) Derive the expression of induced emf of dc generator.
b) A 25-kW, 250V, DC shunt generator has armature and field resistances of 0.06 ohms and 100 ohms respectively. Determine the total armature power developed when working as a motor taking 25kW input. [5+5]

OR

5.a) Give the classification of DC generators with their connection diagrams. Write their relevant voltage equations

b) State the applications of the following DC motors:
i) series ii) shunt. [8+2]

6.a) "Transformer is a constant flux machine". Justify the statement.

b) Sketch the necessary plots for determination of the regulation of alternator by synchronous impedance method and give necessary expressions. [6+4]

OR

7.a) Discuss the principle of operation of induction motor with neat sketch.

b) A single phase transformer has 50 primary and 1000 secondary turns. Net-cross sectional area of the core is 500 cm^2. If the primary winding is connected to 50 Hz supply at 400 V, Calculate the value of maximum flux density on core and the emf induced in the secondary. [6+4]

8.a) Discuss how a transistor can be used as current amplifier.

b) A diode operating at 300 K has $V_{(forward)}$ of 0.4V across it when the current it is 10mA and 0.42V when the current is twice as large. What values of 'I_o' and 'η' allow the diode to be modeled by the diode equation? [6+4]

OR

9.a) Explain how SCR is turned on by its gate?

b) Sketch the characteristic of PN junction. Explain the dependence of this characteristic on junction temperature. [5+5]

10.a) Write a short note on Electrostatic and Magnetic deflections in CRO.

b) Mention the importance of specification of electrostatic deflection sensitivity during process of purchase of a CRO. [6+4]

OR

11. Describe a method of measuring AC voltage using a CRO. [10]

---ooOoo---

Code No: 123AU

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

ELECTRONIC DEVICES AND CIRCUITS

(Common to CSE, ECE, EEE, EIE, ETM, 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) Draw Zener Diode Characteristics. [2]
b) Draw the Diode Equivalent Circuit. Mention the applications of PN-junction diode. [3]
c) Explain how P-N junction diode acts as a Rectifier. [2]
d) Explain the necessity of filter circuit after the rectifier circuit. [3]
e) Explain how transistor work as an amplifier. [2]
f) Compare CE,CC and CB configurations. [3]
g) What is the need of biasing? [2]
h) Explain Bias Compensation using Diodes. [3]
i) Compare BJT and FET. [2]
j) How FET acts as Voltage Variable Resistor? [3]

PART-B

(50 Marks)

2.a) Explain the Avalanche and Zener Breakdowns in PN junction diode.
b) What is tunneling phenomena? Explain the principle of operation of tunnel diode with its characteristics. [5+5]

OR

3.a) Derive the expression for transition capacitance of a diode.
b) Define varactor diode? Explain the operation of varactor diode with its equivalent circuit and mention its applications. [5+5]

4. A sinusoidal voltage whose V_m=26V is applied to half-wave rectifier. The diode may be considered to be ideal and R_L=1.2 KΩ is connected as load. Find out peak value of current, RMS value of Current, DC value of current and Ripple factor. [10]

OR

5.a) Derive the expression for Ripple factor for Full Wave Rectifier with L-section filter.
b) Compare FWR and Bridge rectifier. [5+5]

6. The reverse leakage current of the transistor when in CB configuration is 0.3μA while it is 16μA when the same transistor is connected in CE configuration. Determine α, β and γ. [10]

OR

7.a) Explain input and output characteristics of transistor in CB configuration with neat diagram.

b) Discuss the base width modulation. [5+5]

8.a) Derive the operating point using AC and DC load lines.

b) Draw the circuit diagram of a voltage divider bias and derive expression for Stability factor. [4+6]

OR

9. Draw the circuit diagram of CC amplifier using hybrid parameters and derive the expression for A_I, A_V, R_i and R_O. [10]

10. Explain the different biasing techniques of JFET. [10]

OR

11. Describe the construction and working principle of Enhancement mode and depletion mode MOSFET and draw its characteristics. [10]

---oo0oo---

Code No: 113BS

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) Solve for X in the equation $(19.125)_{10}=(X)_8$. [2]
b) Demonstrate by means of truth table the validity of the DeMorgan laws. [3]
c) Implement Ex-OR with NOR gates. [2]
d) Find the min terms of wxy+yz+x′y. [3]
e) Design a 4×1 multiplexer. [2]
f) How a decoder can be used like DeMux? [3]
g) What are direct inputs in a flip-flop and why they are used? [2]
h) What is race around condition? How it is eliminated? [3]
i) What are the different type of ROMs? [2]
j) Draw the PLA block diagram. [3]

PART-B

(50 Marks)

2.a) Find 9's complement of 9254.
b) Convert F(A,B,C,D)= Π(0,1,2,3,4,6,12) to the other canonical form.
c) Encode the information character 01101110101 according to the 15 bit Hamming code. [2+4+4]

OR

3.a) Represent $(524)_{10}$ in 2421 code and BCD Excess-3 code.
b) Simplify x+xyz+yzx′+wx+w′x+x,y using Boolean algebra.
c) Draw the logic diagram of (A+B)(C+D)(A'+B+D) without simplifying [2+4+4]

4.a) Find F′ in POS form for F(A, B, C, D)= Π(1, 3, 7, 11, 15) +d(0, 2, 5).
b) Simplify the function F(A,B,C,D)=∑ (0,1,3,4,6,8,15) using K-Map. [5+5]

OR

5. Simplify the function A′B′CE′+A′B′C′D′+B′D′E′+B′CD′+CDE′+BDE′ using K-Map and implement using two level AND-OR gates. [10]

6. Design a BCD to Seven segment display circuit using decoder. [10]

OR

7.a) Construct a 4-bit Ripple Adder and explain.
b) Design a 2-bit magnitude comparator. [5+5]

8.a) What is a Master-Slave flip-flop? Explain with block diagram and logic diagram.
b) Design a divide by 6 Ripple Counter using JK flip-flops. [5+5]

OR

9.a) What is the difference between edge triggering and level triggering? Explain about Edge triggered D flip-flop with a neat diagram.
b) Design a BCD counter with JK flip-flops. [5+5]

10.a) Given a 32×8 ROM chip with enable input, construct a 128×8 ROM with four chips and decoder.
b) Obtain the PLA program table to realize $F_1(x, y, z) = \sum(2, 4, 6, 7)$ and $F_2(x, y, z) = \sum(0, 3, 4, 5)$. [5+5]

OR

11. Implement the following Boolean functions using PLA: [10]
$F_1(A,B,C) = \Sigma(1,2,4,6)$ $F_2(A,B,C) = \Sigma(0,1,6,7)$
$F_3(A,B,C) = \Sigma(2,6)$ $F_4(A,B,C) = \Sigma(1,2,3,5,7)$.

---ooOoo---

Code No: 113BY

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) State the expression for the force between one charge point to an array of a charge points? [2]
b) State and explain Guass's law. [3]
c) Give ohms law in point form. [2]
d) Brief about the concept of Polarization in materials. [3]
e) Define Ampere's circuital law and its applications. [2]
f) Obtain Maxwell's second equation. [3]
g) Derive Expression for Vector Magnetic Potential. [2]
h) Write the applications of Permanent Magnets. [3]
i) State Faraday's law of Electromagnetic induction. [2]
j) What is displacement current? Explain. [3]

PART-B

(50 Marks)

2. Deduce the Expression for $\bar{E}$ due to a electric dipole? A field is given in spherical co-ordinate system P (r=5, $\theta = 30^0$, $\Phi=60^0$) as $\bar{E} = \left(20\bar{a}_\gamma - 30\bar{a}_0 + 60\bar{a}_\phi\right)$ v/m. Find the incremental work done in moving a 10 μC charge through a distance of 0.8 μm in the direction of a) $\bar{a}_\gamma$ b) $\bar{a}_\theta$ c) $\bar{a}_\phi$. [10]

OR

3. Prove the Expression $\bar{E} = \bar{\nabla} V$? Where E is the Electric Field Intensity and V is the scalar Potential? A uniform line of charge ρ_l = 2.5 μC/m lies along the z-axis and a circular cylinder of radius 3m has a surface charge density of ρ_s = -0.12 μC/m^2, Both the distributions are infinite in extent with respect to z-axis. Using Gauss's law. Find $\bar{D}$ in all regions. The region is free space? [10]

4. Derive the Expressions for the Boundary conditions between two perfect dielectrics. [10]

OR

5. Prove that the convection current density is linearly proportional to the charge density and the velocity with which the charge is transferred. [10]

6.a) The Magnetic Field Intensity $\overline{H}$ due to a infinite current carrying sheet, Assume a current $\vec{k}$ in xz-plane, Prove that, $\overline{H} = \frac{k_y}{2}\overrightarrow{a_{n_y}}$.

b) Find the Magnetic Field Intensity $\overline{H}$ at a point p(0.01 ,0, 0)m , if the current through a co-axial cable is 6A , which is along z-axis and a= 3mm, b = 9mm, c = 11mm? [5+5]

OR

7. By using Ampere circuital law, derive the Expression for Magnetic Field Intensity $\overline{H}$ due to a infinite long current carrying conductor. Find the Magnetic field Intensity at a radius of 0.5m from a long straight line conductor carries a current of 2A/m. [10]

8. Derive the expressions for coefficient of coupling and equivalent inductance for various connections of magnetic circuits? If a coil of 800μH is magnetically coupled to another coil of 200μH. The Coefficient of coupling between two coils is 0.05 Calculate the inductance, if two coils are connected in a) series aiding b) series opposition c) parallel aiding and d) parallel opposing. [10]

OR

9. Derive the Expressions for Scalar and Vector magnetic potentials. Derive the Expressions for Laplace's and Poisson's equation for magnetic field. [10]

10. Derive the Maxwell's Equations for Time Varying Fields. [10]

OR

11.a) A conductor of length 100cm moves at right angles to uniform field of strength 10000 lines per cm^2, with a velocity of 50 m/s. Calculate e.m.f. induced it when the conductor moves at a angle 30^0 to the direction of field?

b) An a.c voltage source $\vartheta(t) = V_0 \sin wt$ is connected across a parallel plate capacitor of capacitance 'C'. Show that the displacement current in the capacitor is the same as the conduction current in the wires. [5+5]

---ooOoo---

Code No: 113BQ **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

DIGITAL LOGIC DESIGN AND COMPUTER ORGANIZATION

(Information Technology)

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 the Hexadecimal number 2456 into decimal number.	[2]
b)	Describe the steps involved in execution of a program.	[3]
c)	List all the basic logic gates and universal logic gates.	[2]
d)	Give the comparison between synchronous and asynchronous counter.	[3]
e)	Describe conditional jump with an example.	[2]
f)	Define about little-endian and big-endian.	[3]
g)	Describe paged segmentation.	[2]
h)	Explain the micro programmed control unit.	[3]
i)	List the advantages of DMA transfer.	[2]
j)	Write short notes on dual address cycle command.	[3]

PART-B

(50 Marks)

2.a) Discuss the operational concepts of a digital computer and explain the various types of computers and their applications.

b) Calculate the following to binary and then to gray code,
(i) 1001_{16} (ii) 7623_8 (iii) 1234_8 (iv) 1257_{10} (v) 2239_{10}. [5+5]

OR

3.a) Solve the number $(+542.5)_{10}$ as a floating point binary number with 24 bits the normalized fraction mantissa has 16 bits and the exponent has 8 bits.

b) Differentiate between RISC and CISC architectures. [5+5]

4.a) With a neat diagram explain parallel in parallel out shift register.

b) Solve the expression $Y=A\bar{B} + \bar{A}B$ using only 2 input NAND gates. [5+5]

OR

5.a) Solve the multi-level NAND circuit for the following expression
$F(A,B,C,D)= (A\bar{B} +C\bar{D})E+BC(A+B)$

b) Design a PAL for the following equation, $F= \bar{a}\ b\ c + \bar{b}\ c + ab$. [5+5]

6.a) With a neat diagram explain the floating point multiplication algorithm.

b) Explain the Addressing modes present in IA-32 Pentium processor. [5+5]

OR

7.a) What is a straight line sequencing and explain with an example.

b) Write the Booth's algorithm for multiplication of signed-2's complement numbers. [5+5]

8.a) Explain the organization of the control unit to allow conditional branching in the Microprogram.

b) Explain in detail the memory interleaving. [5+5]

OR

9.a) Give the timing diagram of a memory write operation and explain.

b) Show the control steps for the Branch-on-Negative instruction for a processor that has the three-bus structure. [5+5]

10.a) With a neat diagram explain the implementation of interrupt priority using individual interrupt request and acknowledgment lines.

b) Briefly summarize the bus signals of SCSI bus. [5+5]

OR

11.a) Explain in detail the DMA controller.

b) Explain the concept of the programmed I/O with a suitable example. [5+5]

---ooOoo---

Code No: 113AF

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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 meant by the term 'Pyramid of numbers' in ecology? [2]
b) Why are our energy needs growing? [3]
c) What is a biodiversity hotspot? [2]
d) What is Kyoto protocol? [3]
e) Write about the differences between consumerism and crazy consumerism. [2]
f) 'Pyramids of energy are always upright' Why? [3]
g) What are the problems associated with over utilization of ground water in coastal regions? [2]
h) What is ecosystem diversity? [3]
i) What is the purpose of waste water primary treatment? [2]
j) What are the different disposal methods allowed for MSW according to MSW rules? [3]

PART-B

(50 Marks)

2.a) What is the difference between bioaccumulation and biomagnifications?
b) Describe about the carbon cycle. [5+5]

OR

3.a) Compare the pyramid of biomass between a tree ecosystem and a pond ecosystem.
b) Why are the biogeochemical cycles important? [5+5]

4.a) Why is forest cover very important and what are its uses?
b) List the problems associated with deforestation. [5+5]

OR

5.a) Give the salient features of National Biodiversity Act.
b) Discuss about ex situ and insitu strategies for biodiversity conservation. [5+5]

6.a) Discuss about the threats to the biodiversity.
b) What are the consumptive uses of biodiversity? [5+5]

OR

7.a) How does salt affect soils forms?
b) What are the places identified as potential wind energy harvesting sites in India? [5+5]

8.a) What is climate change? How does it happen?
b) What are the impacts of climate change and how can we mitigate the problem? [5+5]

OR

9.a) How does deforestation lead to desertification?
b) Describe the low carbon lifestyle. [5+5]

10.a) How can we acquire the baseline data for carrying out EIA?
b) Mention the MSW management and handling rules. [5+5]

OR

11.a) Mention the salient features of Forest Act.
b) Give the concepts of green building. [5+5]

---ooOoo---

Code No: 113BK **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
FLUID MECHANICS
(Common to CE, 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 and explain following fluid properties:
i) Surface tension
ii) Dynamic viscosity
iii) Capillarity. [2]

b) Left limb of a simple U-tube mercury (specific gravity = 13.6) manometer is attached to a pipe carrying flow of water and the right limb is open to atmosphere. If levels of mercury in the left and right limbs are 20 cm and 30 cm below centre of the pipe respectively, calculate absolute pressure in the pipe. [3]

c) Show that the equipotential lines and streamlines are orthogonal to each other. [2]

d) A stream function in a two dimensional flow is given by $\psi = 4xy$. Calculate the velocity at the point (4, 3). Find the corresponding velocity potential ϕ. [3]

e) State the Bernoulli's equation and write the assumption made in it. [2]

f) Differentiate between the following in brief:
i) Rotational flow and Irrotational flow
ii) Laminar flow and Turbulent flow
iii) Compressible flow and Incompressible flow. [3]

g) What is meant by boundary layer separation? [2]

h) What are the characteristics of boundary layer along a thin flat plate? [3]

i) What are major and minor energy losses in pipes? [2]

j) What do you understand by pipes in series and pipes in parallel? [3]

PART-B

(50 Marks)

2.a) Explain with sketch the relationship between the absolute pressure, atmospheric pressure and gauge pressure.

b) A tank having 2 m × 2 m dimensions in plan is filled with water up to depth of 3 m. A circular opening having diameter 0.2 m is provided at a depth of 1.5 m from the free surface, which is closed with a circular plate. Calculate static thrust and depth of centre of pressure on: (i) one of the sides of the tank, (ii) bottom of the tank and, (iii) the circular plate. [3+7]

OR

3.a) A 1 m wide and 1.5 m deep rectangular plane surface lies in water in such a way that its plane makes an angle of 30^0 with the free water surface. Determine the total pressure and position of centre of pressure when the upper edge is 0.75 m below the free water surface.

b) A square plate of size 1m × 1m and weighing 500 N slides down an inclined plane with a uniform velocity of 2 m/s. The plane makes an angle of 30^0 to the horizontal and has oil film of 1.5 mm thickness. Find the dynamic viscosity of oil. [4+6]

4.a) What is flow net? State properties, applications and limitations of flow net.

b) For a fluid flow, velocity components in x and y directions are u = 2xy and $v = x^2 - y^2 + 4$ respectively. Show that the components represent a possible case of fluid flow. Derive stream function and the flow rate between the stream lines corresponding to points (1, 0) and (1, 1). [4+6]

OR

5.a) The velocity potential function for a two-dimensional flow is given by $\Phi = 2xy - 3x$. Calculate the velocity and value of the stream function at a point (2, 3) in the flow field.

b) Stream function is represented by $\Psi = x^2 + y^2$. Find the velocity and direction at point P (1, 3). Also sketch the stream lines.

c) For a two-dimensional flow, the velocity components are represented by $u = x/(x^2 + y^2)$ and $u = y/(x^2 + y^2)$. Determine whether the flow is irrotational. [3+4+3]

6.a) Derive an equation for the discharge passing over a rectangular notch and show that percentage error in estimation of discharge is 1.5 times the percentage error in head measurement.

b) An oil of specific gravity 0.9 flows through a Venturimeter with inlet diameter of 15 cm and throat diameter 7.5 cm. The mercury manometer connected between the inlet and throat of it shows a deflection of 15 cm. Calculate the discharge of the oil, coefficient of discharge of $C_d = 0.95$. [6+4]

OR

7.a) Derive an expression for rate of flow through Orificemeter.

b) Tapering pipe has diameters of 40 cm and 25 cm at two different sections. Oil of specific gravity 0.85 flows through it. If the velocity of flow at 25 cm section is 3 m/s and pressure is 200 kPa, determine the pressure at the other end. Assume pipe is laid horizontal and losses are negligible between two sections. [4+6]

8.a) Find the displacement thickness, the momentum thickness and energy thickness for the distribution in the boundary layer given by

$$\frac{u}{U} = 3\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^3.$$

b) A smooth thin plate 5m long and 1m wide is placed in an air stream moving at 3 m/s with its length parallel with the flow. Calculate the drag force on each side of the plate. The density of the air is 1.2 kg/m^3 and the kinematic viscosity is 1.6×10^{-5} m^2/s. [5+5]

OR

9.a) Derive an expression for momentum integral equation of the boundary layer.

b) In order to predict the pressure drop in a large air duct, a model is constructed with linear dimension $(1/10)^{th}$ that of the prototype and the water was used as the testing fluid. If water is 1000 times denser than that of air and has 100 times the viscosity of air, determine the pressure drop in the prototype for the conditions corresponding to a pressure drop of 70 kPa, in the model [4+6]

10.a) Derive the Darcy-Weisbach equation for frictional head loss for the flow.

b) A horizontal pipe of diameter 25 cm and length 500 m connects two tanks. The rate of flow through the pipe is 200 liters/sec. Determine difference of elevations between the water surfaces in the two tanks. Also, sketch total energy line and hydraulic gradient line. Take value of the coefficient of friction as 0.004. [4+6]

OR

11.a) Derive an expression for loss of head due to sudden enlargement and sudden contraction of pipe.

b) Three pipes of 400 mm, 350 mm and 300 mm diameter are connected in series between two reservoirs with a difference in level of 12 m. Friction factors are 0.024, 0.021 and 0.019 respectively. The lengths are 200 m, 300 m and 250 m. Determine flow rate: i) Considering minor losses, and ii) Neglecting minor losses. [4+6]

--ooOoo--

Code No: 113BU

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 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) Convert the following decimal numbers into their binary equivalents: $(79.515)_{10}$ and $(66.38)_{10}$ [2]

b) What is an un-weighted code? Represent the decimal numbers 0 to 15 using Gray codes. [3]

c) What is the significance of priority encoder? [2]

d) What is hazard? Using an example show how hazard free circuit is realised? [3]

e) List out the characteristics of flip-flops. Explain any two. [2]

f) Tabulate the excitation tables of T and D flip-flops. [3]

g) Define State reduction and State assignment. [2]

h) What is Lock-out condition in Counters? How to avoid it? [3]

i) How do you indicate Moore outputs and Mealy outputs in an ASM block? [2]

j) Briefly Explain FSM capabilities and limitations. [3]

PART-B

(50 Marks)

2.a) Obtain the Dual of the following Boolean expressions.
i) AB + A(B+C) + B'(B+D).
ii) A + B+ A'B'C

b) Obtain the complement of the following Boolean expressions.
i) A'B + A'BC' + A'BCD + A'BC'D'E
ii) ABEF + ABE'F '+ A'B'EF
iii) ABC + A'BC + AB'C + ABC'. [4+6]

OR

3. For the given three variable Boolean expressions $f(x, y, z) = \pi M (1,3,5,7)$
a) Draw the logic circuit for original expression using Basic Logic gates
b) Reduce the Boolean expression using Boolean algebra
c) Draw the logic circuit for the reduced expression using basic logic gates
d) What is your observation after solving (a) and (c). [10]

4.a) Design a full adder and also implement it using multiplexer.

b) Simplify the given expression using Quine - McCluskey method
$f(w, x, y, z) = \sum m(2, 4, 5, 9, 12, 13)$. [5+5]

OR

5.a) Using K-map obtain the minimal SOP expression for the given switching function and implement it using AND-OR logic.
$f(A, B, C, D, E) = \sum m (0, 1, 2, 3, 16, 17, 18, 19)$

b) Design a 3 to 8 decoder circuit using 2 to 4 decoder circuits. [5+5]

6.a) With a neat diagram explain operation of SR flip-flop and derive its truth table, characteristic equation and excitation table?

b) Convert an SR flip-flop into D flip-flop using standard procedure? [6+4]

OR

7.a) With a neat diagram explain operation of JK flip-flop and derive its truth table, characteristic equation and excitation table?

b) Realize a T flip-flop using JK flip-flop using standard procedure. [6+4]

8. Design a Mod-8 Synchronous UP/DOWN Counter and implement it using T flip-flop. [10]

OR

9.a) Design a Mod-6 synchronous up-counter using D flip-flops.

b) Design a 4-bit bidirectional shift register using JK flip-flops having right and left data inputs and Mode control M such that M=0 left shift, M=1 right shift. [5+5]

10. Draw the ASM chart for the following state transistion, start from the initial state T_1, then if xy=00 go to T_2, if xy=01 go to T_3, if xy=10 go to T_1, otherwise go to T_3. [10]

OR

11. A clock mode sequential circuit has to provide z=1 whenever the input completes the Sequence of pulses 1010 and overlapping is allowed. Draw the state diagram and obtain minimal state using partition method. [10]

---ooOoo---

R09

Code No: 53009

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

ELECTRONIC DEVICES AND CIRCUITS

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

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

Answer any five questions
All questions carry equal marks

- - -

1.a) Explain the breakdown occur in PN junction diode in detail.
b) Derive the expression for transition capacitance of a diode.
c) Explain the operation of PN junction diode with V-I characteristics. [5+5+5]

2.a) A sinusoidal voltage whose V_m=28V is applied to half-wave rectifier. The diode may be considered to be ideal and R_L=1.6 KΩ is connected as load. Find out peak value of current, RMS value of Current, DC value of current and Ripple factor.
b) Define Rectifier. Draw the construction of bridge Rectifier with circuit diagram.
c) Explain the necessity of filter circuit after the rectifier circuit. [5+5+5]

3.a) Explain input and output characteristics of transistor in CE configuration.
b) Explain how transistor work as an amplifier?
c) Define early effect. Why it is called as base width modulation. [5+5+5]

4.a) Define thermal runaway. Explain the methods to avoid thermal runaway in BJT.
b) Draw the circuit diagram of a collector to base bias circuit of CE amplifier and derive expression for Stability factor. [7+8]

5.a) Calculate the voltage gain, input impedance, output impedance, current gain of a CE amplifier. If R_L = 12k ohm, h_{ie} = 3.1k ohm, h_{re} = 6.5×10^{-4}, h_{fe} =80, h_{oe} = 24μA/V.
b) Compare CE, CC and CB configurations. [8+7]

6.a) Describe the construction and working principle of Depletion mode MOSFET and draw its characteristics.
b) Discuss in detail the small signal model of FET with circuit diagrams. [8+7]

7.a) Explain the different biasing techniques of JFET.
b) Why FET is called as VVR? Justify. [8+7]

8.a) Explain the V-I characteristics of SCR, and define latch current, breakdown voltage.
b) Define varactor diode. Explain the operation of varactor diode with its equivalent circuit and mention its applications. [7+8]

---ooOoo---

R09

Code No: 53015

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

ELECTRICAL AND ELECTRONICS ENGINEERING

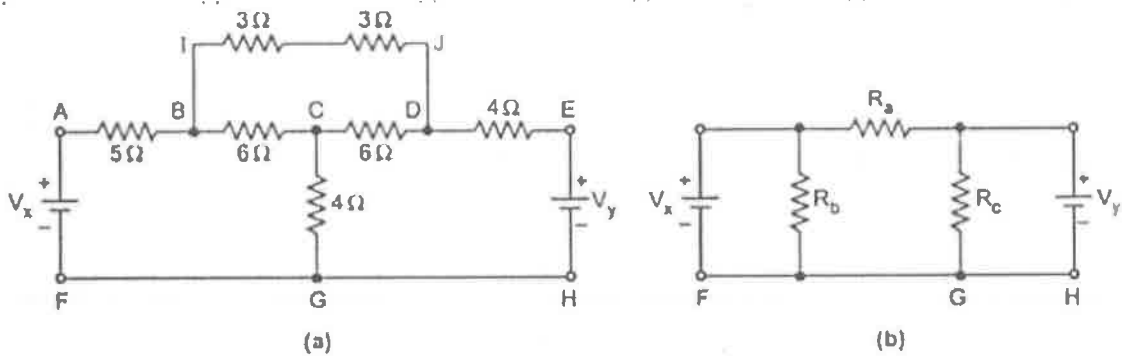
(Common to PTM, AME, CE, ME)

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

Answer any five questions
All questions carry equal marks

- - -

1.a) A circuit is shown in figure a. Using delta-star analysis, reduce it to the circuit as shown in the figure b. Find the values of R_a, R_b, R_c in the equivalent form of the circuit.



b) A 20V battery with an internal resistance of 5 ohms is connected to a resistor of x ohms. If an additional resistance of 6. is connected across the battery, find the value of x, so that the external power supplied by the battery remain the same. [7+8]

2.a) Discuss the working principle of DC generator.

b) A DC generator has an armature emf of 100 V when the useful flux per pole is 20 m Wb, and the speed is 800 rpm. Calculate the generated emf (i) with the same flux and a speed of 1000 rpm, (ii) with a flux per pole of 24 m Wb and a speed of 900 rpm. [7+8]

3. Calculate efficiency and regulation at full load, 0.8 p.f lagging for a 10 kVA, 1phase, 50Hz, 500/250 V transformer gave following results:
a) OC test (LV) side: 250V, 3.0A, 200W
b) SC test (LV) side: 15 V,30A, 300 W. [7+8]

4.a) Sketch the torque slip characteristic of a 3-ph induction motor indicating there in the starting torque, maximum torque and the operating region. How do starting and maximum torques vary with the rotor resistance.

b) Find the no load phase and line voltage of a star connected 3 ph, 6 pole alternator which runs at 1200 rpm, having flux per pole of 0.1 Wb sinusoidaly distributed. Its stator has 54-slots having double layer winding. Each coil has 8 turns and the coil is chorded by 1 slot. [7+8]

5.a) Explain the constructional features of the following type instruments Moving Coil.

b) With the help of neat sketches explain the working of moving iron Instrument. [8+7]

6.a) What is ripple factor and obtain the ripple factor for single phase full wave Rectifier?

b) Describe the action of pn junction diode under forward and reverse bias conditions. [8+7]

7.a) Classify and Explain the types of Feedback amplifiers.

b) Write short notes on: (i) Transistor as an amplifier, (ii) SCR characteristics and applications. [7+8]

8.a) Explain how the applied voltage wave is displayed on the screen of a cathode ray tube. Sketch the same.

b) Explain with block diagram the various parts of a CRT. What extra components are needed to make it a CRO? Explain how would you measure frequency using a CRO. [7+8]

---ooOoo---

Code No: 123BX

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March – 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)	Define specific gravity and viscosity.	[2]
b)	Define laminar and turbulent flow.	[3]
c)	Elaborate surface and body forces.	[2]
d)	Explain the concept of pipes in series.	[3]
e)	Explain mass curve concept.	[2]
f)	Explain elements of hydro electric power stations.	[3]
g)	Differentiate impulse and reaction turbines.	[2]
h)	What do you mean by cavitation?	[3]
i)	Elaborate suction specific speed.	[2]
j)	Explain the concept of pumps in parallel.	[3]

PART-B

(50 Marks)

2. Prove that the total pressure exerted by a static liquid on an inclined plane submerged surface is same as the force exerted on a vertical plane surface as long as the depth of centre of gravity of the surface is unaltered. [10]

OR

3. A two dimensional velocity field is given by $u = 2xy, v = -x^2 y$. Compute the a) velocity, b) acceleration and c) convective acceleration at (1, 1). [10]

4. What is the difference between the Bernoulli's equation and the steady flow energy equation? Derive the steady flow energy equation and reduce it to the Bernoulli's equation. [10]

OR

5. What is meant by the equivalent pipe? Determine the equivalent pipe corresponding to 3 pipes in series with lengths and diameters L_1, L_2, L_3, D_1, D_2, D_3, respectively. [10]

6. A flat plate, weighing 160 N is suspended vertically by a hinge on the top. If a jet of water 3 cm diameter having a velocity of 10 m/s strikes the plate at its midpoint, find the angle through which the plate swings. If the plate is not allowed to swing, find the magnitude of force that must be applied at the lower edge of the plate to keep the plate vertical. [10]

OR

7. Water is drawn in a jet propelled ship through orifices which are at right angles to the direction of motion of the ship. The water discharges at the back with an absolute velocity of 20 m/s when the ship is moving with a speed of 24 km/h. If the cross-sectional area of the jet is $0.04m^2$, find a) the propulsive force on the ship, b) the propulsive power and c) the efficiency of the propulsion. [10]

8. A pelton wheel has a mean bucket speed of 35 m/s with a jet of water flowing at the rate of 0.4 m^3/s under a head of 350 m. The buckets deflect the jet through an angle of 165^0. If the coefficient of velocity is 0.97, determine the power delivered to the runner and the hydraulic efficiency of the turbine. Neglect the frictional losses in the bucket. [10]

OR

9. An inward flow reaction turbine has a degree of reaction of 0.6. The peripheral velocity of the vanes at entry is 15m/s. The absolute velocity of the water leaving the runner is in radical direction. The outer diameter of the runner is twice that of inner. Assuming the velocity of flow as constant and equal to 4 m/s, determine the blade angles at entry and exit. [10]

10.a) Describe cavitation and separation phenomenon in centrifugal pump.
b) State the significance of similarity parameters in hydraulic pumps. [5+5]

OR

11.a) Describe the various characteristic curves of pumps along with their significance.
b) Write short note on:
i) Efficiencies of pumps and
ii) Water Hammer. [5+5]

---ooOoo---

Code No: 123AW

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
SIGNALS AND SYSTEMS
(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) Determine whether a unit step signal u (t) is energy or power signal. [2]
b) Define principle of orthogonality. [3]
c) Define sampling Theorem. [2]
d) Compare Fourier series and Fourier transform. [3]
e) Explain with suitable example what is meant by an LTI system. [2]
f) Define system Bandwidth and signal Bandwidth. [3]
g) List the properties of Cross-correlation. [2]
h) Define Noise and state its properties with respect to correlation. [3]
i) List out the properties of Laplace transform. [2]
j) What is meant by region of convergence in Z Transform? [3]

PART-B

(50 Marks)

2.a) Derive the expression for trigonometric Fourier series coefficients.
b) State the dirichilet's conditions for existence of Fourier series. [6+4]

OR

3.a) Test the orthogonality of the signals sin wt cos2 wt over the interval (t_0 to t_0+T).
b) Find the exponential Fourier series of the signal x(t) = 5cos 5t+10 sin 15t. [5+5]

4.a) Find the Fourier transform of $x(t) = e^{-at} u(t)$.
b) State and prove the convolution property of Fourier transform. [5+5]

OR

5.a) State and prove parsavels energy theorem.
b) If x (t) has Fourier transform pair X (w). Deduce the Fourier Transform of X ($at-t_0$). [5+5]

6.a) Define Transfer function and state its relation with Impulse function.
b) Find the impulse response of a continuous time LTI system with
H(s) = S-1/(S+1)(S+2) such that i) Re[S] >2 ii) -1 Re[S]<2 [3+7]

OR

7.a) Derive the relation between Bandwidth and Rise time.

b) Determine whether the system governed by the equation $y(n) = 5x(n)$ is linear or not Assume that x(n) represents the input to the system and y(n) represents its output. [5+5]

8.a) Determine the convolution of the signals $X(n)=\{2,-1,3,2\}$ and $h(n)=\{1,-1,1,1\}$

b) What is the necessary and sufficient condition on impulse response for stability? [6+4]

OR

9.a) What is the overall impulse response h(n) when two system with impulse response $h_1(n)$ and $h_2(n)$ are connected in parallel and in series?

b) State and prove properties of convolution. [5+5]

10.a) The unilateral Laplace transform of $f(t)$ is $\frac{1}{s^2+s+1}$. What is the unilateral Laplace Transform of $tf(t)$.

b) Find the inverse Laplace transform of the functions

i) $Y(s) = 105/(5+2)^2(5+8)$

ii) $Y(s) = 105/(5+2)^3(5+8)$ [5+5]

OR

11. Find the Laplace transform of following functions:

a) Exponential function

b) Unit Step function

c) Damped sine function. [3+3+4]

---ooOoo---

Code No: 123AA **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
MATHEMATICS – II
(Common to CE, MME, AE, CEE, 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) Find the greatest value of the directional derivative of the function $f=x^2 y z^3$ at (2,1,-1). [2]

b) $\overline{f} = r^n \overline{r}$. Find 'n' if $\overline{f}$ is solenoidal. [3]

c) Find the Fourier series of $f(x)=x$ in $(-\pi,\pi)$, $f(x+2\pi)=f(x)$. [2]

d) Find the Fourier sine and cosine transforms of $f(x)=\begin{cases}1, & 0\le x<a\\ 0, & x\ge a\end{cases}$. [3]

e) Write the normal equations to fit the power curve $y=ab^x$. [2]

f) Form the forward difference table for the following date: [3]

x	0	1	2	3
F(x)	1	3	7	13

g) Given that

x:	10	15	20
F(x):	19.97	21.51	22.47

then find $\Delta^3 f(10)$. [2]

h) Find the positive root of the equation $f(x)=x^3-2x-5=0$ that lies between 2 and 3 using Regular falsi method. [3]

i) Evaluate $\int_0^1 \frac{1}{1+x}dx$ by Trapezoidal rule. [2]

j) If $A=\begin{bmatrix}3 & 1 & 4\\ 0 & 2 & 6\\ 0 & 0 & 5\end{bmatrix}$ then find the eigen values of A^2-A+3I. [3]

PART-B

(50 Marks)

2.a) Find the directional derivative of $2xy+z^2$ at (1, -1, 3) in the direction of $\bar{i}+2\bar{j}+3\bar{k}$.

b) Find constants a, b and c if the vector $\bar{f}=(2x+3y+az)\bar{i}+(bx+2y+3z)\bar{j}+(2x+cy+3z)\bar{k}$ is irrotational. [5+5]

OR

3.a) Apply divergence theorem to evaluate $\iint_s (x+z)dydz+(y+z)dzdx+(x+y)dydx$ Where 's' is the surface of the sphere $x^2+y^2+z^2=4$.

b) Evaluate by Green's theorem $(y-\sin x)dx+\cos x dy$ Where 'C' is the triangle enclosed by the lines y=0, $x=\pi/2$, $\pi y=2x$. [5+5]

4.a) Expand $f(x)=c^{ax}$ in a Fourier series in $0<x<2\pi$, $f(2\pi+x)=f(x)$.

b) Find the Fourier series and representation the function $f(x)=\sin x, -\pi<x<\pi$, $f(2\pi+x)=f(x)$. [5+5]

OR

5.a) Find the Fourier transform of $f(x)=\begin{cases} x, & -1<x<1 \\ 0, & otherwise \end{cases}$

b) Evaluate $\int_0^\infty \frac{x^2}{(a^2+x^2)^2}dx\,(a>0)$ using parseval's identity. [5+5]

6.a) From the following table values of x and $y=e^x$ interpolate values of y when x=1.91

X:	1.7	1.8	1.9	2	2.1	2.2
e^x	5.4739	6.0496	6.6859	7.3891	8.1662	9.0250

b) Find the interpolating polynomial of f(x) from the table. [5+5]

X:	0	1	4	5
F(x)	4	3	24	39

OR

7.a) Fit a straight line to the following data

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

b) Fit a second degree polynomial to the following data by the method of least squares. [5+5]

x	10	12	15	23	20
y	14	17	23	25	21

8.a) Find out the square root of 25 given $x_0=2.0, x_1=7.0$ using Bisection method.

b) Using Newton-Raphson method find square root of N=24. [5+5]

OR

9.a) Solve the equations 2x+3y+z=9, x+2y+3z=6, 3x+y+2z=8 by LU decomposition method

b) Starting with $(x_0, y_0, z_0)=(0, 0, 0)$ and using Jacobi method, find the next five iterations for the system 5x+y+z=10, 2x+8y-z=11, -x+y+4z=3. [5+5]

10. Evaluate $\int_0^4 e^x dx$ using Trapezoidal and Simpson's 1/3 rule. Also compare your result with the exact value of the integral and justify the result. [10]

OR

11. Using modified Euler method find y(0.2) and y(0.4) given $y^1 = y + e^x$ y(0)=0. [10]

---ooOoo---

Code No: 123AN **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) The distribution function of random variable X is given by

$$F(X) = \begin{cases} 0, & x < 2 \\ k(x-2), & 2 \le x \le 6 \\ 1, & x > 6 \end{cases}$$ find the value of k. [2]

b) Find moment generating function. Deduce moment generating function of Poisson distribution. [3]

c) The Probability density function of two-dimensional random variable is

$$f(x,y) = \begin{cases} \frac{8}{9}xy, & 1 < x < y < 2 \\ 0, \text{Other wise} \end{cases}$$

Compute marginal density function of X. [2]

d) If $\sigma_x = \sigma_y = \sigma$ and angle between two regression lines is $\tan^{-1}\left(\frac{4}{3}\right)$, compute r. [3]

e) If we can assert with 99% confidence that the maximum error is 0.05 and P = 0.2. deduce the size of the sample. [2]

f) State the properties of F-distribution. [3]

g) Define transient and study states in queueing model. [2]

h) Explain Customer behaviour in the queue. [3]

i) Differentiate random variable and random process. [2]

j) Compose steady-state distribution of the Markov chain $\begin{bmatrix} 0 & 1 \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$. [3]

PART-B
(50 Marks)

2.a) A coin is tossed until a head appears. Expect the number of tosses required?

b) If the random variable X takes the values 1,2,3 and 4 such that
$2P(X = 1) = 3P(X = 2) = p(X = 3) = 5P(X = 4)$,
derive the probability distribution function and cumulative distribution function of X. [5+5]

OR

3.a) A machine manufacturing bolts is known to produce 5% defective. In a random sample of 10 bolts, compute the probability that there are (i) exactly 3 defective bolts (ii) not more than 3 defective bolts.

b) In Normal distribution, 7% of items under 35 and 89% under 63. Compute mean and variance of the distribution. [5+5]

4.a) The joint probability mass function of X and Y is given by

$$f(x,y) = \begin{cases} \frac{x+y}{21}, x = 1,2,3 ; y = 1,2 \\ 0, Other\ wise \end{cases}.$$

Compute covariance of (x, y).

b) Using the formula $r = \frac{\sigma_x^2 + \sigma_y^2 - \sigma_{x-y}^2}{2\sigma_x \sigma_y}$, compute r from the following data. [5+5]

X	92	89	87	86	83	77	71	63	53	50
Y	86	88	91	77	68	85	52	82	37	57

OR

5.a) In a partially destroyed laboratory record of an analysis of correlation data, the following results only are legible: variance of X is 9, regression equations are $8x - 10y + 66 = 0, 40x - 18y = 214$

Compute (i) the mean values of X and Y.

(ii) coefficient of correlation between X and Y.

(iii) the standard deviation of Y.

b) From the data relating to the yield of dry bark (X_1), height (X_2) and girth (X_3) for 18 cinchona plants, the following correlations were obtained:

$r_{12} = 0.77, r_{13} = 0.72$ and $r_{23} = 0.52$.

Compute (i) $r_{12.3}$ (ii) $R_{1.23}$. [5+5]

6.a) A coin was tossed 400 times and head turned up 216 times. Test the hypothesis that the coin is unbiased at 5% level of significance.

b) A sample of 100 electric bulbs produced by manufacturer A showed a mean life time of 1190 hours and a standard deviation of 90 hours. A sample of 75 bulbs produced by manufacturer by B showed a mean life time of 1230 hours, with a standard deviation of 120 hours. Is there a difference between the mean life time of two brands at a significance level of (i) 0.05 (ii) 0.01. [5+5]

OR

7.a) Eleven school boys were given a test in drawing. They were given a month's further tuition and a second test of equal difficulty was held at the end of it. Do the marks given evidence that the students have benefitted by extra coaching?

Boys	1	2	3	4	5	6	7	8	9	10	11
Marks I test	23	20	19	21	18	20	18	17	23	16	19
Marks II test	24	19	22	18	20	22	20	20	23	20	17

b) A set of 5 similar coins is tossed 320 times and the result is

No. of heads	0	1	2	3	4	5
Frequency	6	27	72	112	71	32

Test the hypothesis that the data follow a binomial distribution. [5+5]

8. Customers arrive at a one-man barber shop according to a Poisson process with mean inter-arrival time of 12 minutes. Customers spend an average of 10 minutes in barber chair.
   a) compute the expected number of customers in the barber shop?
   b) compute the percentage of time an arrival can walk straight into the barber's chair without having to wait.
   c) compute the average time customers spend in the queue?
   d) compute the probability that more than 3 customers in the system? [10]

OR

9. In a single-server queuing system with Poisson input and exponential service times, if the mean arrival rate is 3calling units per hour, the expected service time is 0.25 hour, and the maximum possible number of calling units in the system is 2, compute (a) $P_n(n \geq 0)$.
   (b) the average number of calling units in the system.
   (c) the average waiting in the queue. [10]

10.a) A stochastic(random) process is described by $X(t) = A\sin t + B\,cost$ where A and B are independent random variables with zero means and equal standard deviation. Show that the process is stationary of second order.

b) Three advocates A,B,C have 400,500 and 600 clients respectively at t=0. During one year though no new client has been added, migration from one to the other have taken places as given below:
   From A 50 have gone to B and 25 to C
   From B 50 have gone to A and 100 to C
   From C 25 have gone to A
   Prepare the transition probability matrix and estimate the number of clients associated with A, B, C after one year. [5+5]

OR

11. The transition probability matrix of a Markov chain $\{X_n\}$; n=1,2,3,.... having 3 states 1,2,and 3 is $P = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$ and the initial distribution is $P^{(0)} = (0.7, 0.2, 0.1)$
   Compute a) $P(X_2 = 3)$
   b) $P(X_3 = 2, X_1 = 3, X_0 = 2)$. [10]

---oo0oo---

Code No: 113AC

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

MECHANICS OF SOLIDS

(Common to ME, MCT, MMT, 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) How the temperature stresses are created? [2]
b) How the factor of safety is taken in different situations? [3]
c) Describe the concept of binding moment in beams. [2]
d) What is the contra flexure point? [3]
e) What is the importance of section modules? [2]
f) What are the advantages and applications of channel section? [3]
g) Indicate Normal and Tangential stresses on a plane in the member. [2]
h) What are principal stresses and strains? [3]
i) Differentiate between thin and thick cylinders. [2]
j) What is Neutral axis and polar section modulus? [3]

PART – B

(50 Marks)

2.a) Draw stress-strain curve for Ductile and brittle materials.
b) A straight bar 500 mm long is 25 mm diameter for 300 mm length and 15 mm dia. for the remaining length. If the bar is subjected to an axial pull of 15 KN, find the extension of the bar. Take E = 200 Gpa. [5+5]

OR

3.a) How the stresses in composite bars are found?
b) Three vertical rods equal in length and each 15 mm. diameter are equi-spaced in a vertical plane support a load of 10 KN and the rods are adjusted to share the load equally. If an additional load of 10 KN be added. Determine the stress in each rod. The middle one is of copper and the outer ones are if steel. Take E_{steel} = 200 Gpa, E_{copper} = 100 Gpa. [5+5]

4. A simply supported beam of span, 9 m has UDL of 15 KN/m over 4 m from left support and a concentrated load of 20 KN at the centre, Draw SF and BM diagrams. [10]

OR

5. A beam of length 12 m. is supported at left end and the other support is at a distance of 8 m from left support leaving a overhanging length of 4 m on right side. It carries a UDL of 10 KN/m over the entire length and a concentrated load of 8 KN at the right extreme end. Draw BM and SF diagram and find the position of contra flexure point. [10]

6.a) What are the applications of bending equation?

b) A cantilever of length 10 m has a cross section of 100 mm × 130 mm has UDL of 10 KN/m over a length of 8 m. from the left support and a concentrated load of 10 KN at the right end. Find bending stress in the beam. [5+5]

OR

7. A steel tube of 10 mm. bore with a wall thickness of 1 mm is 1 m. long is full of mercury in the tube. It is placed horizontally and supported at the ends. If the density of steel and mercury is 7.5 and 13.6, find the maximum stress in the tube. [10]

8. Draw "Mohr's stress circle" for principal stresses of 80 N/mm^2 tensile and 40 N/mm^2 compressive and find the resultant stresses on planes making 25^0 and 60^0 with the major principal plane. Find also normal and tangential stresses on these planes? [10]

OR

9. A steel specimen is subjected to the following principal stresses 120 N/mm^2 (Tensile) 50 N/mm^2 (compressive). If the proportionality limit for the steel specimen is 225 N/mm^2, find the factory of safety according to:
   a) Maximum principal stress theory
   b) Maximum principal strain theory.
   c) Maximum shear stress theory. [10]

10. A hollow shaft is to transmit 400 KW power at 120 rpm. if the shear stress in not to exceed 60 N/mm^2 and internal dia. is 0.65 of the external dia. Find internal and external diameters assuming that the maximum torque is 1.5 times the mean? [10]

OR

11. The air vessel of torpedo is 500 mm. external dia. and 10 mm. thick, the length being 2000 mm. Find the change in external dia. and length, when it is charged to 12 N/mm^2 internal pressure. Take E = 200 Gpa and poisson's ratio is 0.3. [10]

---ooOoo---

Code No: 113BJ

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

STRENGTH OF MATERIALS – I

(Common to CE, 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) Explain with a neat sketch, Proof Stress and Strain Hardening. [2]

b) Explain briefly Principle of super position. [3]

c) Write the assumptions in the theory of simple bending. [2]

d) Describe different types of beams and different types of loads. [3]

e) Write down relations for maximum shear force and bending moment in case of a cantilever beam subjected to uniformly distributed load running over entire span. [2]

f) The average shear stress of a rectangular beam is $5N/mm^2$. Find the maximum shear stress of a circular section if its area is double the area of rectangular section and the shear force is 1.5 times the shear force carried by rectangular section. [3]

g) Draw Mohr circle for the state of pure shear in a strained body and mark all salient points on it. [2]

h) Name the theories of failure suitable for brittle material. [3]

i) Why moment area method is more useful, when compared with double integration method? [2]

j) Explain the Theorem of conjugate beam method. [3]

PART-B

(50 Marks)

2.a) Draw the stress – strain curve for mild steel and mark the salient features.

b) A Mild steel rod of 20 mm diameter and 300 mm long is enclosed centrally inside a hollow copper tube of external diameter 30 mm and internal diameter 25 mm. The ends of the rod and tube are brazed together, and the composite bar is subjected to an axial pull of 40 kN. If E for steel and copper is 200 GN/m^2 and 100 GN/m^2 respectively, find the stresses developed in the rod and the tube also find the extension of the rod. [5+5]

OR

3.a) A steel rod of 20mm diameter passes centrally through a copper tube of 50mm external diameter and 40mm internal diameter. The tube is closed at each end by rigid plates of negligible thickness. The nuts are tightened lightly home on the projecting parts of the rod. If the temperature of the assembly is raised by 50°C, calculate the stresses developed in copper and steel. Take E for steel and copper as 200 GN/m^2 respectively and 100 GN/m^2 respectively and α for steel and copper as 12×10^{-6} per °C and 18×10^{-6} per ^{0}C recpectively.

b) The extension in a rectangular steel bar of length 400mm and thickness 3mm is found to be 0.21mm. The bar tapers uniformly in width from 20mm to 60mm E for the bar is 2×10^5 N/mm^2. Determine the axial load on the bar. [5+5]

4.a) What is mean by positive or sagging BM?

b) An overhanging beam ABC of length 7 m is simply supported at A & B over a span of 5 m and the portion BC overhangs by 2 m. Draw the shear force and bending moment diagram. Determine the points of contra flexure if it is subjected to uniformly distributed load of 3 kN/m over a span of 3m from B and a concentrated load of 8 kN at C. [5+5]

OR

5.a) Derive the relation between SF, BM and the rate of loading at a section of a beam.

b) A beam of uniform section 10 m long carries a udl of 2KN/m for the entire length and a concentrated load of 10 KN at right end. The beam is freely supported at the left end. Find the position of the second support so that the maximum bending moment in the beam is as minimum as possible. Also, compute the maximum bending moment. [5+5]

6.a) Compare the weights of two beams of the same material and of equal strength one being circular and solid and the other being circular section and hollow, the internal diameter being ¾ times the external diameter.

b) A beam of size 150 mm wide, 250 mm deep carries a uniformly distributed load of w kN/m over entire span of 4 m. A concentrated load 1 kN is acting at a distance of 1.2 m from the left support. If the bending stress at a section 1.8 m from the left support is not to exceed 3.25 N/mm^2, find the load w. [5+5]

OR

7. The cross section of a joist is a T-section 120mm×200mm×12mm, with 120mm side horizontal. Sketch the shear stress distribution and hence the maximum shear stress, if it has to resist a shear force of 200kN. [10]

8.a) State the condition for the use of Macaulay's method

b) A beam AB of length 8 m is simply supported at its ends and carries two point loads of 50 kN and 40 kN at a distance of 2 m and 5 m respectively from left support Determine, deflection under each load, maximum deflection and the position at which maximum deflection occurs. Take $E = 2 \times 10^5$ N/mm^2 and $I = 8.5 \times 10^6$ mm^4. [5+5]

OR

9. Find the maximum deflection and slope using Macaulay's method for a simply supported beam of span 10 m. Beam carries a point load of 15 kN at a distance of 2 m from the left end and a uniformly distributed load of 50 kN/m for a length of 3 m from the right end. [10]

10. At a certain point in a strained material, the stress on two planes are at right angles to each other are $20N/mm^2$ and $10N/mm^2$, both tensile in nature, they are accompanied by shear stress of magnitude of $10N/mm^2$. Evaluate the principal stresses and maximum shear stress and location of principal plane. [10]

OR

11. A cylindrical shaft made of steel of yield strength 350 MPa is subjected to static load consisting of bending moment 10 kn-m^2 and a torsional moment of 30kNm. Determine the diameter of the shaft using(a)maximum principle stress theory (b) maximum shear force theory(c) maximum strain energy theory and (d) maximum distortion energy theory take E=210GPa, Poissions ratio=0.25 and factor of safety =2. [10]

---ooOoo---

Code No: 113BN

R13

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

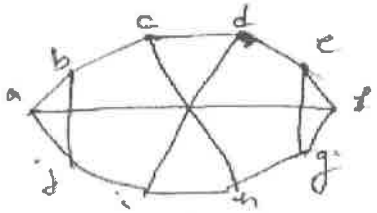
Time: 3 Hours **Max. Marks: 75**

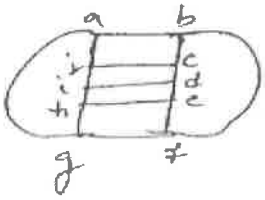
Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Express the formula in terms of $P->Q$ {↑} only. [2]
b) Define tautology, contradiction and contingency of formula. [3]
c) Explain about Lattice and its Properties. [2]
d) Show whether following graphs are isomorphic or not. [3]





e) Show that intersection of two submonoids of a monoid is a monoid. [2]
f) A book binder is to bind 10 different books in red, blue and brown cloth. In how many ways can he do this if each color of cloth is to be used for at least one book? [3]
g) Let X = {1, 2, 3, 4, 5, 6, 7} and R = {(x, y) |x - y is divisible by 3} in X. Show that R is an equivalence relation. [2]
h) Solve simultaneous recurrence relations: $a_n = 3a_n + 2b_{n-1}$ [3]
i) Distinguish between following terms Cycle and Circuits. [2]
j) Describe various methods to generate spanning trees. [3]

PART-B

(50 Marks)

2. Obtain the PDNF and PCNF of the following formulas.
P ∨ (~P-> (Q ∨ (~Q->R)) [10]

OR

3.a) Construct the truth table for the following statement $(P \rightarrow Q) \vee (\neg P \rightarrow R)$.
b) Show that the following statements are logically equivalent without using truth table. $(P \rightarrow R) \wedge (Q \rightarrow R) \Leftrightarrow (P \vee Q) \rightarrow R$. [5+5]

4.a) Let (S1, *1), (S2, *2) and (S3, *3) be semi groups and f: S1 -> S2 and g:S2 ->S3 be homomorphisms. Prove that the mapping of g o f: S1 -> S3 is homomorphism.
b) Prove that H = {0, 2, 4} forms a subgroup of (Z6, +). [5+5]

OR

5.a) Draw the Hasse diagram of: (P(S), <=), where P(S) is power set of the set S= {a, b, c}.

b) How many relations can be defined on a set with `n' elements? If a set A has 'm' elements and a set B has `n' elements, how many relations can be defined from A to B? If a set A = {1, 2}, determine all relations from A to A. [4+6]

6 A student is to answer 12 of 15 questions in an examination. How many choices does the student have:
(a) in all
(b) if he must answer the first two questions
(c) if he must answer the first or second but not both
(d) if he must answer exactly 3 of the first 5 questions
(e) if he must answer atleast 3 of the first 5 questions. [10]

OR

7.a) In how many ways can 23 different books be given to 5 students so that 2 of the students will have 4 books each and the other 3 will have 5 books each.

b) Discuss Pigeon hole principle. [5+5]

8.a) Solve the recurrence relation $a_n - 7a_{n-1} + 12a_{n-2}=0$ for $n \geq 2$, $a_0=1$ and $a_1=2$.

b) Solve the recurrence relation of Fibonacci series. [5+5]

OR

9.a) What is the recurrence relation for towers of Hanoi problem? Obtain a solution for it.

b) Solve following recurrence relation $a_n - 5a_{n-1} + 8a_{n-2} - 4a_{n-3} = n2^n$. [5+5]

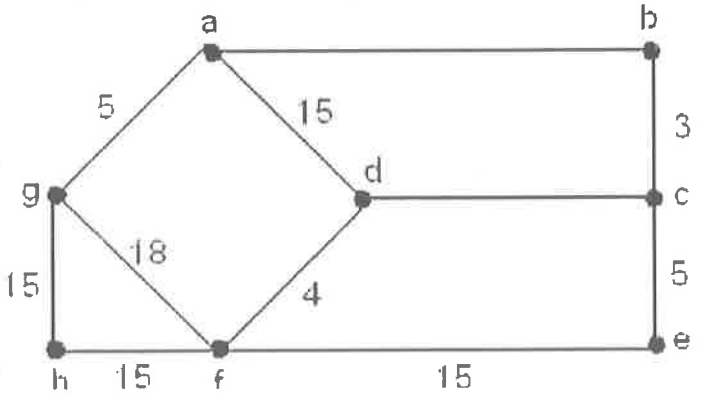
10.a) Write an algorithm to determine if a connected graph is Eulerian, using its adjacency list representation.

b) Write an algorithm to determine if a connected graph contains an Eulerian path, using its adjacency matrix. [5+5]

OR

11.a) State the kruskal's algorithm for Finding Minimal Spanning Tree.

b) Determine spanning tree for the following figure using kruskal's algorithm. [5+5]



---ooOoo---

Code No: 113BW

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) Explain independent and dependent sources? Give examples. [2]
b) Two voltmeters A and B, having resistance of 5.2kΩ and 15kΩ respectively are connected in series across 240V supply. What is the reading on each voltmeter? [3]
c) Explain the significance of average value. [2]
d) Find the energy stored in an inductor of value 5 mH, if the current in it varies from 1 A to 5 A in 10 sec. [3]
e) What is Q factor? Find value of Q factor for an inductor. [2]
f) Write Short notes on coefficient coupling. [3]
g) State the properties of tree. [2]
h) What are the properties of the planar networks? [3]
i) State Reciprocity theorem. [2]
j) Explain the duality existence between Thevenin's equivalent circuit and Norton's equivalent circuit. [3]

PART- B

(50 Marks)

2.a) Explain in detail the volt-ampere relationship of R, L and C elements with neat diagrams.
b) Find the equivalent resistance R_{ab} for the circuit shown in figure 1. [5+5]

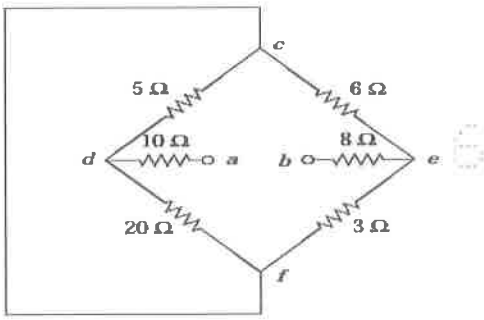


Figure: 1

OR

3.a) State and explain the Kirchhoff's Law which can be applied to loop current method.
b) Find the current through 12Ω resistor for the circuit as shown in figure 2 by using nodal method. [4+6]

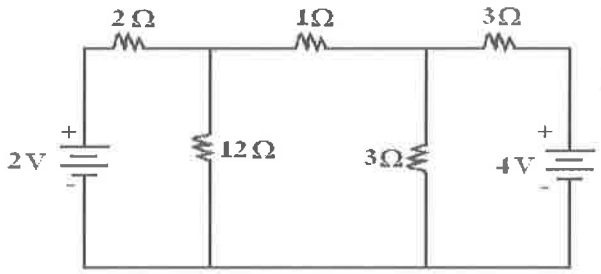


Figure: 2

4.a) Define the following terms:
i) RMS value ii) Form factor iii) Peak factor.

b) For the periodic waveform given in figure 3, find Average value and RMS value. [4+6]

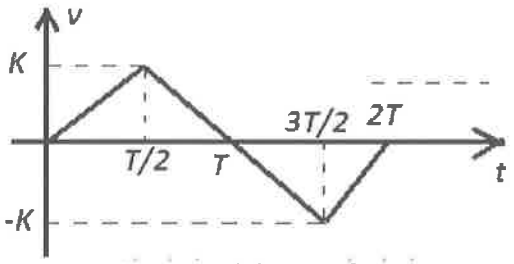


Figure: 3

OR

5.a) Write short notes on Power factor.

b) A coil of resistance 5 Ω and inductance 120 mH in series with a 100 μF capacitor, is connected to a 300 V, 50 Hz supply. Calculate (i) the current flowing, (ii) the phase difference between the supply voltage and current, (iii) the voltage across the coil and (iv) the voltage across the capacitor. [4+6]

6.a) For a R-L series circuit, with R varied from 0 to ∞ , show that current locus is a semi circle.

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

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

b) Draw a series magnetic circuit and explain the procedure to solve the circuit for flux to establish in it. [5+5]

8.a) Explain the following terms with respect to graph theory.
i) Node ii) tree iii) link iv) sub-graph.

b) Obtain the cut - set matrix for the network, as shown in figure 4. [4+6]

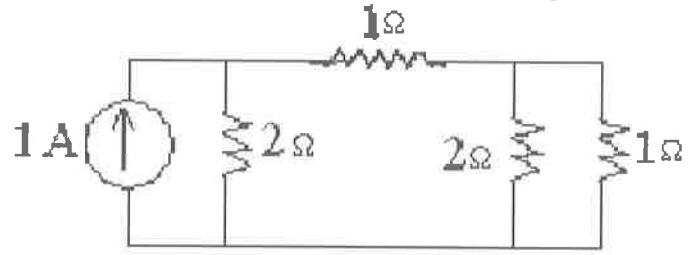


Figure: 4

OR

9.a) Write short notes on Duality.

b) For the network shown in figure 5, Draw Graph, Tree and Dual network. [4+6]

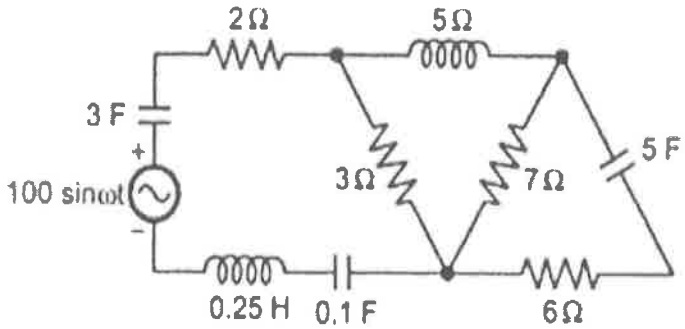


Figure: 5

10.a) State and explain Norton's theorem.

b) Find the value of R_L so that maximum power is delivered to the load resistance R_L as shown in figure 6, and find the maximum power. [4+6]

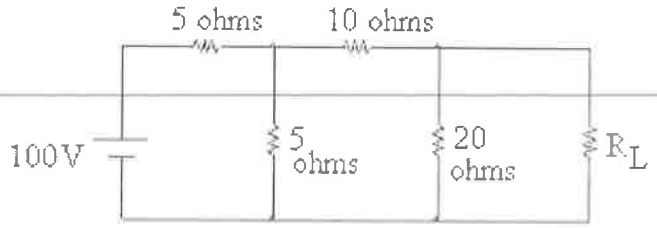


Figure: 6

OR

11.a) State and explain Tellegen's theorem for DC excitation.

b) For the network shown in figure 7, replace the circuit to the left of terminals 'AB' with a Thevenin's equivalent. The determine current in the (2–j2) Ω impedance connected to the equivalent circuit. [4+6]

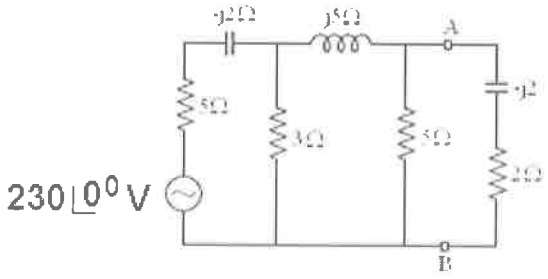


Figure: 7

---ooOoo---

Code No: 53001 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
MATHEMATICS-II
(Common to CE, CHEM, MME, 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 $A=\begin{bmatrix} 2 & -4 & 3 & 1 & 0 \\ 1 & -2 & 1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$.

b) Verify that the following equations are consistent and solve. [8+7]

$$x+2y-12z+8v=27$$
$$5x+4y+7z-2v=4$$
$$-3x+7y+9z+5v=11$$
$$6x-12y-8z+3v=49$$

2.a) Compute the eigen values of the following matrix $\begin{bmatrix} 4 & 2 & 2 & 1 \\ 2 & -3 & 1 & 1 \\ 1 & 1 & 1 & 2 \end{bmatrix}$.

b) Find A^{-3} using Cayley-Hamilton theorem for the non-singular matrix $A=\begin{bmatrix} 2 & 4 \\ 1 & 1 \end{bmatrix}$.

Verify that A^{-3} is the inverse of A^3. [7+8]

3.a) Determine a, b and c so that A is orthogonal, where $A=\begin{bmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{bmatrix}$.

b) Show that $A=\begin{bmatrix} a+ic & -b+id \\ b+id & a-ic \end{bmatrix}$ is a unitary matrix if $a^2+b^2+c^2+d^2=1$. [7+8]

4.a) Reduce the quadratic form to its canonical forms
$6x_1^2+3x_2^2+3x_3^2-4x_1x_2+4x_1x_3-2x_2x_3$

b) Find a matrix P which diagonalizes the matrix associated with the quadratic form
$3x^2+5y^2+3z^2-2yz+2zx-2xy$ [7+8]

5.a) Find the Fourier series of the function $f(x)=\begin{cases}-h, & for\ -\pi<x<0\\ h, & for\ 0<x<\pi\end{cases}$. Hence deduce $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\ldots=\frac{\pi}{4}$.

b) Find the Fourier series of the triangular wave function defined by $f(x)=|x|$ for $-1\le x\le 1$ and $f(x+2)=f(x)$ for all x. [8+7]

6.a) Construct a partial differential equation of all spheres whose centers lie on the z-axis, by the elimination of arbitrary constants.

b) Solve the following partial differential equation $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+z\frac{\partial u}{\partial z}=xyz$. [8+7]

7.a) Solve the following partial differential equation $\frac{\partial^2 y}{\partial x^2}=\frac{1}{c^2}\frac{\partial^2 y}{\partial t^2}$ by the method of separation of variables.

b) Solve the following partial differential equation by the method of separation of variables $4\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}=3u, u(0,y)=e^{-5y}$. [8+7]

8.a) Find the Fourier transform of: $f(x)=\begin{cases}e^{-ikx}, & a<x<b\\ 0, & a<x\ and\ x>b\end{cases}$

b) Find the Fourier sine transform of $g(x)=e^{-x}$. [8+7]

---ooOoo---

Code No: 53014

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) State addition theorem of probability. Three students A, B and C are in a running race. A and B have the same probability of winning the race and each is twice as likely to win as C. Find the probability that B or C wins.

b) State Baye's theorem. A cell phone company uses three different methods to contact its discontinued customers for a reconnection, namely, Telephone contact, sending an email, Approach by the sales executive. It is known from experience that 35%, 25% and 40% are the customers dealt with these three methods. Out of the discontinued customers, 60%, 50% and 70% of the discontinued customers respectively have got reconnection of their cell phones subsequent to the contact. If a randomly selected customer is found to have got his cell phones reconnection recently, what was the probability that he was approached by telephone contact? [7+8]

2.a) Explain normal distribution. If the mean height of sorghum varieties to be 68.22 inches with a variance of 10.8 inches, how many varieties in a field of 100 varieties, would you expect to have 6 feet tall?

b) Define binomial distribution. What are its mean and standard deviation?

c) Explain the sampling distribution of mean $(\bar{X})$, when a sample of size n is taken from a normal population with mean μ and known variance σ^2. [15]

3.a) Explain the terms i) Type I and Type II errors ii) Critical region and iii) confidence interval.

b) It is claimed that a random sample of 100 light bulbs with a mean life of 15269 hours drawn from a factory production outlet, which has a mean life of 15200 hours and a standard deviation of 1248. Test the validity of the claim at 5% level of significance. [8+7]

4.a) A manufacturer claims that only 3% of his products are defective. A random sample of 400 was tested among which 100 were defective. Test the claim of the manufacturer at 5% level of significance.

b) In a sample of 300 units of manufactured products, 65 units were found to be defective and in another sample of 200 units there were 35 defectives. Is there any significant difference in the proportion of defectives in the samples at 5% level of significance? [7+8]

5.a) A die is thrown 60 times with the following results:

Face:	1	2	3	4	5	6
Frequency:	7	8	11	9	15	10

Test at 1% level of significance if the die is unbiased, assuming that $p\left(x^2 > 11.1\right) = 0.05$ with 5 degrees of freedom.

b) Explain t test for difference of means. Measurements performed on random samples of two kinds of cigarettes yielded the following results on their nicotine content (in mgs):

Brand A	21.4	23.6	24.8	20.9	26.5
Brand B	22.0	27.1	23.5	29.1	24.8

Assuming that the nicotine content is distributed normally, test the hypotheses that brand B has higher nicotine content than brand A. [7+8]

6.a) i) Explain different types of correlation.

ii) The table below shows the weights of 6 fathers and their eldest sons:

Weight of father(kgs)	76	89	70	103	98	72
weight of son	60	60	105	110	78	68

Calculate correlation between the weights of father and son and comment briefly whether this value supports the theory that weight is an inherited factor.

b) The lines of regression in a bi-variate distribution are $x + 9y = 7$ and $3y + 4x = \frac{49}{3}$. Find i) mean of X and Y ii) Coefficient of correlation. [8+7]

7.a) Explain pure birth process and show that the number of arrivals in a certain time interval follows Poisson process.

b) At a service center users arrive at the counter following a Poisson distribution with an average time of 5 minutes between two successive arrivals. The time taken for a service is on an average 3 minutes and it follows an exponential distribution. What is the probability that the counter is busy? It is proposed to reduce the average waiting time to less than or half of the present waiting time for completion of the service buy establishing a new counter. What has to be the arrival rate so as to warrant the establishment of new counter? [7+8]

8.a) Describe the classification of the states of Markov process.

b) Define Markov chain, irreducible Markov chain and stochastic matrix. Find the limiting probabilities of the stochastic matrix $P = \begin{bmatrix} 1/3 & 2/3 & 0 \\ 1/2 & 1/2 & 0 \\ 1/3 & 0 & 2/3 \end{bmatrix}$. [7+8]

---ooOoo---

Code No: 123BN

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) Write the converse and contrapositive of the statement: "If P is a square, then P is a rectangle". [2]

b) Rewrite the following statement informally, without quantifiers or variables. $\forall x \in R$, *if* $x > 2$ *then* $x^2 > 4$ [3]

c) Let $I = \{0,1,2\}$ and define functions f and g from I to I as follows: For all x in I,
$f(x) = (x^2 + x + 1) \bmod 3$ *and* $g(x) = (x+2)^2 \bmod 3$
State whether f=g. [2]

d) Compute the transitive closure of the relation R={(1,1),(1,2),(1,3),(2,3),(3,1)} defined over a set S={1,2,3} [3]

e) State principle of inclusion. [2]

f) Give any three applications of Pigeonhole principle. [3]

g) What is a non-homogeneous recurrence relation? Give an example. [2]

h) Give any three applications of generating functions. [3]

i) What do you mean by isomorphism? Give examples of isomorphic graphs. [2]

j) What is a planar graph? Give examples of planar and non-planar graphs. [3]

PART-B

(50 Marks)

2.a) Assume x is a particular real number. Determine whether the following two statements are logically equivalent.
i) $x < 2$ *or it is not the case that* $1 < x < 3$
ii) $x \leq 1$ *or either* $x < 2$ *or* $x \geq 3$

b) Translate the given statements into propositional logic using the propositions provided:
P: "The message is scanned for viruses"
Q:"The message was sent from an unknown system"
i) "The message is scanned for viruses whenever the message was sent from an unknown system."
ii) "It is necessary to scan the message for viruses whenever it was sent from an unknown system." [5+5]

OR

3.a) Using automatic theorem proving show that $(\neg Q \wedge (P \rightarrow Q)) \rightarrow \neg P$.

b) Explain the following:
i) Normal Forms ii) Free and bound variables.
iii) Logical Equivalence iv) Resolution. [5+5]

4.a) Determine whether the following functions are injective, surjective or bijective. Also describe the inverses of the bijective functions.

i) The function $f:N \to N$ with $f(a)=9$ and $f(n) = \begin{cases} 3f(n)+1 & \text{if } f(n) \text{ is odd} \\ \frac{1}{2} f(n) & \text{if } f(n) \text{ is even} \end{cases}$

ii) A function $f:A \to A$ satisfying $f(f(x))=f(x)$ for all $x \in A$

b) Find all homomorphisms. [5+5]

i) $f : Z_2 \to Z_4$

ii) $f : Z_2 \to Z_5$

OR

5.a) Let A, B be finite sets with $|A| = m$ and $|B| = n$. Determine the numbers of:

i) Functions $A \to B$

ii) Injective functions $A \to B$ (provided that $m \le n$)

iii) Surjective functions $A \to B$ (provided that $m \ge n$)

iv) Bijective functions $A \to B$ (provided $m = n$)

v) Symmetric relations on A

b) Determine all subgroups of each of the following groups: i) The additive group Z_3;

ii) The multiplicative group Z_6^*. [5+5]

6.a) In a group of 30 people, at least how many are born in the same month?

b) In how many ways can six coupons for free lunches at different restaurants be distributed among 10 students:

i) If none is to receive more than one coupon?

ii) If there is no restriction on the number of coupons that each student can receive? [5+5]

OR

7.a) A student council consists of 15 students.

i) Suppose two members refuse to work together on projects. How many groups of seven can be chosen to work on a project?

ii) Suppose two team members insist on either working together or not at all on projects. How many groups of seven can be chosen to work on a project?

b) Count the bit-strings of length ten that:

i) Start with 01 and end with 10.

ii) Start with 01 and do not end with 10.

iii) Neither start with 01 nor end with 10. [5+5]

8.a) Find the generating function for the following sequence:

$$\frac{1}{2}, \frac{1\times 3}{2\times 4}, \frac{1\times 3\times 5}{2\times 4\times 6}, \cdots \frac{1\times 3\times 5\times \cdots \times (2n+1)}{2\times 4\times 6\times \cdots \times (2n+2)}, \cdots$$

b) Use generating function to solve the following recurrence relation:

$a_0 = 2, a_1 = 3, a_n = 5a_{n-1} - 6a_{n-2} + 7^n$ *for* $n \ge 2$. [5+5]

OR

9.a) Solve the following recurrence relation using substitution method:

$a_0 = 2, a_1 = 3, a_n = a_{n-2} + 2^n + n3^n + n^2 4^n$

b) Find a recursive relation for the following:

i) The number of strings of length n over the lower-case Roman alphaphet {a,b,c,…,z} containing two consecutive vowels.

ii) The number of strings of length n over the lower-case Roman alphabet {a,b,c,…,z} not containing two consecutive consonants. [5+5]

10. What is a Hamiltonian Cycle? Draw bipartite graph K3,4 and prove that this graph does not have a Hamiltonian cycle. [10]

OR

11. Use the algorithm BFS to find out whether the following graphs, given by their adjacency lists are connected, and otherwise determine their connected components. Consider that the set of vertices is alphabetically ordered. [5+5]

a)

a	b	c	d	e	f	g	h	i	j
d	d	h	a	a	a	b	c	b	b
e	g		b	d	d	i		g	g
f	i		e			j			
j	f								

b)

a	b	c	d	e	f	g	h	i	j	k	l	m
b	a	f	b	b	c	b	b	c	a	c		g
j	d	i	h	g		e	d	k	b	i		
e	k				m							
g												
h												
j												

---ooOoo---

Code No: 123BW

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) State Ohm's law and mention its limitations. [2]
b) Explain how voltage source with a source resistance can be converted into an equivalent current source. [3]
c) Mention the disadvantages of low power factor. [2]
d) In a series R-C circuit, R=10Ω and C=25nF. A sinusoidal voltage of 50 mHz is applied and the maximum voltage across the capacitance is 2.5 V. Find the maximum voltage across the series combination. [3]
e) Define mutual inductance and self inductance. [2]
f) Find the total inductance of the three series connected coupled coils shown in the figure 1. [3]

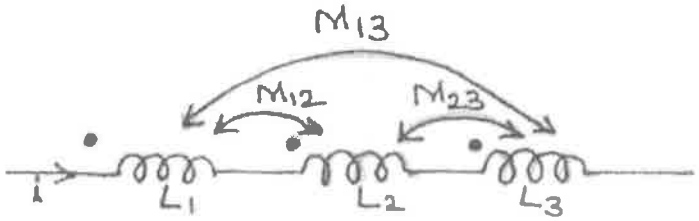


Figure: 1

g) Mention the properties of a tree in a graph. [2]
h) Explain graphical method to draw dual network. [3]
i) State superposition theorem and Reciprocity theorem. [2]
j) Give the proof of Tellegen's theorem. [3]

PART-B

(50 Marks)

2.a) State Kirchoff's voltage and current laws.
b) Find 'i' in the circuit given in figure 2. Check the power balance condition.[3+7]

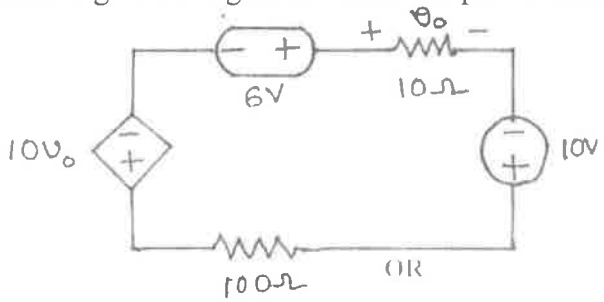


Figure: 2

OR

3.a) Determine the node voltages and the current through the resistors using mesh method for the network given in figure 3.

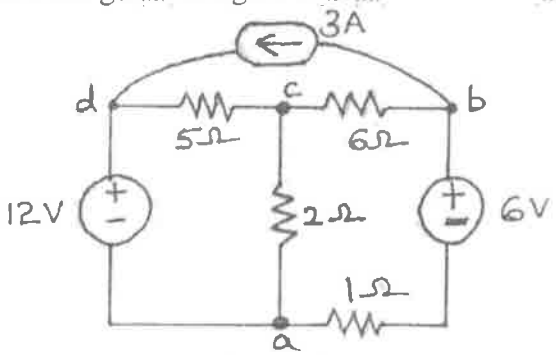


Figure: 3

b) Mention the difference between nodal analysis and mesh analysis. [7+3]

4.a) A series R-L circuit, has resistance of 20Ω and inductance of 0.02H. If the net impedance of the given circuit is $40\angle\Phi^0\Omega$, find Φ and the frequency of the circuit.

b) Define RMS value, Average value and Form factor. [4+6]

OR

5. A voltage $\upsilon(t) = 200\sin\omega t$ is applied to a series RLC circuit where R=60Ω, L=0.18mH and C=20μF. Find:
a) The power supplied by the source
b) The reactive power supplied by the source
c) The reactive power of the capacitor
d) The reactive power of the inductor and
e) The power factor of the circuit. [10]

6. Derive the equation for quality factor of series resonating circuit and parallel resonating circuit. [10]

OR

7.a) Define quality factor and Bandwidth.

b) In the coupled circuit given in figure 4, find the input impedance as well as the net inductance when L_1=0.2H, L_2=0.5H coefficient of coupling (K) being 0.5. [5+5]

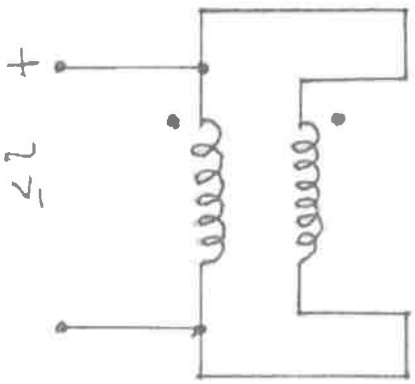


Figure: 4

8.a) Explain the concept of duality.

b) Define a fundamental Tie set and Cut set matrix. Give the procedure for obtaining the same with suitable examples. [3+7]

OR

9.a) The figure 5 represents a graph of a network. Show the tree, twigs and links.

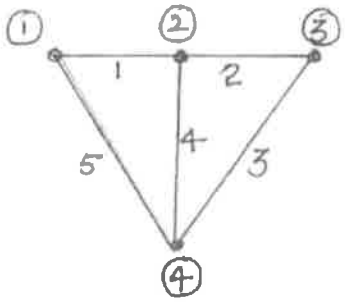


Figure: 5

b) Convert the given current source to voltage source shown in figure 6. [5+5]

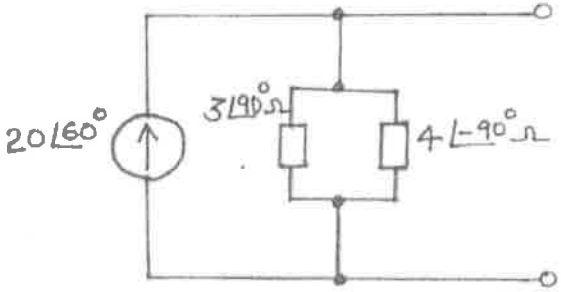


Figure: 6

10.a) State and explain Thevenin's and Norton's theorems.

b) Using Milliman's theorem find the current through R_L and voltage drop in the circuit given in figure 7. [5+5]

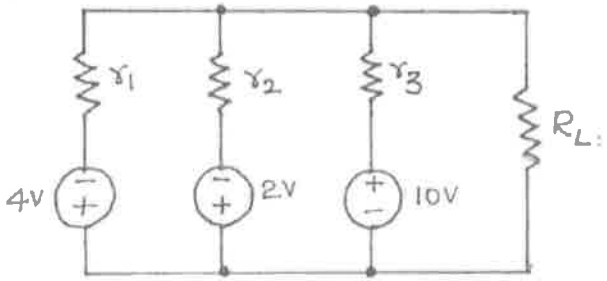


Figure: 7

OR

11.a) State and explain Maximum power transfer theorem and compensation theorem.

b) Find the Norton's equivalent circuit across a-b for the network shown in figure 8. [5+5]

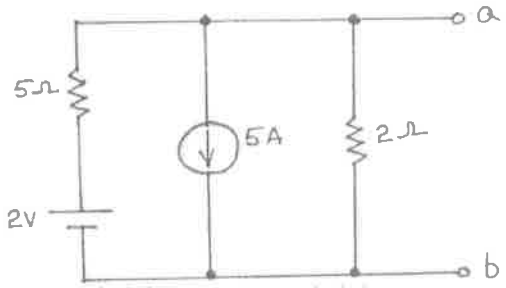


Figure: 8

---oo0oo---

Code No: 123BJ

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
STRENGTH OF MATERIALS – I
(Common to CE, 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) What do you mean by principle of super position? [2]
b) Define different modulii. [3]
c) Define Bending Moment and B.M.D. [2]
d) Explain with neat sketches different types of beams. [3]
e) Define shear stress and write the formulae for calculating this stress. [2]
f) Write the assumptions in simple bending theory. [3]
g) State "Rankine's theorem of failure". [2]
h) Write the limitations of maximum shear stress theory. [3]
i) Define moment area theorem II. [2]
j) What is Macaulay's method and how this is different from double integration method of calculating slopes and deflections in a beam. [3]

PART-B

(50 Marks)

2.a) Draw stress – strain diagram for mild steel, brittle material and a ductile material and indicate salient points.
b) A circular alloy bar 3 m long uniformly tapers from 40mm diameter to 25mm diameter. Calculate the elongation of the rod under the axial force of 75kN. Take E=140GPa. [5+5]

OR

3. Define Resilience and derive the equation of stresses for a body subjected to sudden and impact loading. [10]

4. Draw S.F.D and B.M.D for the cantilever beam shown in figure 1. [10]

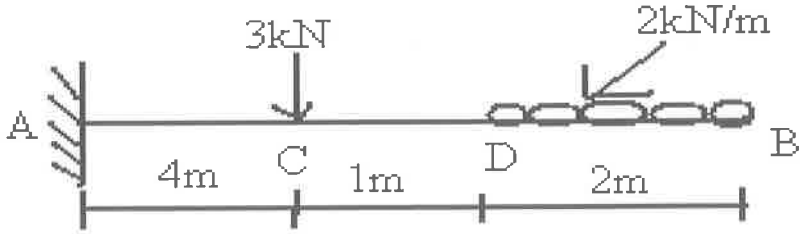


Figure: 1

OR

5. Draw S.F.D and B.M.D for the Over hanging beam shown in figure 2. [10]

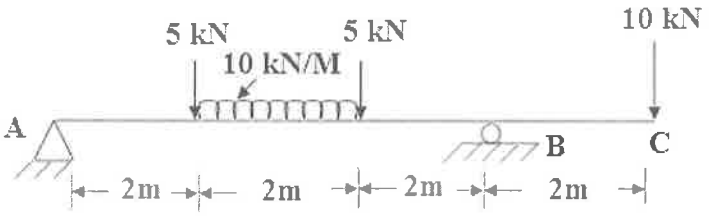


Figure: 2

6. A simply supported beam of span 8 m carries a udl of 15 kN/m over the entire span. If the maximum allowable stress due to bending is restricted to 175 N/mm^2, determine the cross sectional dimensions if the section is:
   a) Rectangular with depth twice the breadth
   b) Hollow circular section having a diameter ratio of 0.7. [5+5]

OR

7.a) Prove that for a rectangular section maximum shear stress is 1.5 times of average stress.

b) Prove that for a Circular section maximum shear stress is 1.33 times of average stress. [5+5]

8. A rectangular block of material is subjected to a tensile stress of 120N/mm^2 on one plane and a tensile of 45 N/mm^2 on a plane at right angles to the former. Each of the above stresses is accompanies by a shear stress of 60N/mm^2. Determine the principal stresses, principal planes and the maximum shear stresses. [10]

OR

9. A Solid shaft is subjected to torque of 30 kN-m and bending moment of 15 kN-m. If the allowable stress is 165 Mpa, find the diameter of the shaft using:
   a) Maximum stress theory
   b) Maximum shear stress theory, Poisson's ratio is 0.3. [5+5]

10.a) Derive the formulae used to find the slope and deflection of a beam by Moment-Area method.

b) Using Moment area theorems find the values of slope and deflection for a cantilever beam of length 'L' subjected to Moment 'M' at the free end? [5+5]

OR

11. A cantilever of length '4a' is carrying a load of W at the free end, and another load of W at its centre. Calculate the slope and deflection of the cantilever at the free end, using conjugate beam method. [10]

---ooOoo---

Code No: 113BX

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) Why a falling rain drop acquires spherical shape. [2]
b) If the surface tension at air water interface is 0.073 N/m. What is the pressure difference between inside and outside of an air bubble of diameter 0.01 mm. [3]
c) Explain the differences among the stream line. Streak line and path line. What will happen to all the lines when the flow is steady? [2]
d) List out all minor and major losses in pipe flow. [3]
e) What is meant by velocity diagrams? What are the uses of it? [2]
f) What is mass curve and what are the uses of it? [3]
g) Distinguish between impulse and reaction turbines. [2]
h) What is meant by governing of a turbine? [3]
i) State the differences between the single stage and multi stage pumps. [2]
j) What do you mean by net positive suction head? (NPSH). [3]

PART-B

(50 Marks)

2.a) Explain the micro manometer with a neat diagram. Discuss the main advantages of the same.
b) Castor Oil of viscosity 0.9 N-S/m^2 fills the space between two concentric cylinders of 15 cm and 15.2 cm and each 25 cm height. Find the torque required to rotate the inner cylinder at 20 rpm if the outer cylinder is stationary. [5+5]

OR

3.a) Discuss various types of classification of flows. Mention their practical applications.
b) Derive continuity equation and clearly state the assumptions made. [5+5]

4.a) Explain the forces on a 90^0 bend with neat sketch.
b) Explain the following with neat sketches:
i) Orifice meter ii) Nozzle meter iii) Pitot tube. [5+5]

OR

5.a) Derive the Darcy Weisbach equation.
b) Two reservoirs connected by a pipe line consisting of two pipes in series one of 15 cm diameter and 6 m long and another 22.5 cm diameter and 15 m long. If the difference in the level of reservoirs is 6.0 m, calculate the discharge by considering all losses. Take f = 0.020 for each pipe. [5+5]

6. Derive the expressions for work done and efficiency in respect of a jet striking curves vanes at the centre. [10]

OR

7.a) Discuss the step by step procedure of estimation of power developed from a catchment.
b) Explain the various elements associated with hydro electric power stations. [5+5]

8.a) A Francis turbine of diameter 3.0 m develops 6750 KW at 300 rpm under a net head of 45 m. A geometrically similar model of scale ratio 1:8 is to be tested at ahead of 9 m. Estimate the size, speed, discharge and power developed by the model. What is the specific speed of the model?
b) Explain the features of governing mechanism of turbine. [5+5]

OR

9.a) What is Cavitation phenomenon? Discuss how does it occurs and prevention methods.
b) A Kaplan turbine working under a head of 15 m develops 7400 KW shaft power. The outer diameter of the runner is 4 m and the hub diameter is 2 m. the guide blade angle at the extreme edge of the runner is 30^0. The hydraulic and overall efficiency are 90% and 85% respectively. If the velocity of the whirl (Vw1) at the outlet is zero , determine the runner vane angles at the inlet and outlet at the extreme edge of the runner and speed of turbine. [5+5]

10.a) A two stage centrifugal pump is required for a fire engine for a discharge of 3.66 m^3 per minute at ahead of 75 m. if the overall efficiency of the pump is 75% and specific speed per stage is about 1300 find i) the running speed in rpm and ii) the power of the driving engine. If the actual manometric head developed is 65% of the theoretical head , there is no slip , the outlet vane angle is 30^0 and the radial flow velocity at exit is 0.15 times the tip speed at exit find the diameter of the impellers.
b) Enlighten the characteristic curves of centrifugal pumps. [5+5]

OR

11.a) Derive an expression for specific speed of a centrifugal pump.
b) Describe the principle and working of a centrifugal pump with a neat sketch. [5+5]

---ooOoo---

Code No: 113AA

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

MATHEMATICS – II

(Common to CE, CHEM, MME, AE, PTE, 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) Find $div\left(x^2i + xzj - z^3k\right)$ [2]

b) State divergence theorem. [3]

c) If f (x) = x in $(0, 2\pi)$ and $f(x+2\pi) = f(x)$ then find a_0 in fourier series. [2]

d) If the fourier cosine tranform of e^{-ax} is $\frac{a}{(s^2+a^2)}$ then find the fourier sine transform of xe^{-ax}. [3]

e) If h = 1, evaluate $\Delta^2(2x^2+3)$. [2]

f) Find the linear polynomial satisfied by f(4)=9.5 and f(7)=16.5 by Lagrange's method. [3]

g) Find two values of x between which the root of $x \log_{10} x = 1.2$ lies. [2]

h) Find LU decomposition of A = $\begin{bmatrix} 2 & 5 \\ -2 & 0 \end{bmatrix}$. [3]

i) If h = 1, evaluate $\int_0^2 \frac{dx}{(4x+5)}$ b y simpson's $\frac{1}{3}rd$ rule. [2]

j) If $\frac{dy}{dx} = 1 - 2xy$ $y(0) = 0$ then find y(0.1) by Taylor's series method taking upto 2 differentials. [3]

PART-B

(50 Marks)

2.a) If $\bar{F} = (x+y+1)i + j - (x+y)k$, then show that $\bar{F}$ curl $\bar{F}$ =0

b) Evaluate $\int_C \bar{F}.d\bar{r}$ where $\bar{F} = 3xyi - y^2 j$ and C is the parabola $y = 2x^2$ from (0,0) to (1,2). [5+5]

OR

3. Verify stokes theorem for $\bar{F} = (x^2+y^2)i - 2xy\, i$ taken around the rectangle bounded by the lines $x = \pm a, y = 0, y = b$. [10]

4.a) Obtain the Fourier series for

$$f(x)=\begin{cases}1, & 0<x<1\\ 2, & 1<x<3\end{cases}$$

and f(x) = f(x + 3) .

b) Find the fourier sine transform of $e^{-|x|}$ and hence evaluate $\int_0^\infty \frac{x\sin mx}{1+x^2}dx$. [5+5]

OR

5.a) Obtain cosine series for the function $f(x)=\begin{cases}x, 0\le x\le \frac{\pi}{2}\\ \pi-x, \frac{\pi}{2}\le x\le \pi\end{cases}$

b) If $\bar{f}(s)=F[f(t)]$, then prove that $F[t^n f(t)]=(-i)^n \frac{d^n \bar{f}(s)}{dt^n}$ [5+5]

6.a) Use Newton's Backward difference formula to find the area of a circle when the diameter is 105, the area for different values of diameter are given below:

d	80	85	90	95	100
A	5026	5674	6362	7088	7854

b) Fit a straight line

x	0	5	10	15	20	25
y	12	15	17	22	24	30

[5+5]

OR

7. Fit a second degree parabola to the following data using method of least squares. [10]

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

8. Test the consistency of equations 3x +3y+2z=1, x + 2y = 4, 10y +3z = - 2. Solve them if they are consistent by LU decomposition method. [10]

OR

9.a) Find a real root of the equation $x \sin x+\cos x=0$, using regula falsi method.

b) Explain the Interpret Newton's method Geometrically. [5+5]

10. Given that $y'=x^2+y^2$, $y(0)=1$ determine $y(0.1)$ and $y(0.2)$ by modified Euler's method. [10]

OR

11. Find the values of y(0.25),y(0.5) and y(0.75) by finite difference method, given that, $y''-3y'+2y=6$, y(0) = 1,y(1) = 1. [10]

---ooOoo---

Code No: 113AW **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

SIGNALS AND SYSTEMS

(Common to ECE, EIE, BME)

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 Mean Square Error. [2]
b) What is an Orthogonal function? [3]
c) What is Signum Function? [2]
d) Write about the properties of Hilbert Transform. [3]
e) Define System Bandwidth. [2]
f) What is Causality? [3]
g) Define spectral density. [2]
h) When the convolution and correlation equivalent? [3]
i) What is steady state response? [2]
j) What is the condition for Z – transform exist? [3]

PART-B

(50 Marks)

2.a) Derive the expression for computing Mean square Error in approximating a function f(t) by a set of n orthogonal functions.
b) Explain about the complete set of Orthogonal functions. [5+5]

OR

3.a) Explain about the Trignometric Fourier series.
b) Write about the complex fourier spectrum. [5+5]

4.a) State and prove the time shifting and frequency shifting properties of Fourier transform.
b) Explain about the effects of under sampling. [5+5]

OR

5.a) State and Prove Sampling Theorem for bandpass signals.
b) Write about the band pass sampling. [5+5]

6.a) Write about the relationship between bandwidth and rise time in linear system.
b) Explain about the Transfer function of a LTI system. [5+5]

OR

7.a) Explain about the Impulse response of Linear system.
b) Write about the Paley-Wiener criterion for physical realization of system. [5+5]

8.a) Determine the convolution of two sequences $x(n) = (1/2)^n u(n)$ and $h(n) = (1/4)^n u(n)$.

b) Define Convolution Theorem in Time and Frequency domain and bring out the expression for convolution in Time domain. [5+5]

OR

9.a) Write about the Detection of periodic signals in the presence of Noise by Correlation.

b) Explain about the Extraction of signal from noise by filtering. [5+5]

10.a) State and prove Time-reversal, Time-Shifting and scaling properties with respect to Z-transform.

b) Using differentiation property find the Z-transform of $x(n) = n^2 u(n)$. [5+5]

OR

11.a) State and Prove Initial value and Final value theorem with respect to Laplace transform.

b) Explain about the concept of Region of Convergence (ROC) for Laplace Transforms. [5+5]

---ooOoo---

Code No: 113AN

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

PROBABILITY AND STATISTICS

(Common to ME, CSE, IT, MCT, MIE, 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) If probability density function is $f(x)=\begin{cases} kx, & 0<x<1 \\ 0, & \text{other wise} \end{cases}$, find the value of k. [2]

b) Prove that $Var(ax+b)=a^2Var(x)$ where a and b are non zero constants. [3]

c) Define the correlation coefficient. [2]

d) Find the $Cov(x,y)$ from the following table [3]

x	1	3	5	6
y	15	18	25	16

e) What is maximum error of estimation for large sample? [2]

f) Explain the null and alternative hypothesis. [3]

g) What is the probability that there are n or more number of customers in a system. [2]

h) Write few characteristics of a queuing system. [3]

i) Define regular matrix. [2]

j) Show that a square matrix $\begin{bmatrix} 1 & 0 \\ 0.5 & 0.5 \end{bmatrix}$ is stochastic matrix. [3]

PART-B

(50 Marks)

2.a) The density function of a random variable X is $f(x)=\begin{cases} Ke^{-x}, & x\geq 0 \\ 0, & \text{otherwise} \end{cases}$. Find the value of K, mean and Variance.

b) Write the characteristics of Normal distribution. [5+5]

OR

3.a) The probability that the life of a bulb for working 10 years is 0.05. Find the probability that out of 6 bulbs (i) At least one , (ii) greater than four and (iii) none work for 10 years.

b) A random variable X has the following probability function:

x	1	2	3	4
P(x)	0.1	0.3	0.4	0.2

Determine (i) Expectation, (ii) variance and (iii) Standard deviation. [5+5]

4.a) Write short notes on correlation and regression coefficients.

b) Heights of fathers and sons (in inches) are given in the following table:

Heights of father	65	66	67	67	68	69	71	73
Heights of son	67	68	64	68	72	70	69	70

Form the two lines of regression and calculate the expected average height of the son when the height of the father is 67.5. [5+5]

OR

5.a) Write the properties of rank correlation coefficient.

b) A random sample of 5 college students is selected and their grades in Mathematics and Mechanics are found to be

Mathematics	85	60	73	40	90
Mechanics	93	75	65	50	80

Calculate Pearman's rank correlation coefficient. [5+5]

6.a) Test whether there is significant difference at 0.05 level in the quality of teaching among four engineering colleges A, B, C, D of a technological university if the number of failures are 26, 23, 15, 32 respectively. Assume that each college has strength of 200 students.

b) The mean and standard deviation of a sample are 11795 and 14054 respectively. If 50, find the 95% confidence interval for the population mean. [5+5]

OR

7.a) The mean life of a sample of 10 electric bulbs was found to be 1456 hours with S.D. of 423 hours. A second sample of 17 bulbs chosen from a different batch showed a mean life of 1280 hours with S.D. of 398 hours. Is there a significant difference between the means of two batches?

b) Define i) Estimator of a statistical constant.

ii) Standard error of a probability distribution. [5+5]

8. In a store with one server, 9 customers arrive on an average of 5 minutes and service is done for 10 customers in 5 minutes.

Find:

a) The average number of customers in the system.

b) The average queue length.

c) The average time a customer spends in the store.

d) The average time a customerspends before being served. [10]

OR

9.a) Discuss Queuing theory. Explain its applications.

b) Define Queue discipline and size of the queue. [5+5]

10.a) Check whether the following Markov chain is regular and ergodic:

$$\begin{bmatrix} 0 & 0.5 & 0.5 & 0 \\ 0.5 & 0 & 0 & 0.5 \\ 0.5 & 0 & 0 & 0.5 \\ 0 & 0.5 & 0.5 & 0.5 \end{bmatrix}$$

b) Explain Markov Chain. [5+5]

OR

11.a) Describe the types of stochastic process.

b) Give some examples of stochastic process. [5+5]

---ooOoo---

Code No: 53020 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

ELECTRIC CIRCUITS

(Common to ECE, ETM)

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

Answer any five questions
All questions carry equal marks

- - -

1.a) Derive the expression for energy stored in pure inductor.
b) Draw the characteristics of Ideal and practical current and voltage sources. [7+8]

2.a) Using Nodal analysis find the power dissipated in 6 Ω resistor for the circuit shown in the figure 1.

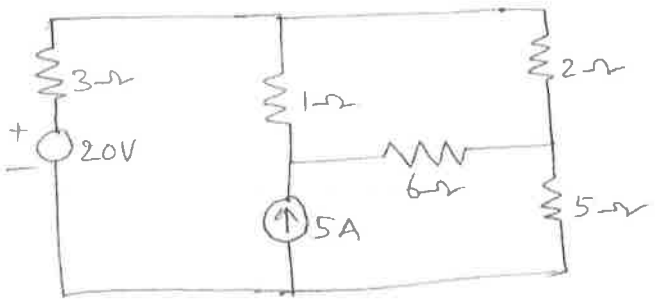


Figure: 1

b) State and explain Kirchhoff's laws. [8+7]

3.a) Derive the values for crest factor and form factor for a sinusoidal wave form.
b) In the parallel circuit shown in figure 2, the total power is 1100 W. Find the power in each resistor and reading on the ammeter. [7+8]

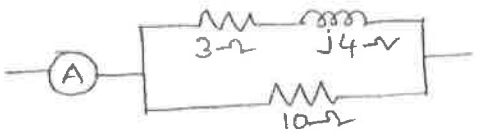


Figure: 2

4.a) Derive the expressions for the half power frequencies of a series RLC circuit.
b) A series RLC circuit has a quality factor of 5 at ω = 50 rad/s. The current flowing through the circuit a resonance is 10 A and the supply voltage is 100 V. The total impedance of the circuit is 20 Ω. Find circuit constants. [7+8]

5.a) Derive the expression for mutual inductance of a pair of coupled coils.
b) Write mesh equations for the network shown in figure 3. [8+7]

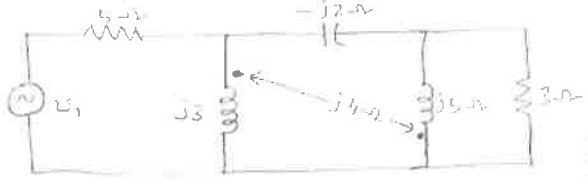


Figure: 3

6.a) Define the following terms:
i) Tree ii) Co tree iii) Twigs iv) Links v) Nodes

b) Determine the Tie set and Cut set matrices for the following graph shown in figure 4. [8+7]

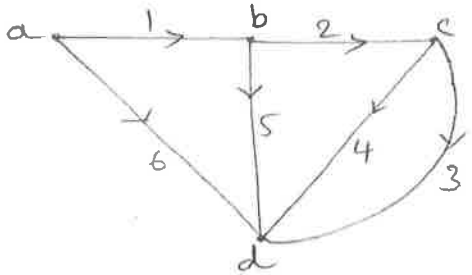


Figure: 4

7.a) Determine the maximum power delivered to the load in the circuit shown in figure 5.

Figure: 5

b) Find the power dissipated in the 4.5 Ω resistor in the following circuit shown in figure 6 using super position theorem. [7+8]

Figure: 6

8.a) Determine current i(t) using Thevenin's theorem shown in figure 7.

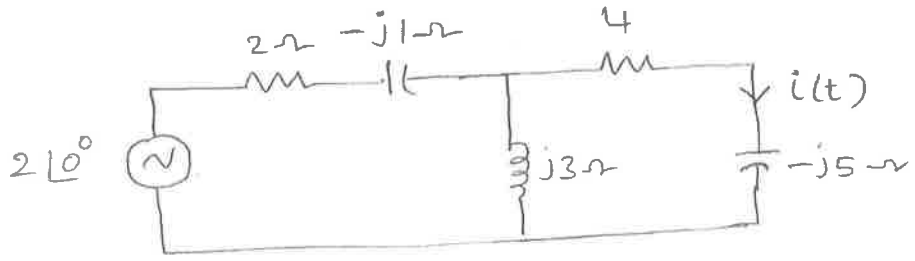


Figure: 7

b) State and prove Maximum power Transfer theorem. [7+8]

---ooOoo---

Code No: 53016

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, March - 2017
MECHANICS OF SOLIDS
(Common to ME, MCT, AE, AME)

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

Answer any five questions
All questions carry equal marks

- - -

1.a) How to consider the self weight of the tapered for the estimation of the stresses developed? Derive the corresponding equation.

b) A rectangular block of size 50 mm × 100 mm × 80 mm is subjected to the following axial loads:
i) 500 kN (tensile) on 100 mm × 80 mm faces;
ii) 900 kN (tensile) on 500 mm × 80 mm faces;
iii) 1000 kN (Compressive) on 500 mm × 100 mm faces.
Taking the poison's ratio as 0.3, find the change in volume of the block. If E = 200 GPa, find the modulus of rigidity and the bulk modulus. [7+8]

2.a) How do you interrelate the shear force and bending moment across the section of the beam? Explain.

b) A beam of span 8.0m is rested over two simple supports at two ends. The beam is carrying U.D.L of intensity 2.0kN/m up to 4.0m length from left end. A concentrated load of 5.0 kN at a distance of 6.0m is applied on the beam. In addition to these loads the beam is also subjected to couples 20.0kNm anticlockwise at left end and 30.0kNm clockwise at right end respectively. Draw Shear force and bending moment diagram showing important values. Also find point of contraflexure in the beam. [7+8]

3.a) What are the assumption made in deriving the bending moment equation and derive the equation.

b) Compute the distance between the channel sections of 6.5 mm uniform thickness shown in figure 1, so that the principal Moment of Inertia of the combined section are equal. [7+8]

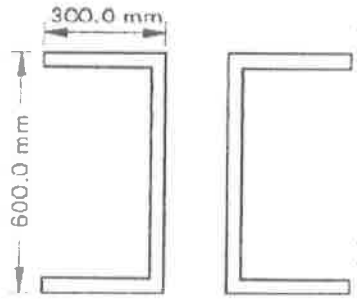


Figure: 1

4. A simply supported beam 4 m long has the cross section shown in Figure 2. Determine the maximum uniformly distributed load which can be applied over the entire length of the beam if the shearing stress is limited to 1.2 MPa. [15]

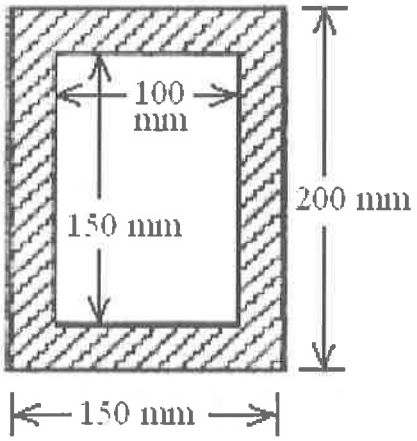


Figure: 2

5. Calculate the forces exerted in the truss structure shown in figure 3. [15]

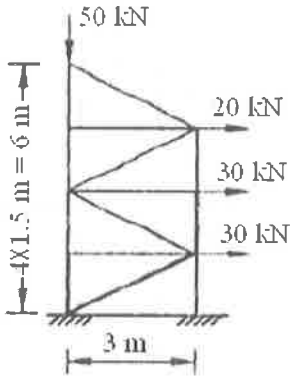


Figure: 3

6.a) Explain the double integration method for the estimation of slope and deflection for the beam with suitable example.

b) A beam 8 m long is simply supported at its ends and carries concentrated loads of 40 kN each at points 2 m from the ends. Calculate the maximum slope and deflection under each load. [7+8]

7.a) Develop the expressions for stresses in a thin cylinder subjected to internal pressure. Are these expressions valid for cylinders with external pressure?

b) A cylindrical shell 1.2 m long, 200 mm internal diameter and 10 mm thick is filled with a fluid at atmospheric pressure. If an additional 3×10^4 mm^3 of the fluid is pumped into the cylinder, find the pressure exerted by the fluid on the wall of the cylinder. Find also the hoop stress induced. Take $E = 2 \times 10^5$ N/mm^2, $\mu = 0.3$. [7+8]

8. The outer diameter of a cylinder is 1.4 times its inner diameter. Assuming $\nu = 0.30$, determine the ratio of external and internal pressures applied separately, so that in both the cases (a) the largest stresses have the same numerical values and (b) the largest strains have the same numerical values. [15]

---ooOoo---

R09

Code No: 53010

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 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 pure inductor.

b) Draw the characteristics of Ideal and practical current and voltage sources. [7+8]

2.a) Using Nodal analysis find the power dissipated in 6 Ω resistor for the circuit shown in the figure 1.

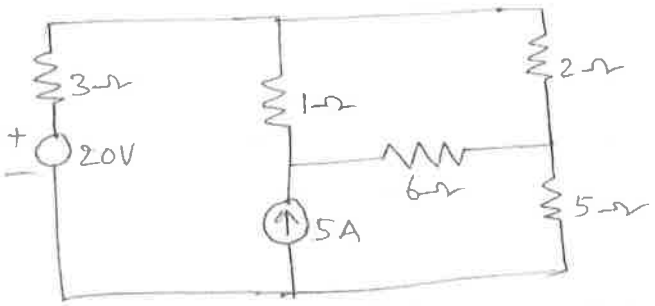


Figure: 1

b) State and explain Kirchhoff's laws. [8+7]

3.a) Derive the values for crest factor and form factor for a sinusoidal wave form.

b) In the parallel circuit shown in figure 2, the total power is 1100 W. Find the power in each resistor and reading on the ammeter. [7+8]

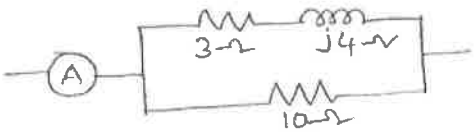


Figure: 2

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

b) A series RLC circuit has a quality factor of 5 at ω = 50 rad/s. The current flowing through the circuit a resonance is 10 A and the supply voltage is 100 V. The total impedance of the circuit is 20 Ω. Find circuit constants. [7+8]

5.a) Derive the expression for mutual inductance of a pair of coupled coils.

b) Write mesh equations for the network shown in figure 3. [8+7]

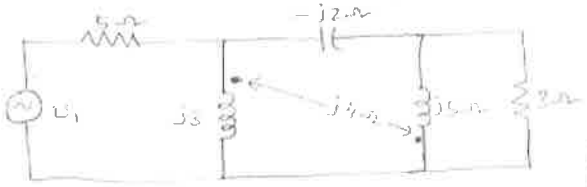


Figure: 3

6.a) Define the following terms:

i) Tree ii) Co tree iii) Twigs iv) Links v) Nodes

b) Determine the Tie set and Cut set matrices for the following graph shown in figure 4. [8+7]

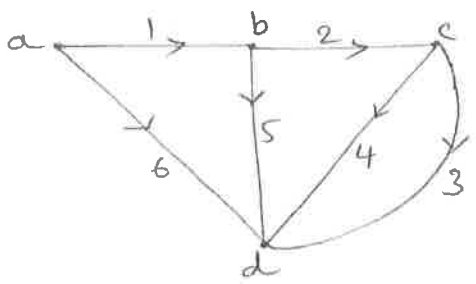


Figure: 4

7.a) Determine the maximum power delivered to the load in the circuit shown in figure 5.

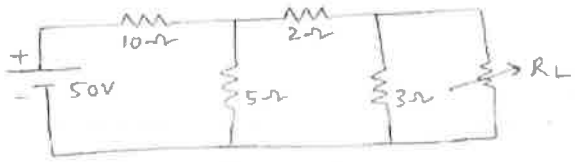


Figure: 5

b) Find the power dissipated in the 4.5 Ω resistor in the following circuit shown in figure 6 using super position theorem. [7+8]

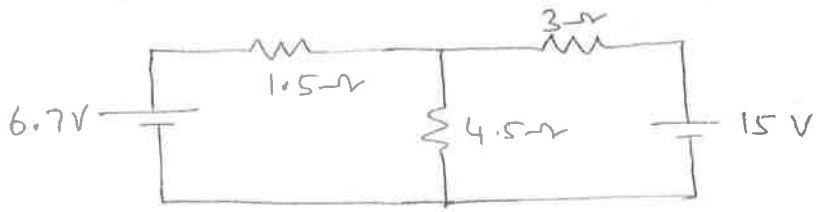


Figure: 6

8.a) Determine current i(t) using Thevenin's theorem shown in figure 7.

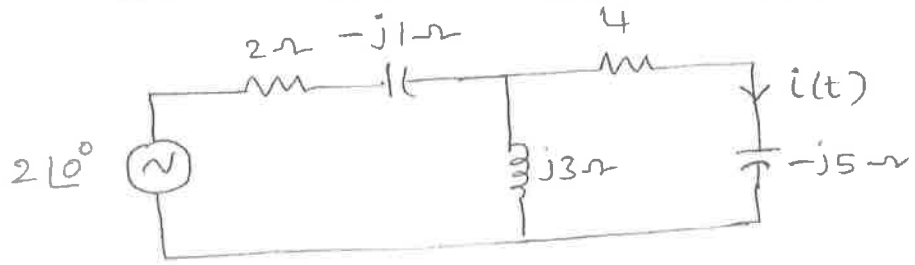


Figure: 7

b) State and prove Maximum power Transfer theorem. [7+8]

---ooOoo---

Code No: 53003

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

STRENGTH OF MATERIALS-I

(Civil Engineering)

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

Answer any five questions
All questions carry equal marks

- - -

1. Two shafts A and B of same length are subjected to equal torques. Shaft A is made of steel and B is of bronze. Find the ratio of shaft diameters to store same strain energy per unit volume. G_s =80 GPa, G_b = GPa. [15]

2. Draw the B.M and S.F diagrams for the beam loaded as shown in figure 1. [15]

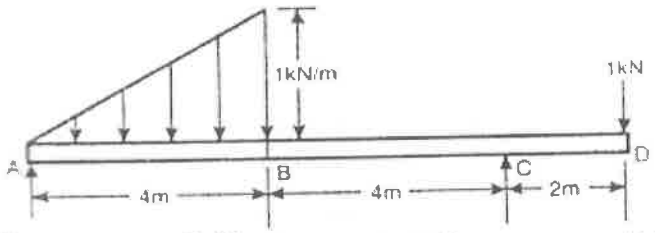


Figure: 1

3. A wooden beam is 8 cm wide and 12 cm deep with a semi- circular groove of 2 cm radius planned out in the centre of each side. Calculate the maximum stress in the section when simply supported on a span of 3 m, loaded with a concentrated load of 450 N at a distance of 1 m from the one end and a uniformly distributed load of 500 N per metre run over the whole span. Shown in figure 2. [15]

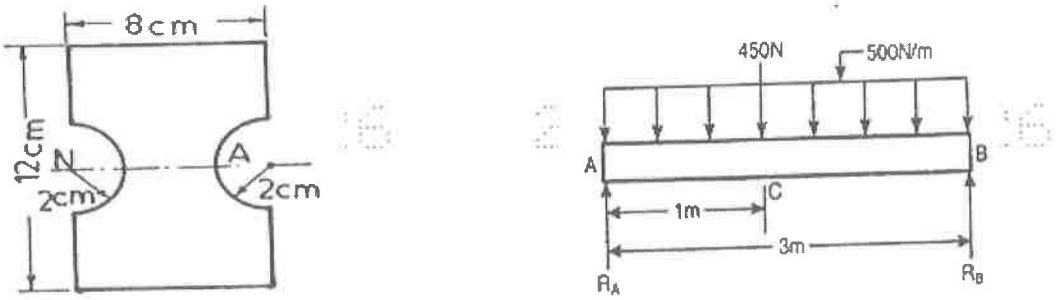


Figure: 2

4. A beam AB supported at its ends has a span of 2 m and carries a uniformly distributes load of 200 kN/m over the entire span. The cross-section of the beam is a T-section having flange width 125 mm, flange thickness 25 mm, web thickness 25 mm and overall depth 200 mm. Calculate the maximum shear stress in the beam. Also draw the shear stress distribution marking principal values. [15]

5. Determine the reactions for the beam shown in figure 3. [15]

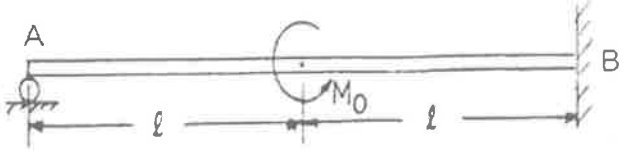


Figure: 3

6. The diameter of a circle which is scribed on a plate is 25 cm. After the circle is scribed, the plate is subjected to the following state of stress, and the circle is deformed into an ellipse. If E=200 GPa and v=0.30, find the length of the major and minor axes. [15]

$\sigma_x = 25$ MPa, $\sigma_y = 8$ MPa, τ_{xy}=10 MPa.

7.a) Prove that the maximum hoop stress in a thick cylinder is given by

$$(\sigma/\theta)_{max} = p\left[\frac{k^2+1}{k^2-1}\right]$$

P = internal pressure

K = outside to inside diameter ratio.

b) If a cylinder of internal diameter d, wall thickness t and subjected to internal pressure only, is assumed to be a thin cylinder, what is the greatest value for the ratio t /d if the error in the estimated maximum hoop stress is not to exceed 5 percent? [7+8]

8. A gun metal tube of 100 mm bore, 2.5 mm wall thickness, is closely wound by a steel wire of 1 mm diameter. Determine the tension under which the wire must be wound if an internal pressure of 3 MPa is required before the tube is subjected to the tensile stress in the circumferential direction.
For gun metal: E_g = 102 GPa, v_g = 0.35 and for steel : E_s=210 GPa. [15]

---ooOoo---

Code No: 53022

R09

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

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

Answer any five questions
All questions carry equal marks

1.a) Explain about CNF and DNF.
b) Determine whether the following is a tautology or not. [7+8]
$Q \rightarrow (P \wedge \neg P) \rightarrow R \rightarrow (P \wedge \neg P) \Rightarrow P \rightarrow Q$

2.a) What are the two rules of inference? Explain with example.
b) Show that $P \vee Q$ follows from P using automatic theorem proving. [7+8]

3.a) With suitable examples explain the equivalence relations.
b) Describe primitive recursive function with suitable example. [7+8]

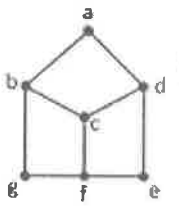
4.a) Discuss about the general properties of algebraic systems.
b) Illustrate semigroup homomorphism with an example. [7+8]

5.a) Define permutations. How many permutations of the letters ABCDEFGH contain the string ABC?
b) State and explain Binomial Theorem. [8+7]

6. Solve the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 0 \text{ for } n \geq 2$. [15]

7.a) Define Graph? Explain the Adjacency Matrix representation of a graph.
b) With example explain Breadth First Search algorithm to produce a spanning tree from a simple graph. [7+8]

8.a) Prove that there is no Hamiltonian cycle in the following graph.



b) Give a brief note on Chromatic Numbers. [8+7]

---ooOoo---

Code No: 53045

R09

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

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

Answer any five questions
All questions carry equal marks

1.a) Describe Handerson Hasselbalch equation.
b) Discuss the procedure of determination of pKa values. [7+8]

2.a) Describe the classification of organic compounds with an example.
b) Discuss how functional groups determine chemical properties of biomolecules. [7+8]

3.a) Write a note on pentose phosphate pathway.
b) Classify carbohydrates. Give the properties and important reactions of them. [8+7]

4. Write notes on:
a) Redox potential
b) Electron transport chain in mitochondria. [7+8]

5.a) Discuss reductive amination and trans amination with example.
b) Write a detailed note on Ramchandran plot. [8+7]

6.a) Write about classification of amino acids with examples.
b) Discuss the significance of non-natural amino acids. [7+8]

7.a) Describe the role of lipids as surfactants in industry.
b) Compare fatty acid synthesis and fatty acid oxidation. [7+8]

8.a) Discuss the synthesis of purines.
b) Describe degradation of nucleic acids. [7+8]

---ooOoo---

Code No: X0122 **R07**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CE, ME, MCT)

Time: 3 hours **Max. Marks: 80**

Answer any five questions
All questions carry equal marks

1.a) State and explain the Kirchoff's Laws with suitable examples.
b) Three capacitors each of 3 micro farads are connected in parallel and this parallel combination is placed in series with 9 micro farads. Obtain the equivalent capacitance of the above system. [8+8]

2.a) What is the necessity of starter for the DC Motor?
b) Explain the operation of 3-point starter used for DC Shunt Motor with neat sketch. [8+8]

3.a) Derive the emf equation of a transformer.
b) A single phase transformer with a ratio of 440/110 Volts takes a no-load current of 5 Amp at 0.2 power factor lagging. If the secondary supplies a current of 120 Amp at 0.8 power factor lagging, estimate the current taken by the primary. [8+8]

4.a) Explain the Synchronous Impedance method of obtaining the voltage regulation of an Alternator.
b) The effective resistance of a 220 V, 50 Hz, 440 KVA, 1-phase alternator is 0.5 ohms. On short circuit a field current of 40 Amps gives the full load current of 200 Amps. The EMF on open circuit with the same field excitation is 1160 Volts. Calculate:
i) Synchronous impedance
ii) Synchronous reactance and
iii)% Regulation at 0.707 pf lag. [8+8]

5. With neat diagram, explain the principle of operation of Permanent Magnet Moving Coil Instruments in detail. [16]

6.a) Explain the break down in p-n junction diodes.
b) With a neat circuit diagram explain the operation of full wave rectifier. [8+8]

7.a) Draw the circuit diagram of npn transistor as an amplifier with self-bias and explain its principle of working.
b) Give the Applications of SCRs. [8+8]

8. Explain briefly about the following terms with respect to a CRO:
a) Sensitivity
b) Electrostatic Deflection
c) Electromagnetic Deflection. [5+5+6]

---ooOoo---