Hall Ticket Number :										

R-15

Code: 5G234

II B.Tech. I Semester Supplementary Examinations February 2022

Electromagnetic Fields

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. a) State and explain vector form of Coulombs law? 4M

   b) Derive the expression for 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

OR

2. a) The flux density D=r/3 a_r nC/m^2 in free space. Find
   (i) E at r=0.2m
   (ii) The total electric flux leaving the sphere af r=0.3m
   (iii) The total charge within the sphere of r=0.3m 10M

   b) Six equal charges Q=100 nC are located at x=5, 6, 7, 8, 9 and 10 meters. Find the potential at the origin. 4M

UNIT–II

3. a) Deduce the boundary conditions for dielectric to dielectric with tangential and normal component? 7M

   b) Derive the equation for capacitance of two parallel transmission lines. 7M

OR

4. a) State the properties of Dielectric materials 5M

   b) Derive the Ohm's law in point form? 9M

UNIT–III

5. a) Derive and explain the relationship between Magnetic flux, magnetic Field Intensity and Magnetic Flux density. 7M

   b) Describe the few applications of Ampere's circuital law? 7M

OR

6. a) State and explain Amperes circuital law. 7M

   b) Explain vector magnetic potential and derive its expression. 7M

UNIT–IV

7. Explain the magnetization and demagnetization by using B-H curve with neat diagram. 14M

OR

8. a) Derive Lorentz Force Equation. 8M

   b) Calculate the inductance of a solenoid 8 cm in length, 2 cm in radius having relative permeability of 100 and carrying 800 turns of wire. 6M

UNIT–V

9. a) State and explain Faradays laws of electromagnetic induction. 7M

   b) A circular loop of 10 cm radius is located in the x-y plane in a field given by $\overline{B}$ =0.5cos377t(3a_y+4a_z) Tesla. Find the emf induced in the loop. 7M

OR

10. a) State and explain Poynting Theorem and Poynting vector 7M

    b) Given a time varying field E=10sin (ωt- βz)a_x V/m in free space, find (i) H (ii) Time average power and (iii) total average power crossing the area of 10x10^{-4} a_z. 7M

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Hall Ticket Number :										

R-15

Code: 5G232

II B.Tech. I Semester Supplementary Examinations February 2022

Electrical Machines-I

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. a) Explain the principle of energy conversion of electromechanical system. 7M
   b) Write energy balance equation. 7M

OR

2. a) Explain the construction of a DC machine with neat sketch & explain the function of each part in detail. 7M
   b) Compare the Lap and Wave windings 7M

UNIT–II

3. a) Derive the E.M.F Equation in DC generator. 7M
   b) An 8-pole DC Generator has per pole flux of 30 mWb and winding is connected in lap with 600 conductors. Calculate the generated E.M.F on open circuit when it runs at 500 rpm. If armature is wave wound at what speed the machine be drive to generate same E.M.F. 7M

OR

4. a) Explain any two methods of improving the commutation 7M
   b) An 8 pole generator has an output of 200A at 500V; the lap connected arm has 1280 conductors, 160 commutator segments. If the brushes are advanced by 4 segments from the no load neutral axis, estimate the armature demagnetizing and cross-magnetizing ampere turns/pole. 7M

UNIT–III

5. a) Explain the voltage build up process in separately excited generator & also state the causes why self excited generator fails to develop the voltage? 7M
   b) Explain the external and internal characteristics of DC shunt generator 7M

OR

6. a) Explain the advantages & disadvantages with the parallel operation of DC generators. 7M
   b) Two D.C shunt generators with E.M.F's of 120 V and 115 V, armature resistance of 0.05 ohms and 0.04 ohms and field resistances of 20 ohms and 25 ohms respectively are in parallel supplying a load of 25 kW. How do they share load? 7M

UNIT–IV

7. a) Explain the working principle of DC motor. 7M
   b) A 250V DC shunt motor on no load runs at 1000 r.p.m and takes a current of 5A. The armature & field resistances are 0.25Ω & 250Ω respectively. Calculate the speed of a motor when it takes a current of 41A. the armature reaction weakens the flux by 4%. 7M

OR

8. Explain the various method of speed control used for D.C. shunt motor. Discuss their merits & demerits 14M

UNIT–V

9. a) Explain the Swinburne's test with neat sketch 7M
   b) When running on no-load, a 400-V shunt motor takes a current of 5A. armature resistance is 0.5 Ω & filed resistance is 200 Ω. Find the output of a motor & efficiency when running on full load & taking a current of 50 A. also find the % change in speed from no load to full load. 7M

OR

10. a) What is Hopkinson's test? What are the advantages of this method of testing? 7M
    b) What are the various methods of finding inertia of motor? Explain any one method. 7M

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Hall Ticket Number :										

R-15

Code: 5G539

II B.Tech. I Semester Supplementary Examinations February 2022

Fluid Mechanics and Hydraulic Machines

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	Blooms Level

UNIT–I

1. a) Define the following properties of the fluid.
   i) Specific Weight ii) Specific Gravity iii) viscosity iv) Surface Tension — 8M
   b) Calculate the Density, Specific weight and Specific gravity of One liter of liquid, which weighs 7N. — 6M

OR

2. a) Explain the property viscosity of a fluid. Also describe its variation with temperature. — 7M
   b) The dynamic viscosity of an oil used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4 m and rotates at 190 r.p.m. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of oil film is 1.5 mm. — 7M

UNIT–II

3. a) Explain the minor losses in pipes briefly. — 7M
   b) At a sudden enlargement of water main from 240 mm to 480 mm diameter, the hydraulic gradient rises by 10 mm. Estimate the rate of flow. — 7M

OR

4. State the Bernoulli's theorem and derive the Bernoulli's equation completely from the fundamental Euler's equation of fluid motion. — 14M

UNIT–III

5. a) Derive an expression for force exerted by the jet on the flat vertical plate moving in the direction of the jet. — 8M
   b) A nozzle of 50 mm diameter delivers a stream of water at 20 m/sec perpendicular to the plate that moves away from the jet at 5m/sec. Find i) the force on the plate ii) the work done ii) the efficiency of the jet. — 6M

OR

6. a) What is pumped storage power plant and explain its concept. 7M

   b) Describe the various storage requirements of hydroelectric power station. 7M

UNIT–IV

7. a) Explain the various parts of Pelton turbine and its working with the neat sketch. 8M

   b) A Pelton wheel has a mean bucket speed of 10m/sec with a jet water flowing at the rate of 700 liters per second under a head of 30 meters. The bucket deflects the jet at angle of 160^0. Calculate the power given by the water to the runner and the hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98. 6M

OR

8. a) Define the unit quantities and describe them with expressions 8M

   b) A turbine develops 500 kW power under a head of 100 meters at 200 r.p.m. What would be its normal speed and output under a head of 81 meters 6M

UNIT–V

9. a) Explain the working principle of single acting reciprocating pump with neat sketch. 7M

   b) Define indicator diagram and also show that area of indicator diagram is proportional to the work done by the reciprocating pump. 7M

OR

10. a) Define slip, percentage of slip and negative slip of the reciprocating pump 7M

    b) A single acting reciprocating pump running at 50 r.p.m., delivers 0.01 m^3/sec of water. The diameter of the piston is 200 mm and stroke length 400 mm. Determine:

    i) The theoretical discharge of pump ii) coefficient of discharge iii) slip and percentage of slip of the pump. 7M

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Hall Ticket Number :										

R-15

Code: 5G231

II B.Tech. I Semester Supplementary Examinations February 2022

Switching Theory and Logic Design

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	State and prove Demorgan's theorems for three variables.	7M		
	b)	What are Universal gates? Realize AND and OR gates using NOR gates.	7M		
		OR			
2.	a)	i) Convert the hexadecimal number 68BE to binary and convert it from binary to octal ii) Express the number $(26.24)_8$ in Decimal iii) Implement AND Gate using NAND Gates.	7M		
	b)	Obtain the i) 1's and 2's complement of 11011010 ii) 9'S and 10'S Complement of 12345678	7M		
		UNIT–II			
3.	a)	Simplify the following Boolean functions to minimum number of literals. i. F = ABC + ABC' + A'B. ii. F = (A+B)' (A'+B').	8M		
	b)	What is K-map? State advantages and limitations of K-map?	6M		
		OR			
4.	a)	Simplify the following Boolean function for minimal SOP form using K-map and implement using NAND gates. *F (W X Y Z)* =Σ(1,3,7,11,15) + *d*(0, 2,5)	8M		
	b)	Define prime implicant and essential prime implicant with example using K-map.	6M		
		UNIT–III			
5.	a)	Implement full adder circuit using 3X8 Decoder.	7M		
	b)	Implement the following Boolean functions using PROM $F_1(A_1,A_0)$= Σm(1,2) F2(A_1,A_0)= Σm(0,1,3).	7M		
		OR			
6.	a)	Design 2x4 decoder using NAND gates.	7M		
	b)	Realize the following functions using PLA f1 (A, B, C) = Σ (0, 2, 4, 5) f2 (A, B, C) = Σ (1, 5, 6, 7).	7M		
		UNIT–IV			
7.	a)	Compare Synchronous and asynchronous sequential circuits.	7M		
	b)	Differentiate between positive edge triggered and negative edge triggered flip- flops	7M		
		OR			
8.	a)	Draw the excitation tables of SR, JK and T flip flops.	7M		
	b)	Explain the operation of twisted ring counter with the help of logic diagram and its timing diagrams.	7M		
		UNIT–V			
9.	a)	Explain the salient features of ASM chart.	7M		
	b)	List the capabilities and limitations of finite state machines.	7M		
		OR			
10.	a)	Explain the minimization procedure for determining the set of a completely specified sequential machine.	7M		
	b)	What are the rules to convert Mealy to Moore model?	7M		

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Hall Ticket Number :										

R-15

Code: 5G233

II B.Tech. I Semester Supplementary Examinations February 2022

Electrical Circuits-I

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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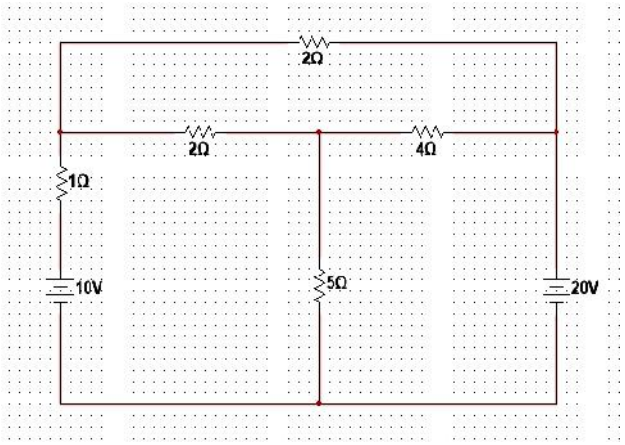
Marks

UNIT–I

1. Define the following terms
   Tree (ii) Branch (iii) Link (iv) Loop (v) Graph(vi) Cut set and (vii) Tie set 14M

OR

2. Draw Graph Tree and find the basic cutest matrix for the given electrical network below.



14M

UNIT–II

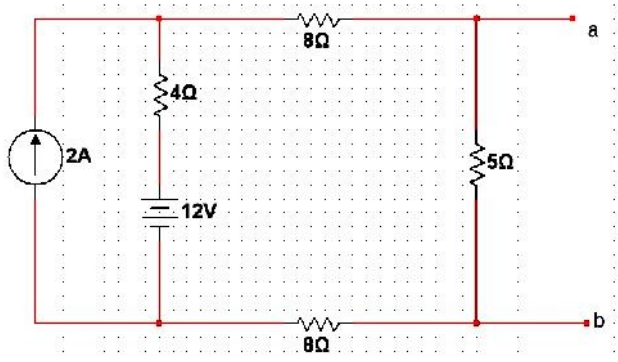
3. a) With neat diagrams explain different types of alternative signals and also explain about phase difference. 7M
   b) Explain the significance of operator j in ac circuits 7M

OR

4. a) Give the detailed comparison of series and parallel resonant circuits. 7M
   b) Two impedances Z_1=(8+j6) ohms and Z_2=(4-jX_c) ohms are connected in parallel. Find the value of X_c such that the circuit resonates. 7M

UNIT–III

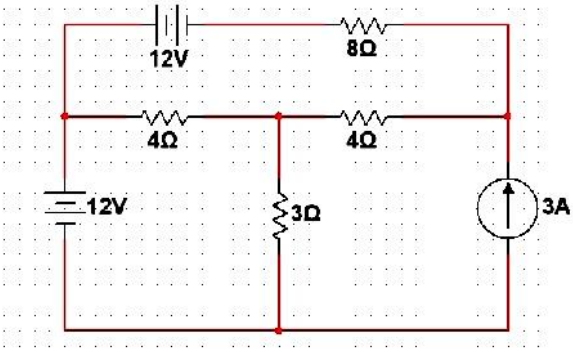
5. a) State and explain Nortons theorem. 7M
   b) Verify Nortons theorem for the given circuit to find the current through load resistance R= 10 ohms connected across a and b terminals.



7M

OR

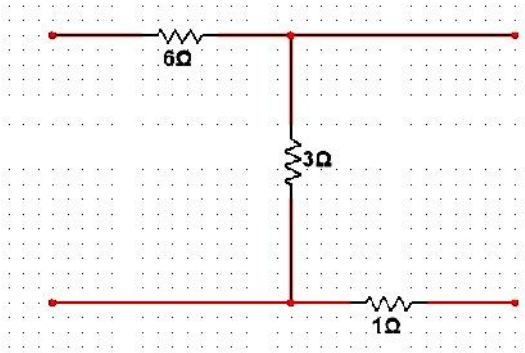
6. Find the current through 3 ohms resistor using super position theorem 14M



UNIT–IV

7. a) Obtain the relation between Hybrid and ABCD parameters. 7M

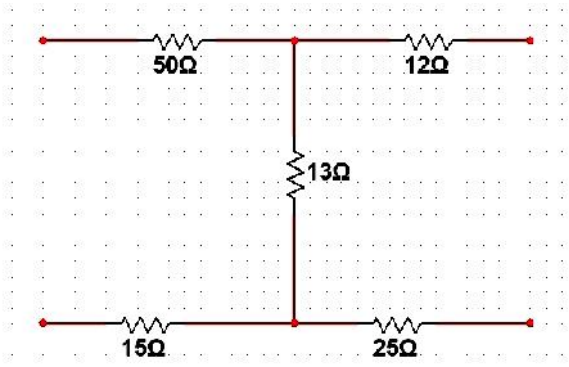
   b) Determine Y parameters for the given network



7M

OR

8. a) Determine ABCD parameters for the given network.



14M

UNIT–V

9. a) Derive the expression for mutual inductance in terms of flux and current. 7M

   b) Define (i) Flux (ii) m.m.f (iii) Reluctance (iv) Magnetic field intensity. 7M

OR

10. a) Develop an expression for equivalent inductance of two coupled coils of self-inductances L_1 and L_2 connected in series aiding and opposing with mutual inductance M. 7M

    b) Two coils connected in series aiding fashion have a total inductance of 250 mH. When connected in series opposing configuration, the coils have a total inductance of 150 mH. If the inductance of one coil is 3 times the other find L_1, L_2 and M. What is the coupling coefficient? 7M

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