Hall Ticket Number :										

R-15

Code: 5G233

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

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. In the circuit of fig 1, simplify the network using network reduction technique to find the current supplied by the battery.

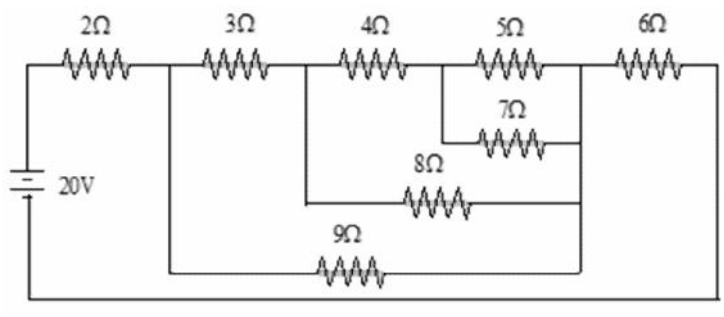

Fig 1

14M

OR

2. In the network of fig 2, find the voltage across the 5 ohm resistor using mesh current analysis.

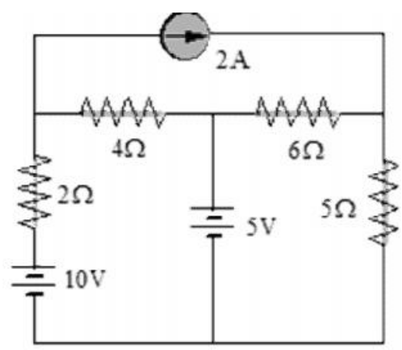

Fig 2

14M

UNIT–II

3. a) Define and determine the Average and RMS values of a sinusoidal voltage. 7M

   b) A series circuit having a resistance and a capacitance draws a current of 2.4A from a 100V, 50Hz, single phase ac supply. The power consumed in the circuit is 80W. Determine the values of resistor and capacitor. 7M

OR

4. a) Derive the formula for the resonant frequency of a series RLC circuit. 7M

   b) Two impedances Z_1 = (8 + j6) ohm and Z_2 = (4 – jX_C) ohm are connected in parallel. Find the value of X_C such that the circuit resonates. 7M

UNIT–III

5. State and explain Norton's theorem with an example. 14M

OR

6. In the circuit of fig 3, determine the impedance to be connected across the load terminals for maximum power transfer if the load consists of a resistance in series with a reactance. Also, find the value of the maximum power transferred.

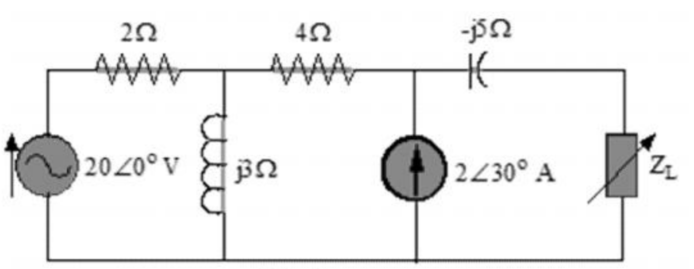

Fig 3

14M

UNIT–IV

7. a) Define the hybrid parameters of a 2 port network. 7M

b) Determine the Z parameters of the network shown in fig 4.

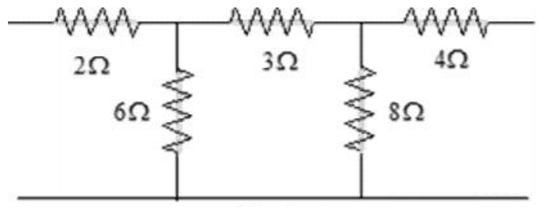

Fig 4 7M

OR

8. Two, 2 port networks are connected in parallel. The Z parameters of the networks are given below:

$$Z_A = \begin{bmatrix} 11 & 3 \\ 4 & 5 \end{bmatrix} \text{ and } Z_B = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$$

Determine the Y parameters of the parallel combination. 14M

UNIT–V

9. a) Three inductances L_1 = 2H, L_2 = 1.8H and L_3 = 2.6H are connected in series as shown in fig 5. Determine the equivalent inductance.

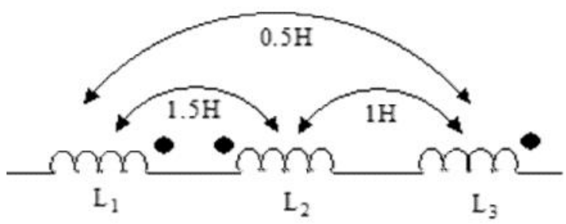

Fig 5 7M

b) Deduce the equation for the coefficient of coupling when two coils are magnetically coupled. 7M

OR

10. a) For the circuit of fig 6, construct the graph of the network and obtain the tie set matrix.

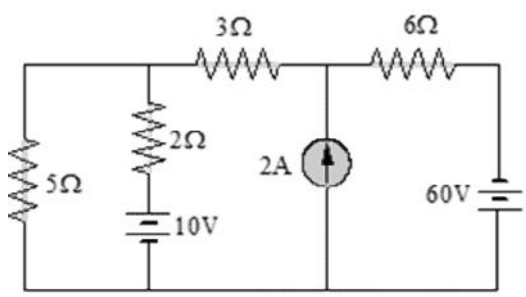

Fig 6 7M

b) Define the term dual networks. Elaborate the procedure of obtaining the dual of the given network. 7M

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Hall Ticket Number :										

R-15

Code: **5G234**

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

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)

****

UNIT–I

1. a) Define electric field intensity? Derive the expression for electric flux density due to an array of point charges? 7M

   b) Four infinite uniform sheets of charge are locate as follows: 20 pC/m^2 at y=7, -8 pC/m^2 at y=3, 6 pC/m^2 at y= -1, -18 pC/m^2 at y= -4. Find $\vec{E}$ at origin. 7M

OR

2. a) State different types of charge distributions and express each of them in terms of their charge densities. 5M

   b) Given the potential $v=10/r^2 \sin\Theta\cos\Theta$ volts. Find D at (2, π/2, 0). Calculate the work done in moving a 10µC charge from A(1,30^0,120^0) to B(4,90^0,60^0) 9M

UNIT–II

3. a) Define electric dipole and dipole moment. Find potential at a point due to the dipole. 7M

   b) Find the capacitance of a co-axial capacitor. 7M

OR

4. a) Derive the expressions for equivalent capacitance when two dielectrics in a capacitor are placed such that the interface is (i) parallel (ii) normal to electric field intensity 7M

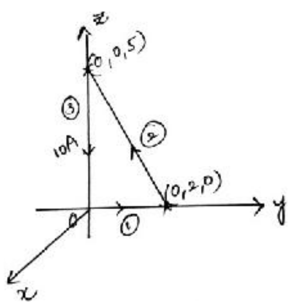
   b) The radii of the two spheres differ by 4cm and the capacitance of the spherical condensers is 53.33pF. if the outer sphere is earthed, calculate the radii assuming air as dielectric. 7M

UNIT–III

5. Deduce the expression for magnetic field intensity at a point due to a circular current carrying wire. 14M

OR

6. The conducting triangular loop in the figure carries a current of 10A. Find $\vec{H}$ at (0,0,5) due to side-1 of the loop.



14M

UNIT–IV

7. Prove that torque experienced by a current loop placed in a uniform magnetic field is normal to the plane containing the magnetic dipole moment and magnetic flux density 14M

OR

8. a) State and explain Lorentz's force equation. 5M

b) Show that the force experienced by the current carrying loop placed in uniform magnetic field is zero. 9M

UNIT–V

9. a) Briefly describe statically induced emf with relevant expressions 6M

b) Express the differential and integral form of (i) Gauss's law for electric field (ii) Gauss's law for magnetic field (iii) Ampere's circuital law and (iv) Faraday's law. 8M

OR

10. a) What is displacement current? Show that displacement current, $J_d = \frac{\partial D}{\partial t}$ 6M

b) State the laws from which Maxwell's I, II, III and IV laws are derived and express Maxwell's equations in free space both in differential and integral form. 8M

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Hall Ticket Number :										

R-15

Code: 5G232

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

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. Design and draw a 2 layer progressive duplex winding with Equalizer connections for a 4-pole dc generator with 16 slots, each slot having 2 coil sides. Indicate the position of brushes. 14M

OR

2. Elucidate the principle of operation and constructional details of a machine, which generates unidirectional voltage with the neat sketch? 14M

UNIT–II

3. a) Derive the Armature ampere-turns, which cause demagnetizing effect and cross magnetizing effect for a DC machine? 8M

   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. 6M

OR

4. a) Illustrate the process of conversion from AC to DC in dc generators with neat diagrams? 8M

   b) Distinguish the methods to avoid sparkings at the brushes in a DC machine? 6M

UNIT–III

5. Sketch the internal and external characteristics of DC machine for the following applications:
   a. suitable for consistent power supply
   b. Arc welding 14M

OR

6. a) List the reasons for operating dc generators in parallel? 5M

   b) Explain the process of building up of voltage in self-excited machine. Under what conditions may it fail to build up the voltage? 9M

UNIT–IV

7. a) Identify the DC motor with the highest starting torque. Assess the reason with relevant equation? 8M

   b) A 4 pole, 220V shunt motor has 540 lap wound conductors. It takes 32A from the supply mains and develops output power of 5.595kw. The field winding takes 1A. The armature resistance is 0.9Ω and the flux per pole is 30mWb. Calculate **i**) the speed, **ii**) the torque developed, **iii**) Shaft torque. 6M

OR

8. Illustrate the different speed control techniques for a shunt motor? 14M

UNIT–V

9. a) Elaborate the test to predetermine the efficiency for a DC machine with relevant equations 8M

   b) When running on no load, a 400V shunt motor takes 5A. Calculate the efficiency when the motor running on full load and taking a current of 50A. Take armature resistance as 0.5Ω and field resistance 200Ω. 6M

OR

10. a) Explain the direct test of a DC machine in detail with advantages and disadvantages? 8M

    b) In a brake test, the dc motor took 42A from a 220V supply mains. The brake pulley of radius 30cm had an effective load of 35kg and the speed was 12rps. Find the efficiency at the above load. 6M

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Hall Ticket Number :										

R-15

Code: 5G539

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

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) Can you distinguish between Newtonian and nonNewtonian fluids? Suppose that the fluid being sheared in SAE 30 oil (viscosity = 0.29 kg/(ms)) at 20°C. Compute the shear stress in the oil if velocity is 3 m/s and h = 2 cm. 7M

   b) Explain Centre of Buoyancy? Lake, has a maximum depth of 60m, and the mean atmospheric pressure is 91 kpa. Determine the absolute and gauge pressure in kpa at this maximum depth. 7M

OR

2. a) A plate having size 100 × 100 mm is pulled with velocity of 0.05 m/s over a fixed plate at distance of 0.25 mm. Find (i) force and (ii) power to maintain velocity if fluid has μ=1 poise. 7M

   b) A plate of size 25 cm × 25 cm and weight 1000N slides down on inclined surface inclining 30^0 to the horizontal which has certain thickness of lubrication with μ=0.1 poise. This attains velocity of 0.5 m/s over the lubricated surface. Find the thickness of lubrication. 7M

UNIT–II

3. a) What is the Bernoulli's theorem? Where the Bernoulli's equation can be applied? 4M

   b) A pipe line 2000 m long is used for power transmission. 110KW is to be transmitted through the pipe in which water having a pressure of 5000 KN/m^2 at inlet is flowing. If the pressure drop over the length of the pipe is 1000 KN/m^2 and co-efficient of friction is 0.0065, estimate: (**i**) the diameter of the pipe, and (**ii**) efficiency of the transmission. 10M

OR

4. a) Explain briefly the following:
      i. Hydraulic Gradient Line (HGL)
      ii. Energy Gradient Line (EGL) 7M

   b) A compound piping system consists of 1800 m of 0.50 m, 1200 m of 0.40 m and 600 m of 0.30 m new cast iron pipes connected in series. Convert the system to (**i**) an equivalent length of 0.40 m pipe, and (**ii**) equivalent size pipe 3600 m long. 7M

UNIT–III

5. a) A jet strikes tangentially a smooth curved vane moving in the same direction as the jet, and the jet gets reversed in the direction. Show that the maximum efficiency is slightly less than 60 % 4M

   b) A jet of water 50mm in diameter having a velocity of 20 m/s, strikes normally a flat smooth plate. Determine the thrust on the plate (i) if the plate is at rest; (ii) if the plate is moving in the same direction as the jet with a velocity of 8 m/s. Also find the work done per second on the plate and the efficiency of the jet when the plate is moving. 10M

OR

6. a) Draw the general layout of a hydroelectric power plant and explain elements of hydro electric power station? 7M

   b) Describe different heads and efficiencies of Hydroelectric power station? 7M

UNIT–IV

7. a) Describe briefly the function of various basic components of impulse and reaction turbines. 7M

b) A pelton wheel to be designed for a head of 60m when running at 200rpm, the pelton wheel develops 95.647kw shaft power, the velocity of the buckets=0.45times of the velocity of the jet overall efficiency=0.85 and co-efficient velocity is equal to 0.98 7M

OR

8. a) Performance characteristics of different turbines? Show that when runner blade angle at inlet of a Francis turbine is 90^0 and the velocity of flow is constant, the hydraulic efficiency is given by $2/(2+\tan^2 \alpha)$, Where α is the vane angle. 10M

b) Define specific speed of a turbine, and derive the expression for specific speed. 4M

UNIT–V

9. a) Estimate the main component parts of a centrifugal pump and explain them briefly. Explain the working principle of a single stage centrifugal pump with a neat sketch. 7M

b) Describe multistage pumps with (**i**) impeller in series and (**ii**) impellers in parallel. 7M

OR

10. a) What are the effects of cavitation? Give the necessary precations against cavitation. 7M

b) Describe main components of reciprocating pump with the help of sketch? 7M

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Hall Ticket Number :										

R-15

Code: 5GC32

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

Mathematical 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. a) Reduce the following matrix into its normal form and hence find its rank

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

b) Test for consistency and solve

$5x+3y+7z=4,\quad 3x+26y+2z=9,\quad 7x+2y+10z=5$ 7M

OR

2. a) Solve $2x-y+3z=9,\quad x+y+z=6,\quad x-y+z=2$ by Gauss elimination method. 7M

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

UNIT–II

3. a) Find a real root of the equation $3x=\cos x+1$ by Newton-Raphson method correct to four decimal places. 7M

b) Apply Runge-Kutta method to find an approximate value of y for $x=0.2$ in steps of 0.1 if $\dfrac{dy}{dx}=x+y^2$, given that $y=1$, where $x=0$. 7M

OR

4. a) Find a root of the equation $x^3-2x-5=0$, using the Bisection method correct to three decimal places. 7M

b) Find by Taylor's series method the value of y at $x=0.1$ and $x=0.2$ to five decimal places from $\dfrac{dy}{dx}=x^2y-1,\quad y(0)=1$. 7M

UNIT–III

5. a) Estimate the value of $f(22)$ and $f(42)$ from the following table by Newton's forward and backward interpolation formula:

x	20	25	30	35	40	45
$f(x)$	354	332	291	260	231	204

7M

b) Use Simpson's $(1/3)rd$ rule and Simpson's $(3/8)th$ rule to estimate $\int_0^6 \dfrac{dx}{(1+x^2)}$ 7M

OR

6. a) Use Lagrange's Interpolation formula to estimate $f(10)$ from the following table:

x	5	6	9	11
$f(x)$	12	13	14	16

7M

b) Find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ at $x=1.1$ from the following table:

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

7M

UNIT–IV

7. a) Fit a second degree parabola 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

7M

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

$(i)\, z = ax+by+a^2+b^2$ and $(ii)\, z = f(x+ay)+g(x-ay)$ 7M

OR

8. a) Fit a curve $y = ae^{bx}$ to the following data by the method of least squares:

x	1	2	3	4
y	1.65	2.7	4.5	7.35

7M

b) Solve $\dfrac{\partial u}{\partial x} = 2\dfrac{\partial u}{\partial t}+u$ where $u(x,0)=6e^{-3x}$ by variable separable method. 7M

UNIT–V

9. a) Obtain the Fourier series for the function $f(x)=x-x^2$ in the interval $[-®,®]$.

Hence show that $\dfrac{1}{1^2}-\dfrac{1}{2^2}+\dfrac{1}{3^2}-\dfrac{1}{4^2}+\cdots\cdots=\dfrac{®^2}{12}$. 7M

b) Find the Fourier sine transform of the function $f(x)=\dfrac{e^{-ax}}{x}$, $a>0$. 7M

OR

10. a) Find the half-range Cosine series for the function $f(x)=(x-1)^2$ in the interval $(0,1)$. Hence show that $\dfrac{1}{1^2}+\dfrac{1}{2^2}+\dfrac{1}{3^2}+\cdots\cdots=\dfrac{®^2}{6}$ 7M

b) Show that $e^{-\left(x^2/2\right)}$ is a self-reciprocal with respect to Fourier Transform. 7M

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Hall Ticket Number :										

Code: 5G231 **R-15**

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

Switching Theory and Logic Design

(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)

*****

UNIT-I

1. 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 NOR Gates

   b) Obtain the
   i. 1's and 2's complement of 11011010
   ii. 9's and 10's complement of 12345678
   iii. State Demorgans theorem for 3 variables

OR

2. a) i. Generate Hamming code for the given 11 bit message 10001110101 and rewrite the entire message with hamming code
   ii. Draw the switching circuits for two way staircase

   b) i. Convert the following to Decimal.
   (A) $(10111111)_2$ (B) $(352)_8$
   ii. Write 3 properties of XOR gate
   iii. Distinguish between weighted codes and unweighted codes

UNIT-II

3. a) Simplify the following using Tabular method
   F(A , B , C , D , E) = Σ(0, 2, 4, 6, 9, 11, 13, 15, 17, 21, 25, 27, 2, 31)

   b) Reduce the expression $f = A\left(B + \overline{C}\left(\overline{AB + A\overline{C}}\right)\right)$ using Boolean theorems.

OR

4. a) Minimize the function f = Σ m(0,2,4,6,7,8,10,12,13,15) using K-Map. Implement using NAND gates.

   b) Implement the Boolean expression of EX-OR gate using minimum number of NAND gates.

UNIT-III

-OR gate using minimum
UNIT-III

5. a) Implement the function F(A,B,C,D)= $AB + BD + \overline{B}C\overline{D}$ using 8 x 1 multiplexer

   b) Design a 4-bit Binary to Gray code converter.

OR

6. a) Design a full adder using Half adder. Give internal logic function and Truth Table

   b) Implement the following unction using PLA
   A(x , y , z) = Σ m(1, 2, 4, 6)
   B((x , y , z) = Σ m(0, 1, 6, 7)
   C((x , y , z) = Σ m (2, 6)

UNIT-IV

7. a) Convert JK-flip flop to D-flip flop.
   b) Design a mod-6 synchronous counter using JK-flip flop.

OR

8. a) Design a mod-8 synchronous counter using D flip-flops.
   b) Draw the excitation tables of SR, T and D-flip flop.

UNIT-V

9. a) List the capabilities and limitations of finite state machines.
   b) Draw and explain ASM chart of a mod-6 counter.

OR

10. a) Draw the state diagram and state table for a sequence detector which can detect a sequence 101.
    b) Minimize the following state table using partition method.

Present state	Next state, Output	
	x = 0	x = 1
a	b, 0	d, 1
b	g, 0	a, 0
c	d, 0	b, 1
d	g, 0	a, 0
e	d, 0	a, 1
f	e, 1	f, 1
g	d, 1	d, 1

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