R-13

Code: 13CS2104

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B. Tech. I Semester

ADVAMCED DATA STRUCTURES

(Computer Science & Engineering)

Time: 3 hours Max. Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

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SECTION-I

1. (a) What is mean by ADT and explain its importance.
   (b) Explain Double linked list with example.

2. (a) What is mean by Stack and write the ADT implementation.
   (b) Explain Circular linked list with suitable example.

SECTION-II

3. (a) Write a short note on Circular queue and Dequeue.
   (b) Explain the applications of Priority queues.

4. (a) What is significance of priorities? and explain how do you arrange elements in a priority queue.
   (b) Write an algorithm to implement Stack with example.

SECTION-III

5. (a) Explain Tree traversal techniques with example.
   (b) Write a short note on recursive and non-recursive binary tree.

6. (a) What is mean by AVL Tree and explain its operations.
   What is mean by Binary Tree and explain its properties.

SECTION-IV

7. (a) How height of the AVL tree is balanced justify with example.
   (b) While the root of a Red- Block tree always be black after performing a deletion operation.

8. (a) Discuss about 2-3 tree with example.

(b) Explain about the LLr, LRr, LLb, LRb inbalances in a Red- Block tree with example.

SECTION-V

9. (a) Sort the following elements using the radix sort
314, 726, 534, 112, 378, 299, 101, 869, 8, 3, 6, 27.

(b) Explain Heap sort algorithm with example.

10. Explain external sorting techniques with example.

R-13

Code : 13CE2106

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER, 2019
II B.Tech. I Semester

FLUID MECHANICS
(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

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SECTION – I

1. (a) Define and distinguish between surface tension and capillarity.

   (b) Two square plates with each side 60 cm are spaced 12.5 mm apart. The lower plate is stationary and upper plate requires a force of 100N to keep it moving with velocity of 2.5 m/sec. the oil film between the plates has the same velocity as that of plates at the surface of contact. Assuming linear velocity distribution. Determine
   1. Dynamic viscosity of the oil in poise
   2. The kinematic viscosity in stokes if the specific gravity of the oil is 0.95.

2. (a) Discuss the significance of vapour pressure problem related to liquids in motion.

   (b) A U-tube manometer of two capillaries of bore 4mm and 5mm respectively. The tube is held vertically and partially filled with a liquid mass density 1000kg/m^3 and angle of contact "o" degree. Calculate the surface tension of the liquid.

SECTION – II

3. (a) What is meant by intensity of pressure? How it varies with the depth of the fluid?

   (b) A triangle plate 0f base width 2m and height 3m immersed in water with its plan making an angle of 60^0 with the free surface of the water. Determine the hydrostatic pressure force and the position of centre of pressure when the apex of the triangle lies 5m below the free water surface.

4. Explain the term total pressure acting on a plane surface immersed on fluid at an angle. Obtain an expression for this, and also for the corresponding depth of the centre of pressure.

SECTION – III

5. (a) A pipe line carrying an oil of specific gravity 0.87 changes in diameter from 200mm of a position A to 500 mm at another position B which is at 4 meters at a higher level. If the pressure at A and B are 1 bar and 0.6 bar respectively and the discharge is 0.2 m^2/sec. determine the loss of head and the direction of flow.

   (b) In a steady two dimensional incompressible flow, the velocity component in the x direction is $u=3x^2+y^2$. Use continuity equation to find the velocity component v in the y direction. For evaluating the arbitrary functions which might appear in the analysis, you may assume that v=0 at y=0. Also find the direction of streamline with respect to x axis at point p(1,2).

6. (a) Derive Euler equation of motion along a streamline, and hence derive the Bernoulli's theorem.

(b) A uniform tapering pipe is 20 cm diameter at one end A and 10cm at the other end B. The pipe is 3m long, is inclined to the horizontal at an angle $\alpha = \tan^{-1}(1/4)$ with end A above B. If the flow velocity at section B is 0.6 m/s. Determine the difference of pressure between the two sections.

SECTION – IV

7. (a) Deduce a formula for computing discharge through an orifice and mention the factors taken care of by the coefficient employed in it.

(b) A rectangular orifice 1.25 m deep and 75 cm wide in the side of a tank has its top edge 1 m below the free water surface in the tank. Find the discharge through orifice, take Cd =0.6

8. (a) Explain the principle of Pitot tube.

(b) Water is being conveyed through a straight pipe line which has been laid with a slope of 15 degree to the horizontal. Ends of simple U-tube manometer have been connected to two points 15 m apart on the pipeline. If the manometer gives reading of 10cm mercury, make calculations for the pressure difference between the two points.

SECTION –V

9. (a) Explain the concept of equivalent pipe

(b) Two pipes each 250m long are available for connecting to a reservoir from which a flow of 0.08 m^3/s is required. The pipe diameters are 10cm and 20cm respectively. Compare the head loss through the system if the pipe constitute a series and parallel arrangement. Neglecting minor loss due to pipe transition and fittings.

10. (a) An oil having viscosity of 7 poise and specific gravity 0.85 flows through a horizontal 50 mm diameter with a pressure drop of 18 kN/m^2 per meter length of pipe. Determine i) the flow rate of oil and the centre line velocity ii) the total friction drag over 100m length of pipe and power required to maintain the flow iii) the velocity and shear stress at 8mm from the wall.

(b) What is the necessity of calculating head loss due to friction?

R-13

Code : 13CS2105

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

FILE STRUCTURES
(Computer Science & Engineering)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 (a) List two types of Record Keys and explain with example.

(b) Explain different types of Record Structures.

2 (a) Discuss about typical Operations for sequential files and Direct files.

(b) Write about pile files and sorted with an example.

SECTION - II

3 (a) State reason why do we want to make files smaller? And explain any one technique for data compression

(b) Discuss about irreversible compression.

4 (a) Explain about Reclaiming space in files.

(b) Discuss in detail about advantages and dis advantages of Keysorting.

SECTION - III

5 (a) Write about Indexed Sequential Files in detail with an example.

(b) List various types of Tree indexes and explain any one of them in detail.

6 (a) Write brief note on Bucket Factor, Fan-out, Primary index and Secondary index.

(b) Discuss about Non-leaf Re-distribution with an example

SECTION - IV

7 (a) Explain about Hash Functions with an example

(b) Discuss in detail Static Hashing With an example

8 (a) Explain in detail about Load Factor

(b) Discuss about in detail linear Hashing

SECTION - V

9 (a) List various c++ File handling functions with syntax.

(b) Explain about File handling related classes in Java.

10 (a) Write a JAVA program to display the contents of a file.

(b) Explain file handling functions in c.

L3

R-13 **Code: 13ME2101**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

BASIC MANUFACTURING PROCESS
(Mechanical Engineering)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 (a) List the casting defects and mention their causes and remedies.

(b) Explain the principle of die casting.

2 (a) What are the preferred materials for pattern and specify their merits and demerits.

(b) Explain Caine's method for riser design.

SECTION - II

3 (a) Explain the reasons why D.C. arc welding is more used than A.C. arc welding for specialized applications.

(b) Differentiate between soldering and brazing.

4 (a) Why is neutral flame extensively used in oxy-acetylene welding?

(b) Explain the principle of friction stir welding.

SECTION - III

5 (a) What is meant by grain flow in the case of forged or rolled components

(b) What are the methods by which the roll separating force could be reduced in cold rolling.

6 (a) What are the specific merits of cold working over hot working?

(b) Briefly explain the meaning of drought and elongation as related to hot rolling.

SECTION - IV

7 (a) Draw the sketch of a punch and die set used for punching operation, indicate its various parts.

(b) Write short notes on explosive forming.

8 (a) Explain spinning operation with a simple sketch.

(b) Differentiate between coining and embossing.

SECTION - V

9 (a) Explain how forging improves the mechanical properties of the components.

(b) What are the differences between impact extrusion and cold extrusion.

10 (a) What is meant by balancing a die in drop forging? Explain with an example.

(b) Show by schematic sketches the process of forward and backward extrusion .Give examples of components produced by extrusion.

R-13

Code : 13EE2102

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

CIRCUITS & NETWORKS
(Common for EEE & ECE)

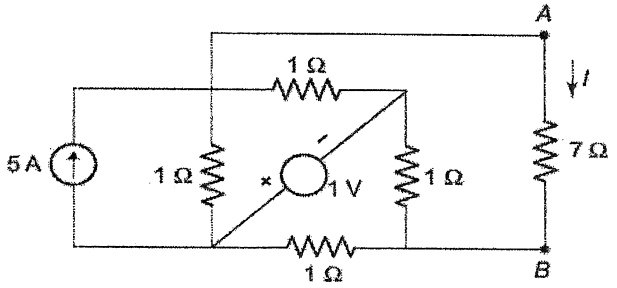
Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

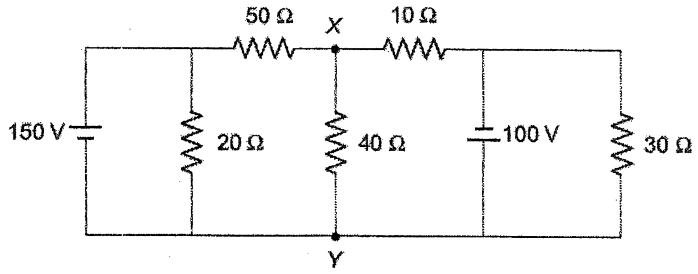
* * *

SECTION - I

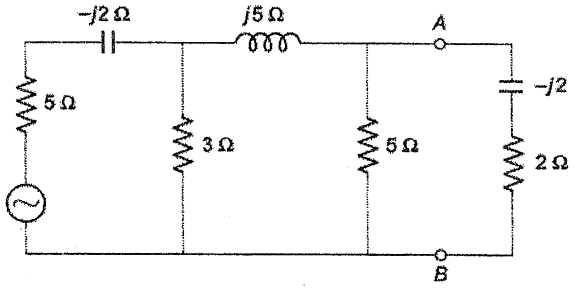
1 (a) Find the current I of the circuit shown using superposition theorem



(b) Obtain *Vxy* using Millman's theorem in the circuit shown below.



2 (a) For the network shown in figure, replace the circuit to the left of terminals '*AB*' with a Thevenin equivalent. Then determine current in the $(2 - j2)$ Ω impedance connected to the equivalent circuit.



(b) State and explain the maximum power transfer theorem. Find the value of load resistance, when the load is impedance with fixed reactance and variable resistance.

SECTION - II

3 (a) Derive the relation between line and phase quantities of star connected system

(b) A unbalanced star connected load with Z_R=10Ω, Z_Y=15Ω and Z_B=20Ω, is supplied from a 3-phase, 440V, symmetrical system. Determine the line currents, and the total power.

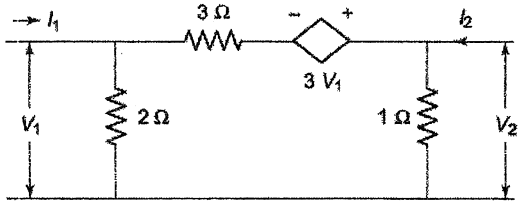
4 (a) Each of the two wattmeters connected to measure the input to a 3-phase circuit reads 10KW when the power factor is unity. What does each wattmeter read when the p.f falls to (i) 0.866 lagging (ii) 0.5 lagging, the total power remaining unchanged.

(b) Briefly explain the different methods of solving the three phase unbalanced star connected load.

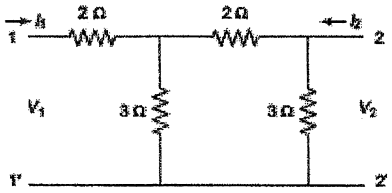
SECTION - III

5 (a) Derive the relation between Z and Y parameters

(b) Find *Y*-parameters for the network shown in figure



6 (a) Find the *Z*-parameters of the network shown in figure



(b) Explain the process of finding the equivalent parameters when two port networks are connected in parallel.

SECTION - IV

7 (a) Briefly explain the significance of poles and zeros

(b) Plot pole zero diagram for the system

$$F(s) = \frac{(s+1)(s^2+1)}{s(s+2)(s^2+4)}$$

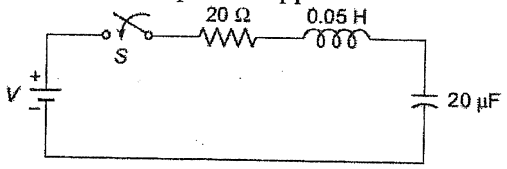
Obtain f(t) using pole zero diagram.

8 (a) What are the restriction on the location of poles and zeros

(b) A system function has zeros at (-2±j3) and -4, and poles at -2, (-1±j5). Plot the pole-zero diagram and get its time domain response.

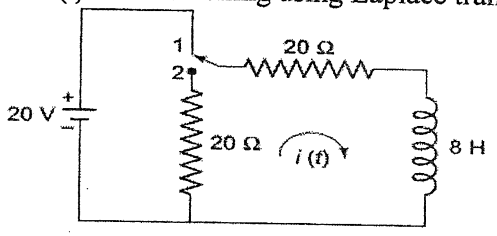
SECTION - V

9 (a) The circuit shown in figure consists of resistance, inductance, and capacitance in series with a 200 V constant source. When the switch is closed at t = 0. Find the transient current using differential equation approach.



(b) Find the response of RC network with sinusoidal excitation using Laplace transform method.

10 (a) In the circuit shown in figure the switch is moved from 1 to 2 at time t = 0. The steady-state current having previously established in the R-L circuit, find the expression for the current $i(t)$ after switching using Laplace transform method.



(b) A series R–C circuit with $R = 100\Omega$and C = 2.5 μF has a sinusoidal voltage 250 sin 500t. Find the current assuming that there is no initial change on the capacitor.

R-13

Code: 13CE2104

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

SURVEYING - I
(Civil Engineering)

Time : 3 hours Max Marks: 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All questions carry equal marks

SECTION - I

1 (a) Explain the two main principles of surveying with suitable sketches.

(b) Explain ranging of a line. How will you range a line between two points which are not visible to each other due to a small hillock in between them?

2. (a) Explain the following terms with the help of neat sketch :
(i) Base line (ii) Check line (iii) Tie line (iv) Offset

(b) There is tower 'T' on the other bank. A point 'C' is selected opposite to the tower and 'CB' is set out right angles to the line 'CT" at 'C' with a optical square. Line 'BC' is produced to 'A' and the angles CBT and CAT measured were 30^0 and 45^0. If the length of the line AB = 210m, find the width of the river.

SECTION - II

3 (a) What is local attraction? How is it detected and removed?

(b) The following fore and back bearings were observed in traversing with a compass in place where local attraction was suspected.

LINE	F.B	B.B.
AB	38° 30′	219° 15′
BC	100° 45′	278° 30′
CD	25° 45′	207° 15′
DE	325° 15′	145° 15′

Find the corrected fore and back bearings and the true bearing of each of the lines given that the magnetic declination was 10 W.

4 (a) What is traverse? What are different types of traverses? Briefly explain the methods of traversing with compass.

(b) What is a meridian? Differentiate between true, magnetic, and arbitrary meridians.

SECTION - III

5 (a) Describe the method of Orientations of plane table by back sighting.

(b) Distinguish between resection and intersection methods as applied to plane table surveying.

6 (a) Describe, with the help of sketches, Lehmann's Rules.

(b) What are the different sources of errors in plane tabling? How are they eliminated.

SECTION - IV

7 (a) What are the sources of errors in leveling, explain in detail?

(b) The following consecutive readings were taken with a dumpy level: 1.895, 1.500, 1.865, 2.570, 2.990, 2.020, 2.410, 2.520, 2.960 and 3.115 m. The level was shifted after 4^{th}, 6^{th} , and 8^{th} readings. The R.L. of first point was 30.500 m, Calculate the RL's of all other points using H.I method and apply the usual checks.

8 (a) Describe the briefly characteristics of contours, with sketches.

(b) Explain with a neat sketch the method of fixing the center line of a road on a contour map. Assume a contour interval of 2 m and a ruling gradient of 1 in 30. Take the highest contour as 100 m and consider a minimum of six contours for explanation.

SECTION - V

9 (a) Derive the formula for Simpson's rule. What are its limitations?

(b) Eleven offsets were taken from a chain line to a curved boundary at 10-m intervals and the lengths of the offsets from the left end are (in meters) 3.8, 5.1, 6.6, 8, 5, 9, 6.2, 7.6, 6.5, 8, and 4.2. Determine the area between the chain line, the curved boundary, and the first and last offsets by (a) the trapezoidal rule, and (b) the Simpson's rule.

10 (a) Write down the procedure for calculating volumes of Borrow pits by spot levels.

(b) The areas enclosed by the contours in a lake are as under

Contour (m)	270	275	280	285	290
Area (m^2)	2050	8400	16300	24600	31500

Calculate the volume of water in lake between 270 and 290 m contours.

R-13

Code : 13EC2103

B.TECH. DEGREESUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

ELECTROMAGNETIC FIELDS & WAVES
(Electronics & Communication Engineering)

Time : 3 hours

Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 (a) Two uniform line charges of density 8nc/m are located in a plane with Y=0 at X=±4m. Find the E-field at a point P(5,4,8)m..

(b) State and explain Coulomb's law. Obtain an expression in vector form.

2 (a) Derive an expression for the Gauss's Law in point form for the electrostatic fields.

(b) Calculate the potential difference V_{AB} for a line charge ρ_L = 10nC/m on the Z-axis , where A(1m,π/2,5) and B(4m,π,3m).

SECTION - II

3 (a) Derive Continuity of Current equation.

(b) In a dielectric material E_X=10V/m and $\bar{P} = (3a_x - a_y + 4a_z)$ nC/m^2.Calculate (i) χ_e (ii) E and (iii) D.

4 (a) Explain boundary conditions for dielectric-dielectric and dielectric-conductor interfaces.

(b) Derive an expression for the capacitance of a coaxial cable.

SECTION - III

5 (a) Find the expression for magnetic field intensity due to an infinite length straight conductor that carries uniform current I.

(b) Given $E = E_m \sin(\omega t - \beta z)$ a_y in free space. Find D, B and H

6 (a) A certain material has X_M =4.2 and $\bar{H}$ =0.2x a_Y A/m. Determine μ_r, μ,M,B J and J_B.

(b) Derive an expression for the energy stored in magnetic field.

SECTION - IV

7 (a) A parallel plate capacitor with plate area of $5cm^2$ and plate separation of 3mm has a voltage $50\sin 10^3 t$ V applied to its plates. Calculate the displacement current assuming $\varepsilon = \varepsilon_0$.

(b) What is the inconsistency of Ampere's law? How it is rectified by Maxwell?

8 (a) Explain the Faraday's law for time varying fields.

(b) Derive the expression for attenuation and phase constants of uniform plane waves

SECTION - V

9 (a) Explain in brief different types of Polarizations.

(b) For a uniform plane wave in space λ=12cm. In a lossless material of unknown characteristics λ=8cm . In this material E=50v/m, H=0.1A/m. Find f, μ_r, ε_r

10 (a) Define Brewster angle and derive an expression for parallel and perpendicular polarizations.

(b) Explain the following terms:

(i) Surface Impedance

(ii) Total Internal Reflection

(iii) Skin Depth

R-13

Code : 13CE2103

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER, 2019

II B.Tech. I Semester

BUILDING TECHNOLOGY

(Civil Engineering)

Time: 3 hours Max. Marks: 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1. (a) What are the qualities of a good building stone? Discuss them in detail.
   (b) Give the comparison of brick work and stone work.

2. (a) Briefly explain the classification of bricks.
   (b) What are the characteristics of a good tile? Give the list of various types of tiles available

SECTION-II

3. (a) What are the raw materials used for the production of cement.
   (b) Define fineness modulus. Give the practical range of fineness modulus values for coarse and fine aggregates.

4. List out modern renovation materials and explain any four materials in brief.

SECTION - III

5. List out different types of foundations you would recommend under different situations and soil conditions. Explain them briefly.

6. (a) Explain in brief various types of mortars used in stone masonry.
   b) What are the requirements of a good mortar and how do you determine the consistency of mortar?

SECTION – IV

7. (a) Classify various types of lintels and discuss their relative uses.
   (b) Discuss various cases of loadings transmitted to a lintel from the wall supported by it.

8. (a) What are the requirements of a good stair case.
   (b) Explain any one method of providing water proof terracing on RCC roof slab.

SECTION – V

9. (a) Explain in brief the objectives of plastering and pointing.
   (b) What are the characteristics of an ideal paint?

10. (a) What are the objectives of varnish and write the characteristics of a good varnish.
    (b) Explain various principles that should be kept in mind while designing a house drainage system.

R-13 Code : 13EE2101

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

ELECTROMAGNETIC FIELDS
(Electrical & Electronics Engineering)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 (a) Derive the concept of Electric field intensity from coulomb's law.

(b) Point charges 1 mC and -2 mC are located at (3,2,1) and (-1,1,4) respectively. Calculate the electric force on a 10nC charge located at (0,3,1) and the electric field intensity at that point.

2 (a) State and explain Gauss's law in integral form.

(b) A point charge of 10nC is located at (-1,2,0) while a line charge at y =1, z=2carries a uniform in charge of charge density of 4nC/m. Find the potential at point A(1,0,2). Assume the potential at the origin to be zero.

SECTION - II

3 (a) State and explain the continuity equation of current in integral and point form.

(b) Derive the expression for the energy stored in a parallel plate capacitor.

4 (a) State and prove the conditions at the boundary between two dielectrics.

(b) Explain Polarization of dielectric materials.

SECTION - III

5 (a) State and explain Biot-savart law.

(b) A steady current element $10^{-3}a_z$ A/m is locates at the origin in free space. What is the magnetic flux density due to this element at the point (1,0,0) in rectangular coordinates?

6 (a) Using Ampere's circuital law, find the magnetic field intensity due to an infinite sheet of charge.

(b) Planes z=0 and z=4 carry current K=10 a_x A/m and K=10a_x respectively. Determine H at a) (1,1,1) b) (0,-3,10)

SECTION - IV

7 (a) Derive the inductance of a two –wire transmission line.

(b) Derive the boundary conditions for magnetic field intensity and flux density.

8 (a) A toroid has 600 turns of coil, circular cross section of $6cm^2$ and a mean diameter of 38cm.The permeability of the toroid is 1000.Calculate the inductance of the coil.

(b) What is magnetic dipole? How does a magnetic dipole differ from an electric dipole?

SECTION - V

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

(b) State and explain the Farday's law of electromagnetic induction.

10 (a) State and explain Maxwell's equation in integral and point form in free space.

(b) Derive the expression for wave equation.

R-13 **Code: 13EE2120**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

ELECTRICAL TECHNOLOGY
(Electronics & Communication Engineering)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

SECTION – I

1 (a) Explain the conditions required for the buildup of emf of a self excited d.c.shunt generator

(b) What is critical field resistance and how is it determined experimentally?

(c) A 4 pole d.c.shunt generator is delivering 20 A to a load of 10 ohms. The armature resistance is 0.5 ohms and shunt field resistance is 50 ohms. Calculate the induced emf of the machine.

2 (a) State the various losses that occur in a d.c.motor and explain how do they vary with load?

(b) A 250 volts d.c.shunt motor has an armature current of 20 A when running at 1000 r.p.m. against full load torque. The armature resistance is 0.5 ohms. What resistance must be inserted in series with the armature to reduce the speed to 500 r.p.m. at the same torque? What will be the speed if the load torque halved with this resistance in circuit? Assume flux to remain constant throughout.

SECTION – II

3 (a) Derive the e.m.f. equation of a single-phase transformer

(b) A single- phase core type 6600/230 V, 50 Hz transformer has a core area of 400 cm^2 and a maximum flux density of 1.18 wb/m^2. Calculate the number of turns in primary and secondary windings.

4 (a) With the help of a vector diagram, explain the principle of action of a transformer on load.

(b) A 250/500 V transformer gave the following test results:

Open circuit test :	250V, 1A, 80W on LV side
Short circuit test : (With LV winding short circuited)	20V, 12A, 100W

Determine the Equivalent circuit parameters and calculate the applied voltage and efficiency when the output is 10A at 500V and 0.8 power factor (lagging)

SECTION – III

5 (a) Explain the principle of working of a 3-phase induction motor.

(b) The power input to the rotor of a 440 V, 50Hz, 6 pole, 3-phase induction motor is 60KW. The rotor emf frequency is 90 cycles per minute. Calculate the slip, rotor speed, rotor copper loss, mechanical power developed and rotor resistance per phase if the rotor current is 60 A.

6 (a) Sketch the slip/torque characteristics of 3-phase squirrel cage and slip ring induction motors

(b) A 4 pole, 3-phase, 50 Hz, induction motor supplies a useful torque of 159 Nw-m.Calculate at 4% slip (i) rotor input (ii) motor input and (iii) the motor efficiency if the friction and windage losses are 500 Watts and the stator losses are 1000 watts.

SECTION – IV

7 (a) Derive the EMF equation of an alternator and explain the effect of coil span factor on the EMF.

(b) A 3-phase, star connected alternator has 8 poles and runs at 750 r.p.m. It has 24 slots per phase and 10 conductors per slot, the flux being 0.055 wb/pole. Calculate the line voltage. Assume coil span factor to be 0.96.

8 (a) Define Regulation of an alternator.

(b) A 600 V, 60 KVA single phase alternator has an effective resistance of 0.25 ohms. A field current of 8 A produces an armature current of 150 A on short circuit and an emf of 330 V on open circuit. Determine (i) the synchronous impedance and (ii) the percentage regulation.

SECTION – V

9 (a) Explain why a single-phase induction motor is not self-starting.

(b) Describe briefly various methods used for starting single phase induction motors.

10 (a) Draw and explain the characteristic curves of single- phase induction motor.

(b) Write brief notes on Stepper motors.

R-13

Code: 13SH2103

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

PROBABILITY & STATISTICS
(Computer Science &Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

SECTION - I

1 (a) State and prove multiplication theorem on probability.

(b) For the following probability distribution, find (i) k, (ii) Mean and (iii) Variance

x	0	1	2	3	4	5	6
p(x)	0	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

2 (a) Box A contains 1 white, 2 red, 3 green balls, Box B contains 2 white, 3 red, 1 green balls, Box C contains 3 white, 1 red, 2 green balls. Two balls are drawn at random from a box with replacement and found to be white and red, find the probability that the balls so drawn come from box B.

(b) The daily consumption of electric power (in millions KW- hours) is a random variable having the probability density function is $f(x)=\begin{cases}\frac{1}{9}xe^{-x/3}, & x>0\\ 0, & x<0\end{cases}$

If the total production is 12 million KW – hours, determine the probability that there is power cut on any given day.

SECTION - II

3 (a) It has been claimed that in 60% of all solar heat installations the utility bill is reduced by at least one-third. Accordingly, what are the probabilities that the utility bill will be reduced by at least one-third in (i) Four of five installations (ii) At least four of five installations?

(b) In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find

4 (a) Suppose that a book of 200 pages contains 20 printing mistakes. Assume that these errors are randomly distributed throughout the book and the number of errors per page has a Poisson distribution. Find the probability that 30 pages selected at random will be (i) At least one error, (ii) At most one error (iii) Free of errors.

(b) Show that the mean deviation from the mean for Normal distribution is equal to 4/5 times of standard deviation approximately.

SECTION - III

5 (a) Find the mean and variance of the sampling distribution of means, for the population **4, 8, 12, 16, 20, 24** by drawing samples of size two without replacement.

(b) The dean of a college wants to use the mean of a random sample to estimate the average amount of time that students take to get from one class to another and he wants to be able to assert with **99%** confidence that the error is at most **0.25** minutes. If it can be presumed from the past experience that the population standard deviation is 1.40 minutes, how large a sample will he have to take?

6 (a) The mean voltage of a battery is **15** and standard deviation is **0.2**. Find the probability that four such batteries connected in series will have a combined voltage of **60.8** or more volts.

(b) The mean and standard deviation of a population are **11,795** and **14,054** respectively. What can we assert with **95%** confidence about the maximum error if $\bar{x}$=**11,795** and n=**50**. And also construct a **95%** confidence interval for the true mean.

SECTION - IV

7 (a) Define Type-I error, Type-II error, Null Hypothesis, Alternative Hypothesis, critical region and level of significance.

(b) The IQ s of **16** students from one area of a city showed a mean of **107** with a standard deviation of **10**, while the IQ s of **14** students from another area of the city showed a mean of **112** with a standard deviation of **8**. Is there a significant difference between the IQ s of the two groups at **0.05** level of significance?

8 (a) An ambulance service claims that it takes on the average less than **10** minutes to reach its destination in emergency call. A sample of **36** calls has a mean of **11** minutes and the variance of **16** minutes. Test the claim at **0.05** level of significance.

(b) A die is thrown 264 times with the following results. Show that the die is unbiased.

No. on the die	1	2	3	4	5	6
Frequency	40	32	28	58	54	52

SECTION - V

9 (a) Fit a second degree polynomial in x for y with the following data.

x	0	1	2	3	4	5	6
y	2.4	2.1	3.2	5.6	9.3	14.6	21.9

(b) Find the rank correlation for the following data.

x	56	42	72	36	63	47	55	49	38	42	68	60
y	147	125	160	118	149	128	150	145	115	140	152	155

10 (a) Fit a straight to the following data.

x	1	2	3	4	5
y	2	5	3	8	7

(b) Three judges A, B, C gave the following ranks. Find which pair of judges has common approach.

A	1	6	5	10	3	2	4	9	7	8
B	3	5	8	4	7	10	2	1	6	9
C	6	4	9	8	1	2	3	10	5	7

R-13

Code : 13ME2102

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

BASIC THERMODYNAMICS
(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1 (a) What are intensive and extensive properties?

(b) Explain what do you understand by thermodynamic equilibrium.

(c) Distinguish between the terms 'change of state' ' path' and 'process'.

(d What is thermodynamic system?

2 (a) State the first law of thermodynamics as applied to non-flow process.

(b) A reciprocating air compressor takes in $2m^3$/min at 0.11 MPa, 20^0C which it delivers at 1.5 MPa, 111^0C to an after cooler where the air in cooled at constant pressure to 25^0C. The power absorbed by the compressor is 4.15W. Determine the heat transfer in (i) The compressor (ii) The Cooler, state your assumptions.

SECTION - II

3 (a) What is a polytropic process? How does it differ four isentropic proses? Derive the law of isentropic expansion or compression in given by $PV^{\gamma} = C$ where $r = \frac{c_p}{c_v}$

(b) Before compression a cylinder contains $750cm^3$ of gar at a pressure of 100 KN /m^2 ab. Pressure and volume after compression according to law $P\gamma^n = C$ is 780 KN /m^2 and one fifth of the initial volume respectively. Compute (i) Value of index 'n' (ii) Work done during compression (iii) Heat rejected during compression Tak $\gamma = 1.4$.

4 (a) State and explain Kelvin-Plank statement of second law of thermodynamics.

(b) Which is the more effective way to increase the efficiency of a carnot engine: to increase T_1, keeping T_2 constant: or to decrease T_2, keeping T_1 constant.

SECTION - III

5 (a) Show that entropy is a property of a system.

(b) A system maintained at constant volume initially at temperature T_1, and a heat reservoir at the lower temperature T_0 is available. Show that the maximum work recoverable on the system in cooled to T_0 is

$$W = c_g\left[(T_1 - T_0)\right] - T_0 \, 1_n \frac{T_1}{T_0}$$

6 (a) What is available energy and unavailable energy?

(b) Calculate the available energy in 50kg of water at 80^0C with respect to the surroundings at $5^{\varphi}C$, the pressure of water being 1 atmosphere.

SECTION - IV

7 (a) What are cyclic and non-cyclic heat engines? Give example

(b) With the help of PV and T-S diagrams, show that for the same maximum pressure and temperature of the cycle and the same heat rejection.

$$\eta_{diesel} > \eta_{dual} > \eta_{\eta otto}$$

8 An ideal diesel cycle with air as the working fluid has a compression ratio of 18 and a cutoff ratio of 2. At the beginning of compression, the air is at 100 KPa, 27^0C and 1917 cm^3. Determine

(i) the pressure and temperature at each point
(ii) (ii) the network and thermal efficiency
(iii) the mean effective pressure

SECTION - V

9 (a) Briefly explain classification of IC engines.

(b) Explain working of four stoke diesel engine.

10 (a) Explain (i) IP (ii) BP (iii) Air fuel ratio

(b) The following particulars refers to a four stoke petrol engine working an otto principle Bork = 10 cm, Stoke = 15cm, clearance volume = 65 cm^3, indicated power = 25KW. Fuel consumption = 6 kg/m and lower calorific value of petrol = 42000 kj/kg calculate

(i) thermal efficiency
(ii) Air standard efficiency and
(iii) Relative efficiency. Assume γ= 1.4.

R-13 **Code : 13EE2103**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

ELECTRO MECHANICAL ENERGY CONVERSION - I
(Electrical & Electronics Engineering)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 Explain the Constructional details of DC Generator with neat sketch and mention the function of each part.

2 (a) Derive the EMF Equation of DC Generator

(b) An 8-pole Generator has an output of 200A at 500V, the lap-connected armature 1280 conductors, 160 commutator segments. If the brushes are advanced 4-segments from the no load neutral axis, estimate the armature demagnetizing and cross-magnetizing ampere-turns per pole.

SECTION - II

3 Explain the Characteristics of different types of D.C. Generators and list out the applications of the same.

4 (a) Explain in detail about Commutation process in a d.c. machine with a neat diagram?
(b) Explain methods of improving Commutation. With a neat diagram?

SECTION – III

5 A 4-pole, 250 V, d.c. shunt motor takes 2 A on a no-load, when running at 1200 rpm. The armature and field resistances are 0.15 ohm and 150 ohm respectively. The brush drop is 2 V. If the motor takes total current of 60 A at full-load, calculate its full-load speed. Assume that the flux gets weakened by 5% under full-load condition due to armature reaction.

6 (a) Explain the methods of speed control of d.c. shunt motors in detail with the help of diagram.
(b) A 220 V compensated shunt motor drives a 700 N-m torque load when running at 1200 rpm. The combined armature compensating winding and interpole resistance is 0.008 ohm and shunt field resistance is 55 ohm. The motor efficiency is 90%. Calculate the value of the dynamic braking resistor that will be capable of 375 N-m torque at 1050 r.p.m. The windage and friction losses may be assumed to remain constant at both speeds.

SECTION - IV

7 (a) Explain the process of parallel operation of two shunt generators connected in parallel.

(b) Two shunt generators operating in parallel deliver a total current of 250 A. One of the generators is rated 50 KW and other 100 KW. The voltage rating of both machine is 500 V and have regulations of 6% (smaller one) and 4%. Assuming linear characteristics, determine (i) the current delivered by each machine, (ii) terminal voltage.

8 (a) Explain Swinburne's Test on D.C machines with a neat sketch.

(b) A 200 V, shunt motor develops an output of 17.158 kW when taking 20.2 kW. The field resistance is 50 ohm and armature resistance 0.06 ohm. What is the efficiency and power input when the output is 7.46 kW?

SECTION - V

9 (a) Explain the principle of operation of single phase transformer and derive the e.m.f equation of transformer.

(b) The maximum flux density in the core of a 250/3000-volts, 50-Hz single phase transformer is 1.2 Wb/m^2 . If the e.m.f. per turn is 8 volt,
Determine: (i) primary and secondary turns, (ii) Area of core.

10 (a) Voltage regulation of a transformer varies with power factor. Validate this statement through suitable derivations. At what power factor will the regulation be
(i) Maximum and (ii) zero.

(b) A 25 kVA, 2000/200 V, 50 Hz transformer has a maximum efficiency at 80% of full load. It's per unit resistance and impedance are 0.012 and 0.05 respectively. Determine its efficiency and voltage regulation at half of the full load and at 0.8 pf lagging.

R-13 **Code: 13CE2105**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

ENGINEERING GEOLOGY
(Civil Engineering)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 (a) Explain the types of voicanic eruptions.

(b) Describe the methods of river erosion.

2 (a) Give a note on glacial deposits.

(b) Write short notes on
(i) Dunes (ii) Coral Reefs

SECTION - II

3 (a) Explain the difference giving examples on the following
(i) Cleavage and Fracture (ii) Density and Specific Gravity.

(b) What are rock forming minerals and give physical properties of any two rock forming minerals.

4 (a) Write physical properties of the following
(i) Talc (ii) Kyanite .

(b) Give important features and properties of the following
(i) Mica group (ii) Feldspar group.

SECTION - III

5 (a) Give classification of sedimentary rocks.

(b) Write notes on the following
(i) Conglomerate (ii) Laterite

6 (a) Write about concordant igneous bodies .

(b) Explain the textures and structures of metamorphic rocks.

SECTION – IV

7 (a) Describe the types of folds based on the position of axial plane with neat sketches.

(b) Discuss about the causes of faulting.

8 (a) Give the classification of joints.

(b) Write about the occurrence of joints in different kinds of rocks.

SECTION - V

9 (a) Explain the geological considerations in the selection of tunnel sites.

(b) Write briefly about the forces acting on a dam.

10 (a) Explain the suitability of different rock types at the dam site.

(b) Explain the properties of stones to be required for their selection as Building and road material.

R-13 **Code : 13CS2103**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Computer Science & Engineering)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1 a) Explain the basic concepts of Object Oriented Programming.
b) What is the usage of enumerated data type? Give examples.

2 a) Explain the scope and life time of variable.
b) What feature of Java makes it platform independent and portable?

SECTION - II

3 a) Explain iteration using multidimensional array in Java.
b) Write a program to implement matrix multiplication.

4 a) Explain about Input stream Class.
b) Write a Java program to check whether the given string is palindrome or not.

SECTION - III

5 a) Write a sample program to illustrate packages.
b) Demonstrate constructor overloading concept.

6 a) Differentiate between interface and abstract class.
b) Write a runtime polymorphism program in Java by using interface reference variable.

SECTION - IV

7 a) What is the difference between a thread and a process?
b) How to achieve synchronization among threads? Write suitable code.

8 a) With a suitable Java program explain user-defined exception handling.
b) What is meant by re-throwing exception? Discuss a suitable scenario for this.

SECTION - V

9 a) Explain the life cycle of an applet.
b) What are the various layout managers used in Java?

10 a) Explain delegation event model.
b) Write an Applet to draw a smiley picture accept user name as a parameter and display welcome message.

R-13

Code : 13EC2102

B.TECH. DEGREE SUPPLEMETARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

ELECTRONIC DEVICES & CIRCUITS

(common to ECE & EEE)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 (a) Explain the operation of SCR and interpret how it can be used as rectifier.
(b) Differentiate TRIAC and DIAC based on construction and operation phenomenon.

2 (a) Justify how UJT acts as relaxation oscillator. What are the necessary conditions required for stable oscillations.
(b) Draw and explain half wave rectifier. Find its efficiency.

SECTION - II

3 (a) Illustrate emitter bias circuit with neat operation. How it is advantage when compared with fixed bias.
(b) With a neat sketch explain collector to base bias circuit and derive one stabilization factor.

4 (a) Differentiate CE, CB and CC amplifiers.
(b) Explain the effect of coupling capacitors for low frequency response of CE amplifier.

SECTION – III

5 (a) Explain the operation of bootstrap circuit with suitable waveforms.
(b) What are the effects of direct coupling in multistage amplifiers in terms of quiescent point?

6 (a) Deduce the expression for gain and bandwidth for multistage n-amplifiers.
(b) Describe transform coupling and how it achieves impedance matching? Justify.

SECTION – IV

7 Draw the frequency response of an amplifier and explain the reason for different for the different slopes in the response.

8 Draw the small signal model of common source amplifier and derive expression for voltage gain and output impedance.

SECTION - V

9 Draw the circuit diagram of a current series feedback amplifier and derive expression for voltage gain with and without feedback.

10 (a) Explain the working of Wien Bridge oscillator.
(b) Explain in detail about the different feedback topologies.

R-13

Code : 13EE2120

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

ELECTRICAL & ELECTRONICS ENGINEERING
(Mechanical Engineering)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

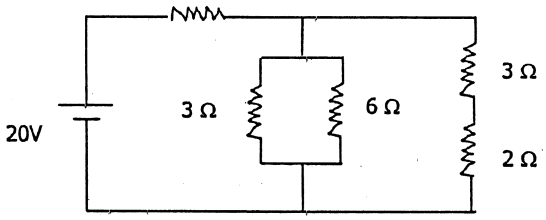
SECTION - I

1 (a) Write short notes on active and passive elements.

(b) Consider three capacitors having capacitance 5 ,10, 12 microfarads are connected in series across 600V d.c. supply .Determine (i) Equivalent capacitance of the combination, (ii) charge on each capacitor , (iii) potential across each capacitor

2 (a) Derive the values of form factor and peak factor of a sinusoidally varying quantity.

(b) Determine the current supplied by the source in the network shown in fig.



SECTION - II

3 (a) Explain the principle of operation of single phase transformer.

(b) A single phase transformer has to be designed to work with a primary voltage of 11KV and a secondary voltage of 440V.If the maximum flux density is 1.2 Wb/m^2 and the number of primary turns is 1400. Calculate (i) the number of secondary turns and (ii) the area of cross section of the core .The supply frequency is 50Hz

4 (a) Derive the condition for obtaining the maximum efficiency in a single phase transformer.

(b) Describe about the equivalent circuit of a 1-phase transformer.

SECTION – III

5 (a) Define the slip and deduce an expression for the frequency of rotor current of the induction motor.

(b) Derive the relationship for torque developed by a three phase induction motor and draw a typical torque –slip characteristics.

6. (a) Explain the principle of operation of any one of the single phase induction motor.

(b) A three phase , 6 – pole, 50 Hz induction motor has a slip of 1% at no load and 3% at full load. Determine (i) synchronous speed (ii) no load speed (iii) Frequency of rotor current at standstill (iv)frequency rotor current at full load.

SECTION - IV

7 Draw and explain the V-I characteristics of tunnel Diode for both forward and reverse biased conditions.

8 Write short notes on

(a) diode resistance and capacitance

(b) half bridge rectifier

SECTION - V

9 (a) With neat sketches, explain the flow of different current components of PNP transistor. Give their relationship

(b) With the help of input & output characteristics, Describe the functioning of a BJT in common base configuration.

10 (a) Give the advantages and disadvantages of h-parameter analysis.

(b) Derive the conversion formula for one h –parameter (any one of them) of CC configuration in terms of h-parameters of CE configuration.

R-13

Code : 13CE2102

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech I Semester

FLUID MECHANICS – I
(Civil Engineering)

Time : 3 hours Max Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section
All questions carry equal marks

SECTION - I

1 (a) Explain briefly the following :
(i) Surface tension (ii) Compressibility

(b) A plate has an area of $1m^2$. It slides down an inclined plane, having angle of inclination 45^0 to the horizontal, with a velocity of 75m/sec. The thickness of oil film between the plane and the plate is 1.2 mm. Determine the viscosity of the fluid if the weight of the plate is 110N.

2. (a) A liquid has a specific gravity of 1.9 and kinematic viscosity of 8 stokes. Determine its dynamic viscosity.

(b) Explain the following :
(i) Mass density (ii) Weight density

SECTION - II

3 (a) List various pressure measuring instruments and explain working of any one with a neat sketch.

(b) The barometric pressure at sea level is 760 mm of mercury while that on a top hill is 740 millimeters. If the density of air is assumed constant as $1.16kg/m^3$. Determine the elevation of the top hill.

4 (a) Explain the terms
(i) Buoyancy (ii) Meta centric height

(b) A metallic cube 45 cm side and weighing 500 N is lowered into a tank containing a two fluid layer of water and mercury. Determine the position of block at mercury-water interface when it has reached equilibrium.

SECTION - III

5 (a) Define (i) Velocity potential function and (ii) stream function.

(b) In a two dimensional incompressible flow, the fluid velocity components are given by u=x-4y and v = -y-4x, show that velocity potential exists and determine its form. Also calculate the stream function.

6 (a) Explain various types of fluid flow.

(b) In a two dimensional potential flow, the velocity potential is given by $\varnothing = x(4y-1)$ determine the velocity at the point P (4,5). Find also the value of stream function at the point P.

SECTION - IV

7 (a) Explain Continuity equation and obtain an expression for continuity equation for a three dimensional flow.

(b) Derive the Bernoulli's equation and mention assumptions made.

8 (a) Explain Euler's Equation of motion.

(b) Water is flowing through a pipe of 12 cm diameter under a pressure of 2 bar and with a mean velocity of 4 m/sec. Determine the total head of the water at a cross-section, which is 10m above the datum line.

SECTION - V

9 (a) Explain the working principle of Venturimeter and derive the expression for the discharge through it.

(b) The head of water over an orifice of diameter 6 cm is 12m. Determine the actual discharge and actual velocity of jet at vena-contracta. Take Cd = 0.62 and Cv = 0.965.

10 (a) Describe briefly various methods of Dimensional Analysis

(b) What are the dimensionless numbers and write their importance?

R-13

Code : 13EC2101

B.TECH. DEGREE EXAMINATION, NOVEMBER 2019

II B.Tech I Semester

SIGNALS & SYSTEMS
(Common to EEE & ECE)

Time : 3 hours Max Marks: 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All questions carry equal marks

SECTION-I

1 (a) Define Mean square error and derive the expression for evaluating Mean square Error

(b) Define vector space and hence explain important properties of vector space.

2. A rectangular function defined as

$$f(t) = \begin{cases} A & 0 \le t \le \pi/2 \\ -A & \frac{\pi}{2} \le t \le \frac{3\pi}{2} \\ A & \frac{3\pi}{2} \le t \le 2\pi \end{cases}$$

Approximate above function by Acos t between the intervals (0.2π) such that mean square error is minimum

SECTION-II

3 (a) With regard to Fourier series representation. Justify the following statements

(i) Odd function have only sine terms
(ii) Even functions have no sine terms
(iii) Function with half wave symmetry have only odd harmonies

(b) Find the Fourier transform of x (t) = sgn (t)

4 (a) Describe the symmetry property of Fourier transform

(b) Find the trigonometric Fourier series of full wave rectified sinewave.

SECTION-III

5 (a) Explain the characteristics of an ideal LPF. Explain why it cannot be realized

(b) Find the convolution of the signals $x(t) = u(t), h(t) = \sin t\ u(t)$

6 (a) Derive the condition for distortion less transmission.

(b) Test whether the following systems are linear or not
(i) $y(t) = x(2t)$ (ii) $y(t) = \log[x(t)]$

SECTION-IV

7 (a) Find the convolution of the signals $x(n) = \{1.\ 2.\ 1.\ 2\}$; $h(n) = \{1.\ -1.\ 2.1\}$

(b) Test the stability and causality of the systems with impulse response
(i) $h(n) = (2)^n\ \mu(n-1)$ **(ii)** $h(n) = \{1.2.\ 3.\ 1.\ 2.\ 4.\ 5\}$

8 Find the DTFT of the sequence x (n) $= \begin{cases} 1 \ for\ 0 \le n \le (N-1) \\ 0 \ otherwise \end{cases}$

SECTION-V

9 (a) Write a MATLAB program to generate the following sequences
(i) impulse sequence (ii)u (n) –u(n-5) (iii) sinusoidal sequences

(b) Write a MATLAB Program to find the frequency response of the system $y[n] + 0.7y\lfloor n-1 \rfloor + 0.12y\|n-2\| = x[n]$

10 (a) Write a MATLAB program to find inverse z- transform of the system with difference equation $y[n] + 0.5y[n-1] + 0.06y[n-2] = x[n] + 0.5x[n-1]$

(b) Write a MATLAB program to find the impulse response of the system with difference equation $y[n] + 0.6y[n-1] + 0.08y[n-2] = x[n] + 2x[n-1]$

R-13

Code: 13CE2101

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019
II B.Tech. I Semester

ENGINEERING MECHANICS
(Common to Civil Engineering & Mechanical Engineering)

Time : 3 hours

Max Marks: 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All questions carry equal marks
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SECTION - I

1 (a) 26kN force is the resultant of the two forces, one of which is as shown in Fig.1 Determine the other force.

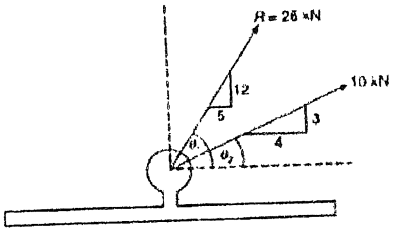


Fig.1

(b) Determine the reactions at contact points for the spheres A, B and C as shown in Fig.2 it is given that W_A=W_B,W_C = 6kN, the diameters of d_A = d_B = 500 mm, dC = 800 mm.

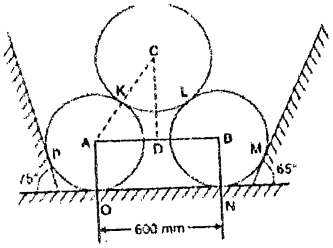


Fig.2

2. (a) Resolve 400 N force acting on a block as shown in Fig.3
   (i) Into horizontal and vertical components
   (ii) Along the inclined plane and right angles to the plane

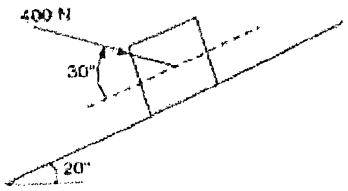


Fig.3

(b) State and prove Varignon's Theorem.

SECTION - II

3 (a) State and prove parallel axis theorem.

(b) Determine the centroid of the section of the concrete dam as shown in Fig.4

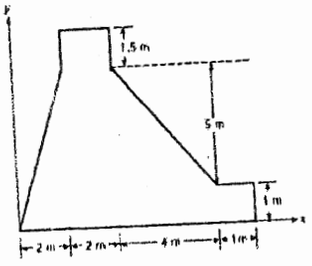


Fig. 4

4 (a) Derive the expression for moment of Inertia of triangular section of base 'b' and height 'h' about an axis passing through C.G. of the section and parallel to base.

(b) Determine the moment of inertia of the shaded area shown in the Fig.5

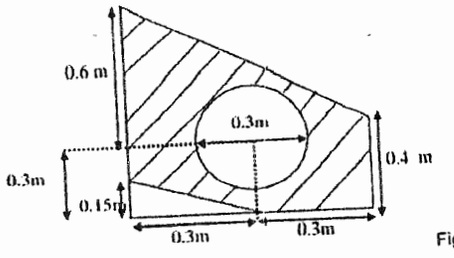


Fig. 5

SECTION - III

5 (a) An effort of 500N is required to just move a body up an inclined plane of angle 15^0 with horizontal. The force is applied parallel to the plane. If the inclination of the plane is increased to 20^0, the effort applied parallel to the plane is 575N. Find the weight of the body and the coefficient of friction.

(b) A block of weight W_1 = 1290 N rests on a horizontal surface and supports another block of Weight W_2 = 570 N on top of it as shown in Fig.6. Block of weight W_2 = is attached to a vertical wall by an inclined string AB. Find the force 'P' applied to the lower block, that will be necessary to cause the slipping to impend. Coefficient of friction between blocks 1 and 2 = 0.25, coefficient of friction between 1 and horizontal surface = 0.40

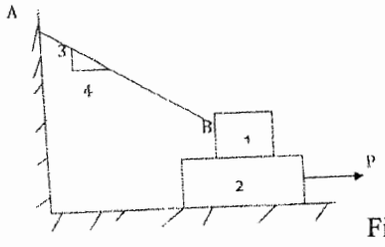


Fig..6

6 (a) What is the Value of 'P' in the system shown in Fig.7 to cause the motion to impend to the left? Assume the pulley is smooth and co-efficient of friction between the other contact surfaces is 0.20

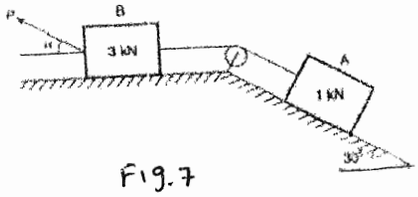


Fig.7

(b) A belt if running over a pulley of diameter 1.5 m at 300 rpm. The angle of contact is 150^0 and coefficient of friction is 0.35. If the maximum tension in the belt is 450kN, determine the power transmitted by it.

SECTION – IV

7 (a) Block of weight 10 N falls at a distance 1.20 m on top of the spring. Determine the spring constant if it is compressed by 125 mm to bring the weight momentarily to rest

(b) A stone is projected with a speed of 30km/s at an angle of elevation of 50^0. Find its velocity (i) after 2 seconds (ii) at the highest point of its path (iii) at a height of 6m.

8 (a) A car moves with a uniform velocity of 36 km/hr in the first 90 sec. It accelerations uniformly at 2 m/s^2 and attains maximum velocity of 72 km/hr. it moves further with this uniform velocity for the next 5 minutes and moves with uniform retardation and comes to rest in the next 90 seconds. Find the total time of the journey and the distance travelled

(b) Explain D' Alembert's Principle when the body is in
(i) Linear motion (ii) Rotary motion

SECTION - V

9 (a) Define, Strain, shear strain Young's modulus and rigidity modulus and plot the tensile test diagram for mild steel and explain salient features

(b) A steel bar of 10 mm in diameter is acted upon an axial load of 12 kN.. The change in diameter is measured as 0.0022 mm. Determine the (i) the Poisson's Ratio (ii) the modulus of elasticity and bulk modulus. The value of modulus of rigidity is 78GPa.

10 (a) The loading of steel bar of 30 mm diameter is an shown in Fig.8. Find the elongation of the bar E_s= 205 GPa.

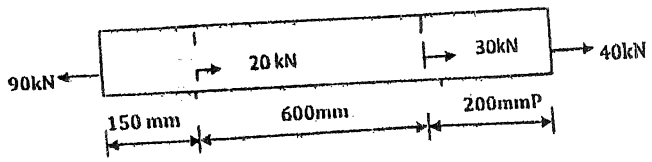


Fig. 8

(b) A steel rod of 25 mm diameter axially passes through a brass tube of 25 mm internal diameter and 35 mm external diameter when the nut o the rod is tightened, initial stress of 10 MPa is developed in the rod. The temperature of the tube is then raised by 60^0C, Calculate the final stresses in the rod and tube. Take E_s = 200 GPa, E_B = 80 GPa, $\alpha_s = 11 \times 10^{-6}/^0C$ and $\alpha_B = 19 \times 10^{-6}/^0C$.

R-13 **Code : 13CS2102**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

DIGITAL LOGIC DESIGN

(Computer Science & Engineering)

Time : 3 hours Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

1 (a) Solve for x
(i) $(1001.1001)_2 = (x)_{10}$ (ii) $(1011.0011)_2 = (x)_{10}$, (iii) $(CD)_{16} = (x)_2$
(iv) $(AA.1A)_{16} = (x)_2$

(b) Perform following multiplications of Hexadecimal numbers.
(i)A **X** 8 (ii) A12 **X** 6 (iii) A1 **X** 8 (iv) A13 **X** 2B

2 Prepare a table of combinations for the following Boolean Algebra expressions.
(i)X(Y' + Z') + XY' (ii) AB(A'B + A'B') (iii) (X (Y + Y') + X' (Y' + Y) . Z'

SECTION – II

3 Simplify each of the following functions and implement with NAND gates.

(a) $F_1 = AC' + ACE + ACF' + A'CD' + A'D'E'$

(b) $F_2 = (B' + D') (A' + C'' + D) (A + B' + C' + D) (A' + B + C' + D')$

4 (a) Implement THE Boolean Function WITH Exclusive – OR and AND gates.
F= AB'CD + A'BCD' + AB'C'D + A'BC'D

(b) Implement a Full Adder Circuit with Multiplexer

SECTION – III

5 (a) Design a BCD counter with JK Flip-Flop..

(b) Draw the logic diagram of a Master-Slave D-Flip-Flop using NAND gate.

6 (a) Give difference between serial and parallel Transfer. What type of register is used in each case.

(b) Design and explain the operation of a decode Johnson counter.

SECTION – IV

7 (a) Explain in detail about RAM

(b) Explain Block diagram for a Computer.

8 (a) Explain about type of Sequential programmable devices and their function.

(b) Explain in detail about ROM and their types.

SECTION – V

9 (a) List the importance and desing principle of the Latches..

(b) Explain about asynchronous sequential circuits with examples.

10 (a) Explain about types of Hazards.

(b) Explain about Flow Tables in detail.

R-13

Code : 13SH2104

B.TECH.DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech I Semester

NUMERICAL METHODS & STATISTICS
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

1 (a) Find the root of the equation $\cos x = xe^x$ using the regula-falsi method correct to four decimal places.

(b) Using Newton's iterative method, find the real root of $x\log_{10} x = 1.2$ correct to five decimal places.

2 Apply Gauss-Seidel iteration method to solve the following equations $10x+y+z=12;\ 2x+10y+z=13;\ 2x+2y+10z=104$

SECTION - II

3 (a) Find $Y(2.0)$ using Newton's backward interpolation formula from the table

X	1	1.4	1.8	2.2
Y	3.49	4.82	5.96	6.5

(b) The following data gives the velocity of a particle for 20 seconds at an interval of 5 seconds. Find the initial acceleration using the entire data

Time t (sec)	0	5	10	15	20
Velocity v (m/sec)	0	3	14	69	228

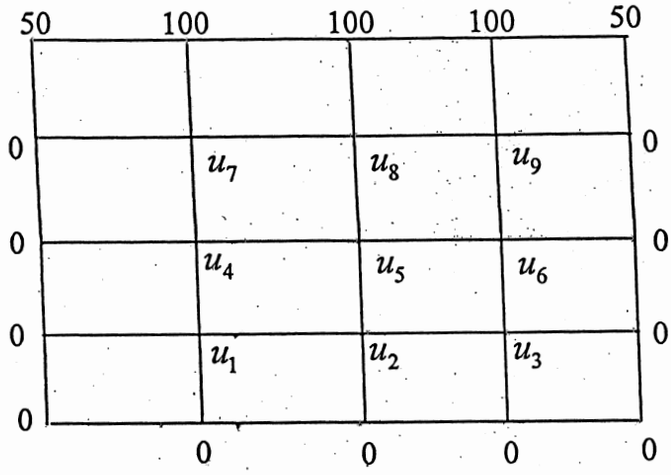
4 Find the values of $\int_0^1 \frac{dx}{1+x^2}$ by using the trapezoidal rule with $h=0.5,\ 0.25$ and 0.125. Then obtain a better estimate by using Romberg's method.

SECTION - III

5 Find the Solution of $\frac{dy}{dx} = x-y$ at $x=0.4$ subject to the condition $y=1$ at $x=0$ and $h=0.1$ by Millen's method

6 Solve the Laplace's equation for the figure given below

(P.T.O.)



SECTION - IV

7 (a) If P is the pull required to lift a load W by means of a pulley block, find a linear law of the form $P = mW + c$ connecting P and W, using the following data.

P	12	15	21	25
W	50	70	100	120

(b) Fit the curve $y = ae^{bx}$ to the following data:

x	2.30	3.10	4.00	4.92	5.91	7.20
y	33.0	39.1	50.3	67.2	85.6	125.0

8 (a) In a partially destroyed laboratory record, only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y = 107$ respectively. Calculate $\bar{x}$, $\bar{y}$ and the coefficient of correlation between x and y

(b) Three judges, A, B, C, give the following ranks. Find which pair of judges has common approach

A	1	6	5	10	3	2	4	9	7	8
B	3	5	8	4	7	10	2	1	6	9
C	6	4	9	8	1	2	3	10	5	7

SECTION - V

9 (a) There are two groups of objects: one of which consists of 5 science and 3 engineering subjects and the other consists of 3 science and 5 engineering subjects. An unbiased die is cast. If the number 3 or 5 turns up, a subject is selected at random from the first group, otherwise the subject is selected at random from the second group. Find the probability that an engineering subject is selected ultimately.

(b) X is continuous random variable with probability density function given by

$$f(x) = \begin{cases} kx, & 0 \le x < 2 \\ 2k, & 2 \le x < 4 \\ -kx + 6k, & 4 \le x < 6 \end{cases}$$ Find k and mean value of X

10 (a) Fit a Poisson distribution to the set of observations:

x	0	1	2	3	4
f	122	60	15	2	1

(b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.

R-13

Code : 13CS2101

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Computer Science & Engineering)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1 (a) What is Tautology? Verify Whether $(((P \vee Q)) \rightarrow R) \wedge (\neg P)) \rightarrow (Q \rightarrow R)$ is a Tautology?

(b) Prove that $P \rightarrow (Q \rightarrow R) \Leftrightarrow \neg P \rightarrow (P \rightarrow Q)$.

2 What is Disjunctive Normal form? Write the procedure to obtain DNF of a given formula.
Obtain the DNF of $P \rightarrow ((P \rightarrow Q) \wedge \neg(\neg Q \vee \neg P))$

SECTION - II

3 (a) Define Relation and explain the properties of Relation with examples.

(b) What is a poset? Explain with an example and draw its Hasse diagram.

4 (a) Fine the inverse of the following functions :
(i) $F(x) = 4e^{(2x+3)}$ and (ii) $F(x) = \sqrt[3]{7-3x}$

(b) Prove if f: A→B and g: B → C are bijective functions then $(g0f)^{-1} = f^{1}0g^{-1}$.

SECTION - III

5 Define abelian group and show that the set of rational numbers (Q) under usual addition is abelian?

6 (a) How many numbers can be formed using the digits 1,3,4,5,6,8 and 9 if no repetitions are allowed?

(b) In how many different orders can 4 men and 4 women be seated in a row of 8 seats if
(i) Any on may sit in any of the seats
(ii) The first and last seats must be filled by men
(iii) Men and women are seated alternatively
(iv) All members of same sex seated in adjacent seats

SECTION - IV

7 (a) Solve the recurrence relation $a_n - 3a_{n-1} = 5(3^n)$ *for* $n \geq 1$ given that $a_0 = 2$

(b) Find the general Solution of recurrence relation $a_n - 7a_{n-2} + 10a_{n-4} = 0$ *for* $n \geq 4$

8 Solve the recurrence relation $a_{n+2} - 10a_{n+1} + 21a_n = 3n^2 - 2$ *for* $n \geq 0$

SECTION - V

9 (a) Prove that in any graph the numbers of vertices of odd degree is even?

(b) Prove that two simple graphs G1 and G2 are isomorphic if and only if their complements $\overline{G_1}$ *and* $\overline{G_2}$ are isomorphic.

10 (a) Explain about Multi graph and Euler circuits with example.

(b) Explain about BFS and DFS methods.

R-13

Code: 13SH2101

B.TECH.DEGREE SUPPLEMENTARY EXAMINATION, NOVEMBER 2019

II B.Tech. I Semester

ENGINEERING MATHEMATICS - III

(Common to EEE & ECE)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1 Solve by the method of separation of variables, $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where $u(x,0) = 6e^{-3x}$

2 A tightly stretched string with fixed end points x=0 and x=L is initially at rest in its equilibrium position. If it is set vibrating by giving to each of its points a velocity $\lambda x(L - x)$, find the displacement of the string at any distance x from one end at any time t.

SECTION – II

3 a) Show that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}}\sin x$

b) Show that $J_{n-1}(x) + J_{n+1}(x) = \frac{2n}{x}J_n(x)$

4 Show that $(1 - 2xt + t^2)^{-\frac{1}{2}} = \sum_{n=0}^{\infty} t^n P_n(x)$

SECTION – III

5 a) Prove that $W = Z^2$ is analytic everywhere and hence find its derivative

b) Find the analytic function whose imaginary part is $V = x^2 - y^2 + \frac{x}{x^2 + y^2}$

6 a) Show that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$

b) Obtain the bilinear transformations which maps the points $z = \infty, i, 0$ into the points $w = 0, i, \infty$ respectively

SECTION - IV

7 a) State and prove Cauchy's Integral formula

b) Expand $f(z)=\dfrac{e^{2z}}{(z-1)^3}$ about $z=1$ as Laurent's series.

8 a) Find the poles and residues of $\dfrac{z\ e^{iz}}{z^2+a^2}$

b) Evaluate $\int_C \dfrac{z^2-2z}{(z+1)^2(z^2+4)}dz$ c : |z| = 3 using residue theorem

SECTION - V

9 a) Find $Z[n\cos n\theta]$

b) Evaluate $Z^{-1}\left[\dfrac{z^2}{(z-4)(z-5)}\right]$ using convolution theorem

10 Solve $y(n+2)+3y(n+1)+2y(n)=0$ given $y(0)=0$ and $y(1)=1$, using Z-transformation

R-13

Code: 13SH2102

B.TECH. DEGREE SUPPLEMETARY EXAMINATION, NOVEMBER 2019

II B.Tech I Semester

COMPUTATIONAL TECHNIQUES, STATISTICS AND COMPLEX ANALYSIS

(Civil Engineering)

Time : 3 hours Max Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section
All questions carry equal marks

SECTION-I

1 (a) Find the root of the equation $\cos x = xe^x$ using the method of false position correct to three decimal places.

(b) Find the positive root of $x^4 - x = 10$ correct to three decimal places, using Newton – Raphson method.

2. (a) Find the cubic polynomial which takes the following values

x:	0	1	2	3
$f(x)$:	1	2	1	10

Hence or otherwise evaluate $f(4)$

(b) A curve passes through the point (0,18) (1, 10) (3, -18) and (6, 90) find the slope of the curve at $x = 2$ by using Lagrange's formula.

SECTION-II

3 (a) Apply Gauss elimination method to solve the equations $x+4y-z=-5$, $x+y-6z=-12$, $3x-y-z=4$.

(b) Solve the equations by using Gauss–Jordan method $2x+y+z=10$, $3x+2y+3z=18$, $x+4y+9z=16$.

4 (a) Apply factorization method to solve the equations $3x+2y+7z=4$, $2x+3y+z=5$, $3x+4y+z=7$.

(b) Solve the equations: $10x_1-2x_2-x_3-x_4=3$, $-2x_1+10x_2-x_3-x_4=15$, $-x_1-x_2+10x_3-2x_4=27$, $-x_1-x_2-2x_3+10x_4=-9$ by Gauss – Seidal iteration method.

SECTION-III

5 (a) The following data gives the velocity of a particle for 20 seconds at an interval of 5 seconds. Find the initial acceleration using the entire data

Time t (sec)	0	5	10	15	20
Velocity v (m/sec)	0	3	14	69	228

(b) Find the maximum and minimum value of y from the following data

x:	-2	-1	0	1	2	3	4
y:	2	-0.25	0	-0.25	2	15.75	56

6 (a) Evaluate $\int_0^1 \frac{1}{1+x^2}dx$ using Trapezoidal rule taking $h=\frac{1}{4}$

(b) Use Simpson's 1/3 rule, to find $\int_0^{0.6} e^{-x^2}dx$ by taking seven ordinates.

SECTION-IV

7 (a) The probability density function of a variable X is

X:	0	1	2	3	4	5	6
$P(X)$:	K	$3K$	$5K$	$7K$	$9K$	$11K$	$13K$

(i). Find $P(X<4)$, $P(X\geq 5)$, $P(3<X\leq 6)$,
(ii) What will be the minimum value of K so that $P(X\leq 2)>3$.

(b) A variant X has the probability distribution.

x:	-3	6	9
$P(X:x)$	1/6	1/2	1/3

Find $E(X)$ and $E(X^2)$. Hence evaluate $E(2X+1)^2$

8 (a) Write the applications of the following distributions

(i) Binomial (ii) Poisson (iii) Normal

(b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.

SECTION-V

9 (a) Show that the function $f(z)=\sqrt{|xy|}$ is not analytic at the origin, although Cauchy – Riemann equations are satisfied at that point.

(b) Find the analytic function, whose imaginary part is $e^x(x\sin y+y\cos y)$

10 (a) Evaluate $\int_0^{1+i}(x-y+ix^2)dz$

(i) Along the straight line from z = 0 to $z = 1 + i$.
(ii) Along the real axis from $z = 0$ to $z = i$ and then along a line parallel to imaginary axis from $z = i$ to $z = 1 + i$

(b) Evaluate $\int_c \frac{e^{2z}}{(z+1)^4}dz$ around $c:|z-1|=3$ using Cauchy's integral formula.