Hall Ticket Number :										

R-15

Code: 5G233

II B.Tech. I Semester Supplementary Examinations March 2021

Electrical Circuits-I

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

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

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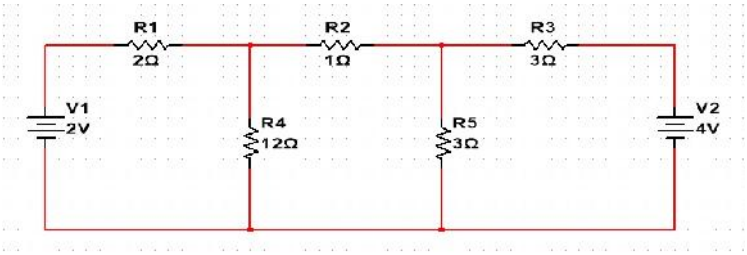
UNIT–I

1. a) Explain in detail the V-I relationship for R, L and C with neat diagrams.
   b) What is current and voltage division rule?

OR

2. a) Find the current through R_4=12 ohms resistance for the circuit shown below using nodal analysis.



UNIT–II

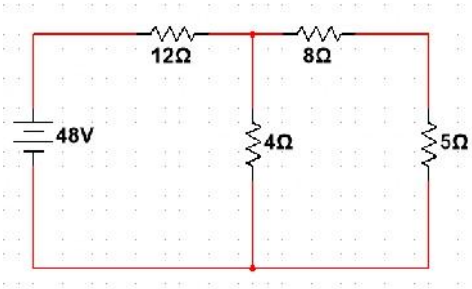
3. a) Define Time period and form factor.
   b) Discuss about power triangle and power factor in ac circuits.

OR

4. a) Define the terms (i) Resonant Frequency(ii) Band width(iii)Resonance(iv) Q-factor
   b) Derive the expression for resonant frequency bandwidth for a parallel RLC circuit.

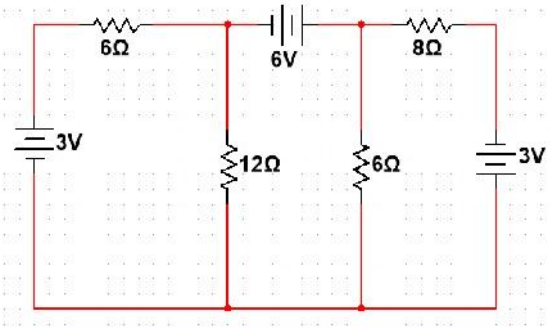
UNIT–III

5. a) State and explain super position theorem for DC circuits with an example.
   b) Find the current through 5 ohms resistor using Thevenins theorem



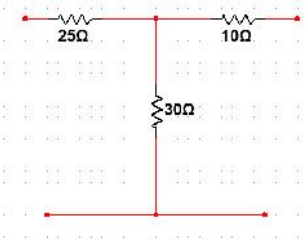
OR

6. Verify Tellegens theorem for the given circuit



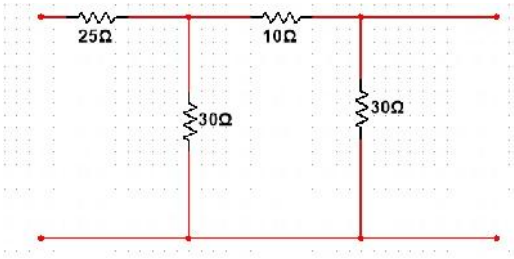
UNIT–IV

7. Find Z parameters for the given network



OR

8. Find Y parameters for the given network



UNIT–V

9. a) Explain self and mutual inductance in coupled magnetic circuits.

   b) What is a magnetic circuit? Compare magnetic circuit with an electrical circuit.

OR

10. A steel ring of 180 cm mean diameter has a cross sectional area of 250 mm^2. Flux developed in the ring is 250 micro webers. When a 4000 turns coil carries certain current. Calculate (i) m.m.f required (ii) Reluctance (iii) current in the coil. Assume relative permeability of steel is 1100.

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Hall Ticket Number :										

R-15

Code: 5G234

II B.Tech. I Semester Supplementary Examinations March 2021

Electro Magnetic Fields

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

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

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UNIT–I

1. a) State and explain Gauss law in Integral form.
   b) Derive the equation for potential at a point inside a solid sphere having uniform charge density?

OR

2. a) Define Potential and Potential difference?
   b) A 300 nC of charge is uniformly distributed around a circular disc of radius 4 m. Find the potential at a point on the axis 5m from the plane of the ring.

UNIT–II

3. a) Define Dipole and Dipole moment? Derive the expression for potential due to dipole?
   b) Explain Polarization of dielectric materials?

OR

4. Explain the phenomenon of polarization when a dielectric slab is subjected to an electric field with the help of neat sketches. How this phenomenon reduces the electric field inside the dielectric.

UNIT–III

5. a) Obtain an expression for Magnetic field intensity due to an infinitely long current carrying conductor?
   b) Derive the expression for Vector Magnetic Potential.

OR

6. A solenoid with 2 cm radius 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 is compressed in to a ring of radius 2 cm what would be the magnetic field intensity at the center of the ring?

UNIT–IV

7. a) What is a magnetic dipole? How does it differ from an electric dipole?
   b) Derive the expression for inductance of a solenoid using Amperes circuital law.

OR

8. Derive the expression for force between two long parallel current carrying conductors placed in a magnetic field.

UNIT–V

9. a) Distinguish clearly the dynamically induced EMF and statically induced EMF explain with neat diagram.
   b) Find the EMF developed around a circular path with radius r=0.5m in the plane z=0 at t=0 if(i) $B=0.1 \sin(377t)a_{z,}$(ii) $B=0.1\sin(377t/r)a_{r.}$

OR

10. Compare and Contrast Electric and Magnetic Fields?

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Hall Ticket Number :										

R-15

Code: 5G232

II B.Tech. I Semester Supplementary Examinations March 2021

Electrical Machines-I

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 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) Distinguish the methods to avoid sparking at the brushes in a DC machine? 7M

   b) A 4-pole motor has a wave connected armature with 888 conductors. The brushes are displaced backward through 5 mechanical degrees from the geometric neutral plane. If the total armature current is 90A. Calculate the cross and demagnetized ampere turns per pole. 7M

OR

4. Explain the reactance voltage in case of a DC machine. 14M

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. 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? 14M

UNIT–IV

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

OR

8. A 4-pole, lap wound DC motor has 540 conductors. Its speed is found to be 1000rpm. The flux per pole is 25 mwb. It is connected to 230 Volts dc supply. Ra is 0.8Ω. Calculate induced emf and armature current. 14M

UNIT–V

9. 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

OR

10. a) Explain the fields test to determine the efficiency of a dc series machine. 7M

    b) Describe the Swinburne's test to determine the no-load losses of a dc machine. 7M

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Hall Ticket Number :										

R-15

Code: 5G539

II B.Tech. I Semester Supplementary Examinations March 2021

Fluid Mechanics and Hydraulic Machines

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

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

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UNIT–I

1. a) Define the following properties of the fluid.
   i) Specific Weight ii) Specific Gravity iii) viscosity iv) Surface Tension 08M
   b) Calculate the Density, Specific weight and Specific gravity of One liter of liquid, which weighs 7N. 06M

OR

2. a) Explain the phenomenon of Surface Tension. 08M
   b) Find the surface tension in a soap bubble of 40mm diameter when the inside pressure is 2.5 N/m^2 above atmospheric pressure. 06M

UNIT–II

3. a) Describe the Reynolds's experiment with neat sketch 07M
   b) Explain the TEL and HGL with neat sketch. 07M

OR

4. a) The water is flowing through the taper pipe of length 100m having diameters 600mm at the upper end and 300mm at the lower end, at the rate of 50litres/sec. The pipe has the slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher end is 19.62 N/cm^2. 08M

UNIT–III

5. Explain the elements of hydroelectric power station with neat sketch. 14M

OR

6. A jet of water of diameter 75 mm moving with a velocity of 25m/sec strikes a plate in such a way that the angle between the jet and plate is 60^0. Find the force exerted by the jet on the plate (i) in the direction normal to the plate (ii) in the direction of the plate. 14M

UNIT–IV

7. a) Explain the classification of turbines. 08M
   b) Define the various types of efficiencies of hydraulic turbines. 06M

OR

8. a) Explain the Draft tube theory and list out its functions. 08M
   b) A water turbine has a velocity of 6 m/sec at the entrance to the draft tube and velocity of 1.2 m/sec at the exit. For friction losses of 0.1m and tail water 5m below the entrance to the draft tube, find the pressure head at the entrance. 06M

UNIT–V

9. Define centrifugal pump. Explain the working of single stage centrifugal pump with neat sketch. 14M

OR

10. A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 r.p.m. works against a total head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/sec. The vanes are set back at an angle of 40^0 at outlet. If the outer diameter of the impeller is 500mm and width at the outlet is 50mm, determine: (i) Vane angle at inlet (ii) Work done by the impeller on water per second (iii) manometric efficiency. 14M

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Hall Ticket Number :										

R-15

Code: 5GC32

II B.Tech. I Semester Supplementary Examinations March 2021

Mathematics Methods-III

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

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

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UNIT–I

1. Verify Cayley-Hamilton theorem for the matrix $A=\begin{bmatrix}6 & 2 & 1\\ 6 & 1 & 2\\ 7 & 2 & 2\end{bmatrix}$ and find its inverse.

OR

2. Discuss for values of a and « the simultaneous equations $x+y+z=6$; $x+2y+3z=10$; $x+2y+$ a $z=$ « have (i) unique solution, (ii) no solution and (iii) infinite number of solutions

UNIT–II

3. Employ Taylor's method to obtain appropriate value of y at $x=0.2$ for the differential equation $\frac{dx}{dy}=2y+3e^{x}$, $y(0)=0$. Compare the numerical solution obtained with the exact solution.

OR

4. Find a root of the equation $x^3-2x-5=0$, using the Bisection method correct to three decimal places.

UNIT–III

5. Find first and second derivatives of y at x=1.5 if

x	1.5	2	2.5	3	3.5	4
y	3.375	7.000	13.625	24.000	38.875	59.000

OR

6. Use Lagrange's interpolation formula to find the value of y when $x=10$,if the following values of x and y are given

x	5	6	9	11
y	12	13	14	16

UNIT–IV

7. Form the partial differential equations (by eliminating the arbitrary constants and arbitrary functions) from

$(i)\ z=ax+by+a^2+b^2$ and $(ii)\ z=f(x+ay)+g(x-ay)$

OR

8. a) Solve $(mz-ny)p+(mx-lz)q=(ly-mx)$

   b) Solve $q^2=z^2p^2(1-p^2)$

UNIT–V

9. Obtain the Fourier series for the function $f(x)=x-x^2$ in the interval $[-®,®]$ Hence show that $\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+---+\infty=\frac{®^2}{12}$

OR

10. Find the sine and cosine transform of $f(x)=\begin{cases}\sin x, 0<x<a\\ 0, x\geq a\end{cases}$

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Hall Ticket Number :										

R-15

Code: 5G231

II B.Tech. I Semester Supplementary Examinations March 2021

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 (5 x 14 = 70 Marks)

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UNIT–I

1. a) Solve the Following
   i) $(456.25)_{10}$ = (_____)$_{16}$
   ii) $(1011101.001)_2$ = (_____)$_8$
   iii) $(21C.DC)_{16}$ = (_____)$_2$
   iv) $(56.24)_8$=(_____)$_{10}$
   b) Represent +25 and -25 in sign magnitude, sign 1's complement and sign 2's complement representation.

OR

2. a) Distinguish between weighted and non-weighted codes with examples.
   b) Represent the Decimal number 8620 in i) BCD ii) Excess 3 iii) Gray Codes.

UNIT–II

3. a) Simplify the the following Boolean functions to minimum number of literals.
      i) xy+y'z'+wxz' ii) w'x'+x'y'+w'z'+yz
   b) What is the difference between canonical form and standard form? Which form is preferable while implementing a Boolean function with gates?

OR

4. Simplify the following Boolean expressions using K-map and implement them using NOR gates:
   i. F (A, B, C, D) = AB'C' + AC + A'CD'.
   ii. F (W, X, Y, Z) = W'X'Y'Z' + WXY'Z' + W'X'YZ + WXYZ.

UNIT–III

5. a) Implement full adder using two half adders. Give the internal logic function and truth table.
   b) Compare Programmable logic devices.

OR

6. Design a combinational circuit using PROM. The circuit accepts a 3 bit binary number and generates its equivalent excess 3 code.

UNIT–IV

7. a) Distinguish between combinational and sequential circuits.
   b) Explain clocked sequential circuits with an example.

OR

8. Design a sequential circuit with two D-Flip-Flops A and B and one input x. When x=0, the state of the circuit remains the same. When x=1, the circuit goes through the state transitions from 00 to 01 to 11 to 10 back to 00 and repeats.

UNIT–V

9. a) Compare between Moore and Mealy machine.
   b) Discuss the various blocks ASM chart.

OR

10. 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

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