Hall Ticket Number :

Code: 4G536 **R-14**

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Fluid Mechanics and Hydraulic Machines

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. a) Why dynamic viscosity of a gas decreases with temperature and that of liquids increases with temperature? 4M

   b) A thin flat plate of size 80 cm by 50 cm is moved horizontally between two horizontal plane boundaries at a distance of 2 cm from the top boundary and 3cm from the lower boundary. The viscosity of fluid above plate is 1.56 poises and the viscosity of fluid below the plate is 2.83 poises. What force is required to drag the plate at a horizontal velocity of 30 cm/s? 10M

OR

2. a) Classify the flows of fluids. Mention practical example for each type of flow 7M

   b) A pipe 450 mm in diameter branches into two pipes of diameters of 300 mm and 200 mm respectively. If the average velocity in 450 mm and diameter pipe is 3 m/s, find

   (i) Discharge through 450 mm diameter pipe

   (ii) Velocity in 200 mm diameter pipe if the average velocity in 300 mm pipe is 2.5 m/s 7M

UNIT-II

3. a) Derive Bernoulli's equation from fundamentals 7M

   b) Flow of water occurs in downward direction through a vertical tapering pipe. The height of taper pipe is 3.5 m and the diameter at section 1 is 20 cm. The rate of flow is 10,000 lpm. What should be the diameter if $p_1 = p_2$. Neglect losses of head. What would be the value of d if the flow is upward? 7M

OR

4. a) Explain working principle of Venturimeter with neat sketch 4M

   b) Two pipes, one of 10 cm diameter, 200m long and another of 15 cm diameter, 400 m long are connected in parallel. The friction factors are 0.0075 for the smaller pipe and 0.006 for large pipe. The total discharge through the system is 50 lps. Find the discharge and head loss in each pipe. Neglect minor losses. Calculate the equivalent length of a 20 cm diameter pipe having f =0.005 10M

UNIT-III

5. a) Derive an expression for the force exerted by a jet of water on moving inclined flat plate in the in the direction of jet 7M

   b) A nozzle of 40 mm diameter delivers a stream of water at 20 m/s perpendicular to a plate that moves away from the jet at 6 m/s. Find **(i)** the force on the plate **(ii)** the work done and **(iii)** the efficiency of the jet 7M

OR

6. a) Explain how you calculate power developed from a given catchment area. 7M

   b) Enumerate the different types of a hydro-electrical plants and explain concept of storage power plant and pumped storage power plant 7M

UNIT-IV

7. a) Explain the concept of Cavitation in Hydraulic Turbine and List out the different measures that are usually adopted to combat the effect of cavitation 7M

   b) Determine the appropriate scale ratio for a Kaplan turbine model to work under a head of 5 m and use water at the rate of 1.96 m^3/s. The prototype machine works under a head of 15 m and produces a power of 30,000 metric H.P. with a specific speed of 850. Assume that the model and prototype have same overall efficiency of 90%. Calculate the speed and power output of the model. 7M

OR

8. a) Draw a neat sketch of a Pelton Turbine and briefly indicate the functions of each component. 7M

   b) A Francis turbine is required to give an output power of 15000 KW while working under a head of 14 cm and a speed of 300 rpm. Calculate the guide vane and runner angles and the leading dimensions of the runner. Assume overall efficiency = 80, speed ratio= 0.75, flow ratio = 0.15, ratio of outer to inner diameters = 0.6 and percent flow area blocked by runner vanes thickness =4 7M

UNIT-V

9. a) Explain the working principle of Centrifugal pump with neat sketches 7M

   b) Determine the manometric and overall efficiencies of a centrifugal pump from the following data. Total head = 22 , discharge =160 lps, liquid pumped = brine of sp. Gr. 1.18, speed = 1200 rpm, diameter = 30 cm, width = 5 cm, shaft power = 55 KW and vane angle at outlet = 35^0. What is the type of impeller? 7M

OR

10. a) Give a comparative analysis of a centrifugal and reciprocal pumps 7M

    b) A single –acting reciprocating pump has a diameter (piston) of 100 mm and stroke length 200 mm. The length and diameter of the suction are 6.5 m and 50 mm respectively. If the suction lift of the pump is 3.2 m and separation occurs when pressure in the pump falls below 2.5 m of water absolute and manometer reads 763 mm of mercury, find the maximum speed at which pump can be run without separation in the suction pipe. 7M

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Hall Ticket Number :										

Code: 4GC32 **R-14**

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Engineering Mathematics

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. (a) Find the Fourier series expansion for $f(x) = \pi - x$ in$0 < x < \pi$.

   (b) Find the half-range sine series for $f(t) = t - t^2$ in $0 < t < 1$.

OR

2. (a) If $F(s)$ is the complex Fourier transform of $f(x)$ then prove that $F\{f(ax)\}=\frac{1}{a}F\left(\frac{s}{a}\right)$ $a \neq 0$.

   (b) Find the Fourier cosine transform of $(x) = e^{-ax}$ $(x > 0, a > 0)$.

UNIT-II

3. (a) Reduce A into Echelon form and determine its rank

$$A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$$

   (b) Solve the system of equations

$$x + 3y - z = 0; \quad 2x - y + 4z = 0; \quad x - 11y + 14z = 0.$$

OR

4. (a) List the properties of Eigen values and Eigen vectors.

   (b) Find the Eigen values and Eigen vectors of $A = \begin{bmatrix} 3 & 2 \\ 1 & 2 \end{bmatrix}$

UNIT-III

5. (a) Using the Newton-Raphson method, evaluate to two decimal places the root of the transcendental equation $f(x) = e^x - 3x = 0$. Using between 0 and 1.

   (b) Find the real root of the equation $x^3 + x$-1=0 using the method of iteration.

OR

6. Use Runge Kutta method to evaluate $y(0.1)$and $y(0.2)$ given that $y' = x + y$, $y(0) = 1$.

UNIT-IV

7. (a) Using Newton's forward interpolation formula and the given table values

x	1.1	1.3	1.5	1.7	1.9
y	0.21	0.69	1.25	1.89	2.61

Obtain $f(x)$ when $x = 1.4$

(b) Using Lagrange is interpolation formula find the value of $y(10)$ from the following table:

x	5	6	9	11
y	12	13	14	16

OR

8. Evaluate $\int_0^6 \frac{1}{1+x}dx$ by using

(i) Simpson's $\frac{1}{3}$ rule (ii) Simpson's $\frac{3}{8}$ rule.

UNIT-V

9. (a) Fit a straight line $y = a + bx$ from 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

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

OR

10. (a) Eliminate the arbitrary function from $z = x - y + f(x, y)$.

(b) Solve $\frac{\partial^2 u}{\partial x^2} - 2\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 0$

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Hall Ticket Number :										

R-14

Code: 4G231

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Switching Theory and Logic Design

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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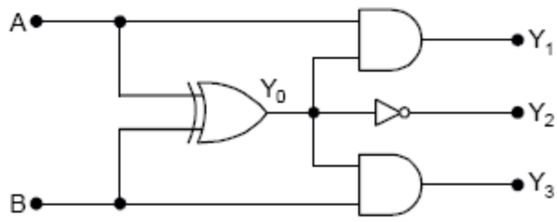
UNIT-I

1. a) Convert the following numbers as indicated:
   (i) Decimal 225.225 to binary, octal and hexadecimal.
   (ii) Binary 11010111.110 to decimal, octal and hexadecimal. 6M

   b) What is the Gray code? What are the rules to construct Gray code? Develop the 4 bit Gray code for the decimal 0 to 15. 8M

OR

2. a) Determine the purpose of digital circuit of Fig.



8M

   b) Verify that the (i) NAND (ii) NOR operations are commutative but not associate. 6M

UNIT-II

3. a) Simplify the following Boolean function for minimal SOP form using K-map and implement using NAND gates. $F(W,X,Y,Z)=\sum(1,3,7,11,15)+d(0,2,5)$ 6M

   b) Simplify the Boolean functions using tabular method and verify result with K-map. $F(x,y,z)=\sum(7,13,14,15)$. 8M

OR

4. a) What are the advantages of Tabulation method over K-map? Simplify the following Boolean function using Tabulation method.
   $Y(A,B,C,D)=\sum(0,1,2,3,5,7,8,9,11,14)$. 8M

   b) For the following function using K-map, Find minimal sum of products expression $T(W,X,Y,Z)=\sum(1,2,3,5,13)+d(6,7,8,9,11,15)$. 6M

UNIT-III

5. a) Design 2x4 decoder using NAND gates. 6M

   b) Realize the following functions using PLA
   f_1 (A, B, C) = ∑ (0, 2, 4, 5) f_2 (A, B, C) = ∑ (1, 5, 6, 7) 8M

OR

6. a) Design a BCD-to Gray code converter using
   (i) 8:1 multiplexers (ii) dual 4 : 1 multiplexers and some gates. 6M

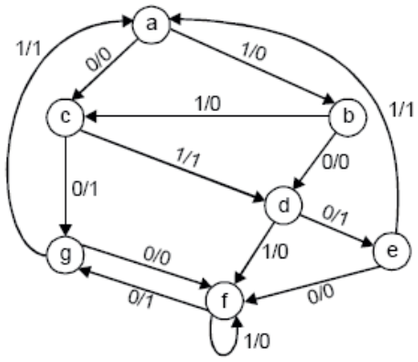
   b) For the given 3-input, 4-output truth table of a combinations circuit, tabulate the PAL programming table for the circuit.

Inputs			Output			
x	y	z	A	B	C	D
0	0	0	0	1	0	0
0	0	1	1	1	1	1
0	1	0	1	0	1	1
0	1	1	0	1	0	1
1	0	0	1	0	1	0
1	0	1	0	0	0	1
1	1	0	1	1	1	0
1	1	1	0	1	1	1

8M

UNIT-IV

7. a) For the state diagram shown in Fig below. Write state table & reduced state table.

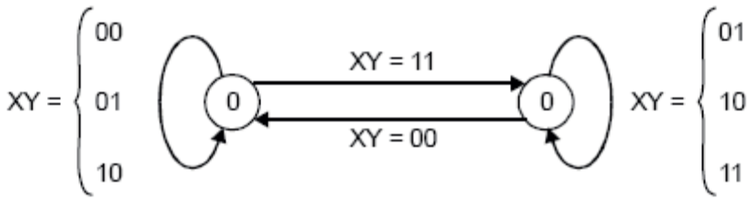


8M

b) Design an Excess-3 adder using 4-bit parallel binary adder and logic gates. 6M

OR

8. a) Design the circuit and draw the logic diagram of the sequential circuit specified by the following state diagram. Use an RS flip-flop.



7M

b) Design Mod-4 synchronous counter using J-K flip -flop 7M

UNIT-V

9. What are the conditions for the two machines are to be equivalent? For the machine given below, find the equivalence partition and a corresponding reduced machine in standard form:

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

14M

OR

10. a) Convert the following Mealy machine into a corresponding Moore machine.

PS	NS,Z	
	X=0	X=1
A	C,0	B,0
B	A,1	D,0
C	B,1	A,1
D	D,1	C,0

7M

b) Draw the portion of an ASM chart that specifies the conditional operation to increment register R during state T1 and transfer to state T2, if control inputs z and y are = 1 and 0 respectively. 7M

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Hall Ticket Number :										

R-14

Code: 4G232

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Electrical Machines-I

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. a) Explain the following terms as applied to a DC armature winding
   (i) Front Pitch
   (ii) Back Pitch
   (iii) Pole pitch
   (iv) Commutator Pitch 7M

   b) Draw the winding diagram of a lap winding for 6 poles, 18 slots with coil sides/slot, double layer showing therein position of poles, direction of motion, direction of generated emf. 7M

OR

2. a) Discuss the necessity of commutator and brush arrangement for operation of DC machine 7M

   b) Explain the working principle of a DC generator 7M

UNIT-II

3. a) List the methods used to improve the commutation problem. Explain resistance method in detail. 7M

   b) A 6 pole generator has wave-connected armature having 550 conductors. It delivers 150A current at full load and the brush lead is 120. Find the number of demagnetizing and cross magnetizing ampere turns per pole 7M

OR

4. a) Explain the armature reaction effect in the DC machine 7M

   b) A Short shunt DC compound generator is supplying 150A at 500V. The resistance of armature, series and shunt field windings are 0.04Ω, 0.025 and 300Ω respectively. Find the emf induced. If the same machine is connected as long shunt what will be induced emf. 7M

UNIT-III

5. a) Two shunt generators running in parallel are supplying a load of 300A. One generator is rated at 65kW and has regulation of 5% and other is rated at 130kW and has regulation of 6%. The voltage rating of both the machines is 500V. Assuming linear characteristic, find **(i)** the current supplied by each machine, and **(ii)** terminal voltage 7M

   b) Write a short note on parallel operation of shunt generator 7M

OR

6. a) Compare the external characteristics of all types of DC generators 7M

   b) Explain the characteristics of DC Generators 7M

UNIT-IV

7. a) A DC shunt motor working on 25A at 400V supply is running at 1200rpm. The armature resistance is 0.4Ω and shunt field resistance is 200Ω. Find **(i)** the back emf, **(ii)** mechanical power developed, **(iii)** gross torque, **(iv)** loss torque, **(v)** shaft torque and **(vi)** BHP. Assume stray losses to be 400W. 7M

   b) Describe the armature reaction and commutation effect in DC motor 7M

OR

8. a) A 50kW ,500V DC shunt generator has armature resistance 0.04Ω and 250Ω resp. Find the total armature power developed when it works as **(i)** generator supplying 50kW output, and **(ii)** motor taking 50kW input 7M

   b) Explain the working of 3-point starter 7M

UNIT-V

9. a) What are stray losses? How are they separated in DC motors 4M

   b) When retardation test is performed on the separately excited DC machine, the induced voltage falls from 200V to 185V in 20 seconds when the armature is disconnected from the supply. If the armature connection id changed suddenly from supply to load, it takes 12 A (average) in 6 seconds. Find the efficiency of the machine running as a motor and taking a current of 30 A at 200 V supply. The armature and field resistances are 0.3Ω and 200Ω, respectively. 10M

OR

10. a) Describe Swinburne's test for DC motors? Explain why it is considered as economical method for testing DC shunt machines? 6M

    b) A field test of two DC series machines gives the following results: Motor armature current is 50A at 500V. Drop across motor field winding is 38V. Generator armature current is 400 A at 400V. Drop across the generator field is 37 V. The armature resistance of each machine is 0.25Ω. Find the efficiency of each machine. 8M

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Hall Ticket Number :										

R-14

Code: 4G233

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Electrical Circuits-I

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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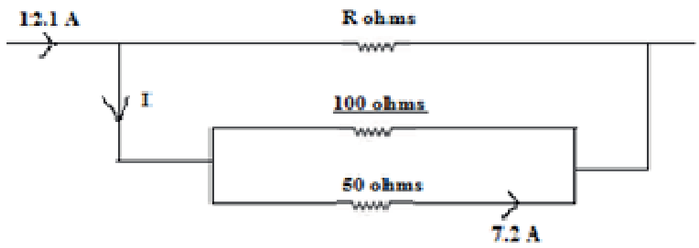
UNIT-I

1. a) State and Explain Kirchhoff's Laws 6M

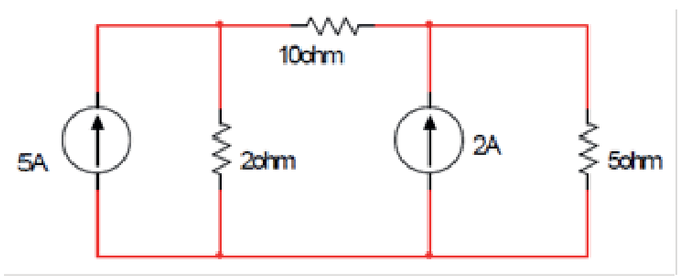
   b) Find the value of 'R' for the circuit shown in figure



8M

OR

2. a) Find the current through 5Ω resistor for the circuit shown in figure

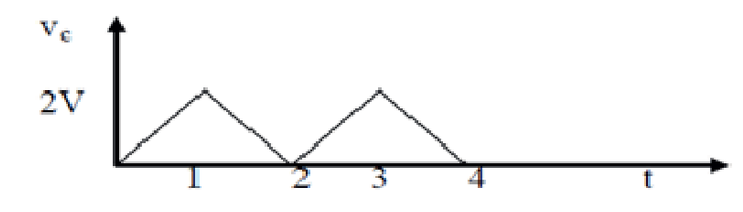


7M

   b) By means of an example explain the source transformation technique adopted in electric circuits 7M

UNIT-II

3. a) Find the RMS Value and form factor of the following periodic wave shown in figure.

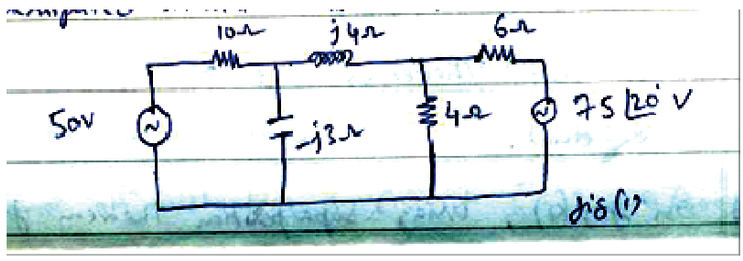


7M

   b) Draw the locus diagram for RL circuit with R varied from zero to infinity. 7M

OR

4. a) Determine the voltage drop across 4Ω resistor for the circuit shown in figure.



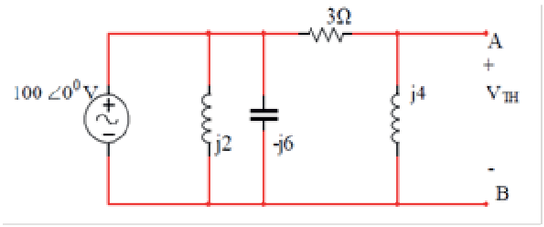
7M

   b) Define resonance frequency and half power frequency. Derive the expression for band width of a series resonant circuit. 7M

UNIT-III

5. a) Derive the condition for maximum power transfer in DC circuits 7M

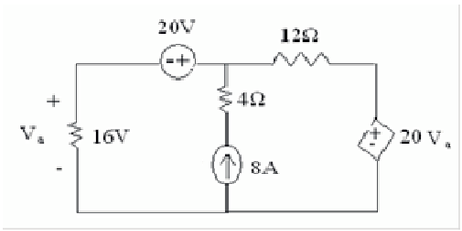
   b) Find the load impedance that draws maximum power and the amount of maximum power drawn for the circuit shown in figure.



7M

OR

6. a) Find the voltage drop across16Ω resistor using super position theorem for the circuit shown in figure



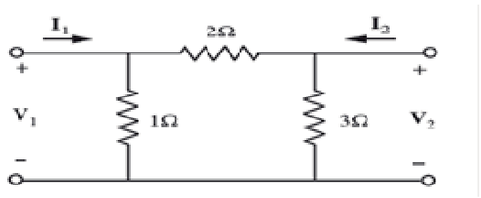
7M

   b) State and Explain compensation theorem 7M

UNIT-IV

7. a) Express Z-parameters in terms of Y-parameters for a two-port network 7M

   b) Find ABCD parameters for the two-port network shown in figure

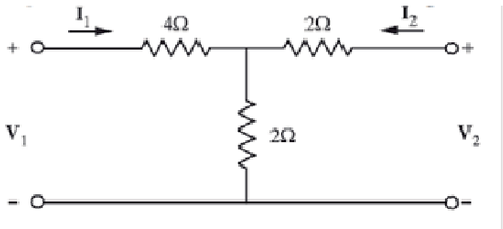


7M

OR

8. a) Find the combined network parameters for 2 two-port networks connected in parallel. 7M

   b) Determine the impedance parameters for the two-port network shown in figure



7M

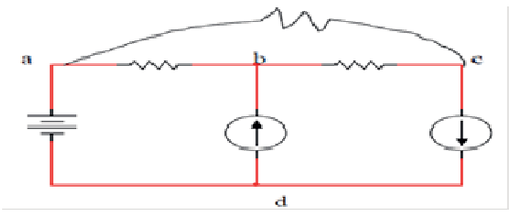
UNIT-V

9. a) Derive the expression for coefficient of coupling for two mutually coupled coils. 7M

   b) Obtain the effective inductance of two mutually coupled coils connected in series aiding and opposition. 7M

OR

10. a) Draw the graph and obtain the basic cutset matrix for the circuit shown in figure



7M

   b) Obtain the Dual of Series RLC network 7M

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Hall Ticket Number :

R-14

Code: 4G234

II B. Tech. I-Semester Regular Examinations Nov/Dec 2015

Electromagnetic Fields

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. a) Derive the expressions for the electric field intensity and potential at a point p which is situated 'h' meter away from the disc along its axis. The disc is charged uniformly with a charge density of ρ_s c/m^2? 10M

   b) What is the highest possible potential of an isolated spherical conductor of radius 0.4 m? Assume the strength of air is 60 kv/cm? 4M

OR

2. a) State and explain Gauss law? 7M

   b) Derive the equation for potential at a point inside a solid sphere having uniform volume charge density? 7M

UNIT-II

3. a) Give the expression for capacitance of coaxial cable with two dielectrics? 7M

   b) The capacitance of a condenser formed by two parallel metal sheets, each 100cm^2 in area separated by a dielectric 2 mm thick is 2 x 10^{-4} μf. A potential of 20 kv is applied. Find **(i)** electric flux **(ii)** potential gradient in kv/cm **(iii)** the relative permittivity of the material **(iv)** electric flux density? 7M

OR

4. a) What is dipole? Derive the expression for potential due to a dipole? 8M

   b) In a material for which σ = 5 s/m and ε_r =1, the electric field intensity is E= 200sin10^5t v/m, find the conduction and displacement current densities? 6M

UNIT-III

5. a) Derive an expression for magnetic field intensity of any point on the axis of circular coil carrying current? 7M

   b) A solenoid with radius 2 cm is wound with 20 turns/cm and carries 10 mA. Find H at the center of solenoid if the length is 10 cm. if all the turns of the solenoid were compressed in to a ring of radius 2 cm. what would be the magnetic field intensity at the center of the ring? 7M

OR

6. a) Explain the vector magnetic potential and derive its expression? 7M

   b) If the vector potential A is given as A=5(x^2+y^2+z^2) a_x. Find out flux density? 7M

UNIT-IV

7. a) Derive an expression for force between two straight long parallel conductors carrying currents in the same direction? 7M

   b) What is the maximum torque on a square loop of 1000 turns in a field of intensity of 1 tesla? The loop has 10 cm sides and carries 3 A current. What is the magnetic moment of the loop? 7M

OR

8. a) Derive an expression for inductance of solenoid? 7M

   b) A 6000 turns solenoid is 3 m long and has a diameter 10 cm calculate the inductance of the solenoid and energy stored when a current of 12 A is flowing through the coil? 7M

UNIT-V

9. a) State Maxwell's equations, and obtain them in differential form? 7M

   b) In a material for which σ= 10 S/m and ε_r = 1, the electric field intensity is E = $200\sin 10^{10}t$ V/m. find the conduction and displacement current densities and the frequency at which they have equal magnitudes? 7M

OR

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

    b) A circular cross section conductor of radius 3 mm carries a current $i_c = 5\text{Sin}(6\text{x}10^8)$ μA what is the amplitude of the displacement current density if σ = 40 ms/m and ε_r = 1 ? 7M

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