Hall Ticket Number :										

R-15

Code: 5G233

II B.Tech. I Semester Supplementary Examinations May 2017

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 = 70 Marks)

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UNIT–I

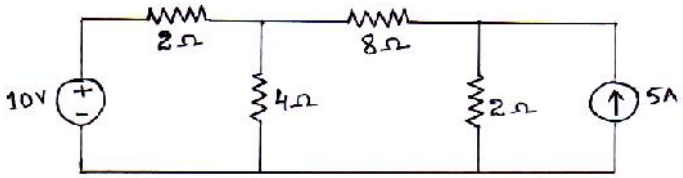
1. a) Derive the relations between star and delta transformation. 8M

   b) Determine the equivalent capacitance when number of capacitors connected in series and parallel. 6M

OR

2. a) Explain voltage division rule and current division rule with suitable examples 6M

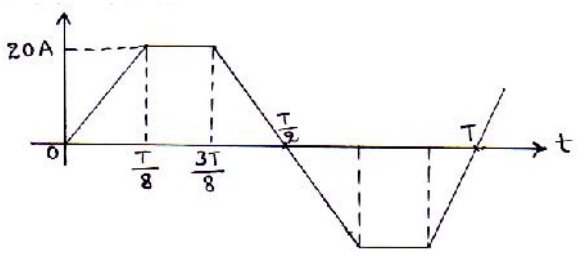
   b) Find the current through 4Ω by using both Mesh and Nodal analysis.



8M

UNIT–II

3. a) Find the Average, RMS values and Peak factor, Form Factor for the waveform shown.



8M

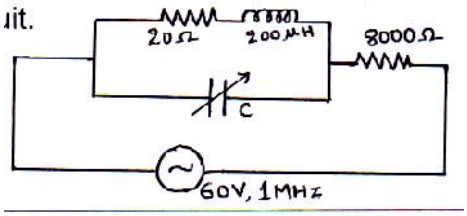
   b) Define

   i. Reactance iii. Susceptance v. Reactive power
   ii. Impedance iv. Admittance vi. Power factor 6M

OR

4. a) Derive an expression for Q-factor of series RLC circuit. Also write the relation between Q-factor and Band width. 7M

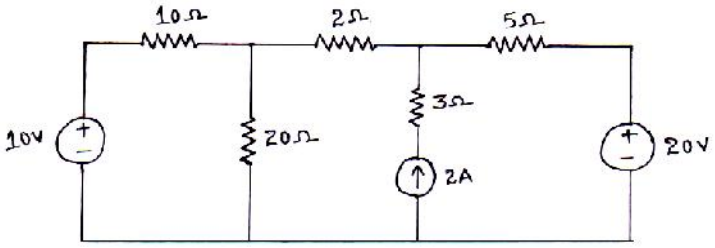
   b) A tuned circuit consists of a coil having an inductance of 200µH and a resistance of 20Ω is in parallel with a variable capacitor is connected in series with a resistor of 8000Ω across a 60v supply having a frequency of 1Mhz. calculate i)value of C to give resonance ii) the dynamic impedance and Q-factor of tuned circuit.



7M

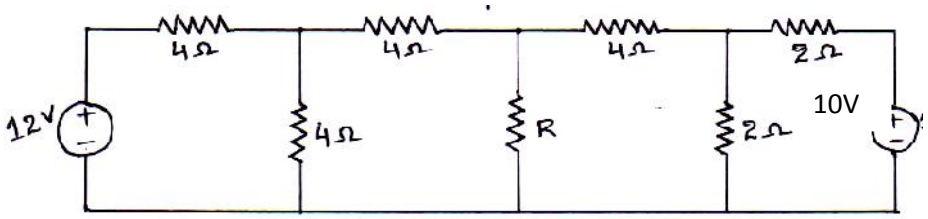
UNIT–III

5. a) Find the voltage across 2Ω resistor using superposition theorem in the circuit shown.



7M

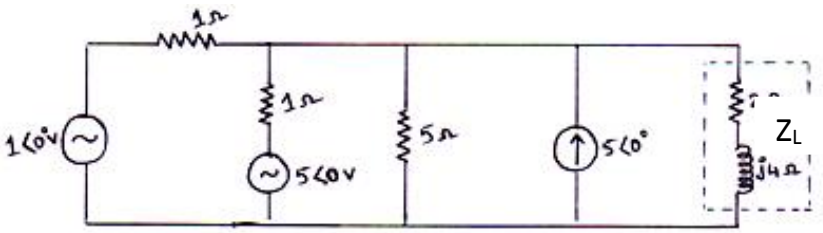
b) Determine the value of resistance R in the network shown for maximum power transfer to it and the maximum power.



7M

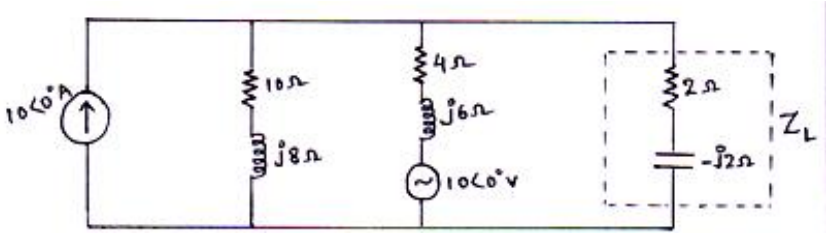
OR

6. a) Calculate the current flowing through Z_L by applying Millman's theorem in the network.



6M

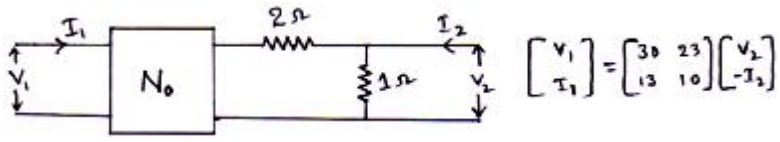
b) Determine the current through Z_L in the circuit shown using Thevenin's theorem.



8M

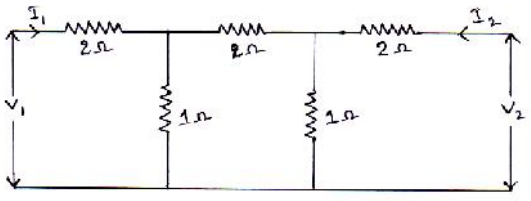
UNIT–IV

7. a) In the arrangement of figure shown below, find the ABCD parameters of N_0.



8M

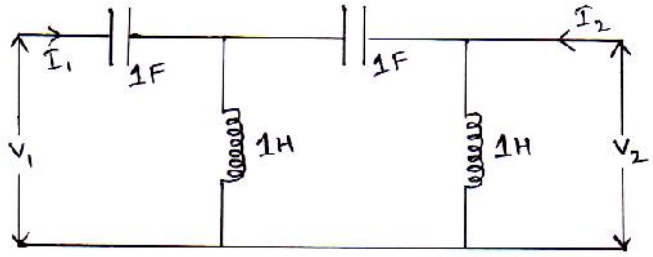
b) Determine Y parameters of the network shown



6M

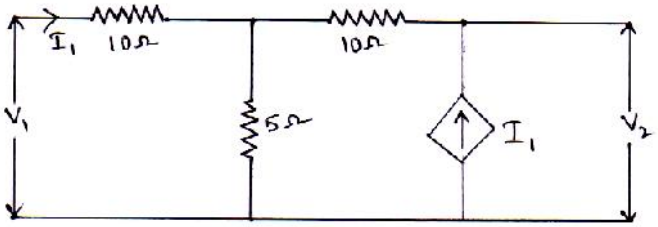
OR

8. a) Determine h parameters of the network shown



8M

b) Determine the Z parameters for the network shown.

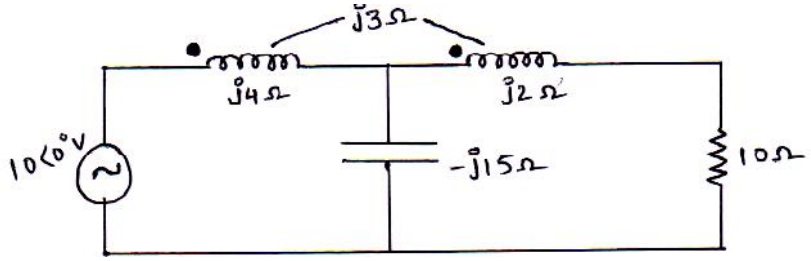


6M

UNIT–V

9. a) A circular iron ring has a mean circumference of 1.5m and a cross-sectional area of 0.01m^2. A saw- cut of 4mm wide is made in the ring. Calculate the magnetizing current required to produce a flux of 0.8mWb in the air gap if the ring is wound with a coil of 175 turns. Assume relative permeability of iron has 400 and leakage factor of 1.25. 8M

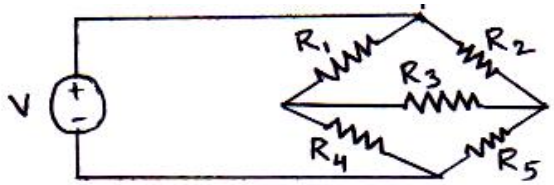
b) Find the voltage across the 10Ω resistor for the network shown.



6M

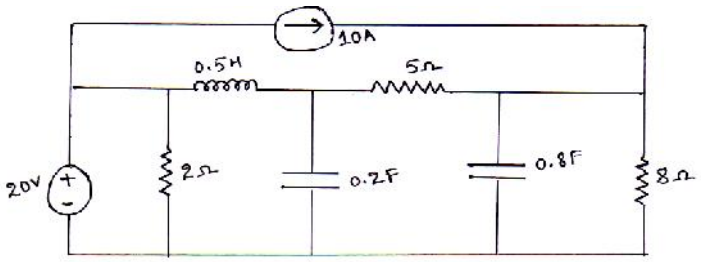
OR

10. a) Draw the graph of the network shown and select a suitable tree and obtain the cut-set matrix. Also write KCL equations from the matrix.



8M

b) Determine the dual of the network shown.



6M

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Hall Ticket Number :										

R-15

Code: 5G232

II B.Tech. I Semester Supplementary Examinations May 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. a) Draw and explain energy balance equation in dc machines. 6M

   b) A 4–pole, lap wound 750 rpm DC shunt generator has an armature resistance of 0.4Ω and field resistance of 200Ω. The armature has 720 conductors and the flux per pole is 30m Wb. If the load resistance is 15Ω, determine the terminal voltage. 8M

OR

2. a) What is a commutator? Discuss its need in DC machines. 6M

   b) Define the terms: Front pitch, back pitch, short pitching. 4M

   c) Differentiate between progressive winding and retrogressive winding. 4M

UNIT–II

3. a) From fundamentals, derive the expression for EMF induced in DC machines. 7M

   b) An 8-pole DC generator has per pole flux of 40 Wb and winding is connected in lap with 960 conductors. Calculate the generated emf on open circuit when it runs at 400 rpm. If the armature is wave wound at what speed must the machine be driven to generate the same voltage. 7M

OR

4. a) Derive the expressions for demagnetizing and cross magnetizing ampere turns per pole. 10M

   b) What are different losses that occur in DC machines? Briefly explain. 4M

UNIT–III

5. a) Draw and explain the internal and external characteristics of DC generators. 7M

   b) Define and briefly explain critical field resistance and critical speed of a DC generator. 7M

OR

6. a) Discuss the need for parallel operation of DC generators. 5M

   b) Draw and explain the open circuit characteristic of a DC shunt generator. Also explain the voltage build up process in self excited generators. 9M

UNIT–IV

7. a) What is the need for starter? With a neat diagram, explain the operation of a 3-point starter. 8M

   b) Discuss the speed control scheme normally used to control the speed of a DC motor below its rated speed. 6M

OR

8. a) What is back-EMF? Explain its significance. 4M

   b) Draw and discuss the characteristics of DC shunt motors. Also mention their applications. 10M

UNIT–V

9. a) Explain the Hopkinson's test for determination of efficiency of shunt machines. 7M

   b) A Field's test on two mechanically coupled DC series motors (with their field windings connected in series) gave the following test data.
   Motor: Armature current: 50A; Armature Voltage: 500V; Field winding voltage drop: 38V.
   Generator: Armature current: 38 A; Armature Voltage: 400 V; Field winding voltage drop: 36V. Resistance of each armature is 0.2 ohms. Calculate the efficiency of each machine at this load. 7M

OR

10. a) Explain the Swinburne's test to determine the no load losses of a DC machine. What are the limitations of this test? 7M

    b) A retardation test on a DC motor gave the following results: With the field unexcited, the speed fell from 1530 to 1470 in 43 second; with field normally, the same drop in speed occurred in 26 seconds; with an average load of 1.2 kW supplied by the armature, the same speed drop occurred in 20 seconds. Determine the moment of inertia of the rotating parts at 1500 rpm and the core loss for normal excitation at this speed. 7M

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Hall Ticket Number :										

R-15

Code: 5G234

II B.Tech. I Semester Supplementary Examinations May 2017

Electromagnetic 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) Derive an expression 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) Three identical point charges of 4µc each are located at the corners of an equilateral triangle, 0.5mm on a side in free space. How much work will be done to move one charge to a point midway between the other two? 4M

OR

2. a) Explain the applications of Gauss's law to symmetrical charge distributions 10M

   b) A non uniform surface charge density $\rho_s = \frac{5\rho 2}{\rho 2+1}$ nC/m^2 lies in the plane

   z = 2 where ρ≤5 and ρ_s > 5. How much electric flux leaves the circular region ρ ≤ 5, z =2? 4M

UNIT–II

3. a) What is dipole? Derive the expression for electric field intensity due to a dipole? 7M

   b) A dipole of moment $\bar{P} = 6\bar{a}_z$ nC/m is located at origin in free space

   i) Find V at P (r=4, θ=$\bar{2}\bar{0}^{\vartheta}$,Φ=0^o) ? 7M

OR

4. a) State and explain the boundary conditions at surface of perfect conductor? 10M

   b) State the properties of dielectric materials? 4M

UNIT–III

5. a) Explain the scalar magnetic potential and derive its expression? 7M

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

OR

6. a) Using Ampere's Circuital law, find the magnetic field intensity in the case of a closely wound torroidal coil? 7M

   b) A conductor is bent in the form of a regular polygon of 'n' sides inscribed in a circle of radius 'r'. Show that the expression for magnetic flux density $\bar{B}$ at the centre for a current of I amp is $\bar{B} = \frac{\mu 0NI}{2\pi r}\tan\frac{\pi}{n}$? 7M

UNIT–IV

7. a) Derive an expression for the force between two parallel conductors? 7M

   b) A negative charge Q = -40nC is moving with a velocity of 6 X 10^6 m/s in a direction specified by the unit vector a_y = -0.48a_x -0.6a_y + 0.64a_z. Find the magnitude of vector force excreted on the moving particle by the field a) $\bar{B}$ = 2a_x -3a_y + 5a_z mT b) $\bar{E}$ = 2a_x – 3a_y +5a_z Kv/m? 7M

OR

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

   b) Two mutually coupled coils are connected in series. L1 = 0.5 H, L2 = 0.6 H, m = 0.1 H. A DC current of 2 amps is passed through this system in such a way that the current increase at a uniform rate of 1 amp per sec. What is the voltage developed across the end points if,

   i. The coils are connected in magnetically adding conditions.

   ii. The coils are connected in a magnetically opposing condition. 7M

UNIT–V

9. 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 sin (6 X 10^8) μA what is the amplitude of the displacement current density if σ = 40 ms/m and ε_r =1? 7M

OR

10. a) State and prove Poynting theorem? 7M

    b) Write Maxwell's equations for time varying fields in point and integral form? 7M

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Hall Ticket Number :										

R-15

Code: 5G539

II B.Tech. I Semester Supplementary Examinations May 2017

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 = 70 Marks)

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UNIT–I

1. a) What is vapour pressure? What is its significance in flow problems? 4M
   b) State and prove Pascal's law and give some examples where this principle is applied. 10M

OR

2. a) What is a manometer? How are manometers classified? 4M
   b) Define the equation of continuity. Obtain an expression for the continuity equation for a two dimensional flow. 10M

UNIT–II

3. a) State the limitations of the Bernoulli's theorem. 4M
   b) What is impulse momentum theorem? Derive the same. 10M

OR

4. a) How can you differentiate the pipes in parallel & series? 4M
   b) Derive the expression for loss of head due to friction in a given pipe. 10M

UNIT–III

5. a) Define impact of jet and derive an expression for the force of a jet on a fixed plate. 4M
   b) What is hydroelectric power plant? What are the factors consider for constructing power plant. Explain in detail classification of power plants. 10M

OR

6. a) Draw the lay of Hydroelectric power plant. Explain the functions of each complement. 4M
   b) Three turbo-generators each of capacity 10,000kW have been installed at a hydel power station. During a certain period of load, the load on the plant varies from 12,000kW to 26,000kW. Calculate (**i**) total installed capacity (**ii**) load factor (**iii**) Plant factor (**iv**) utilization factor. 10M

UNIT–IV

7. a) What is the significance of specific speed? 4M
   b) A turbine develops 5000kW when running at 80rpm. The head on the turbine is 20m. If the head on the turbine is increased to 30m, determine the speed and power developed by the turbine. 10M

OR

8. a) Differentiate between an impulse turbine and a reaction turbine. 4M
   b) A Kaplanar turbine runner is to be designed to develop 900kW. The net available head is 5.5m. Assume a speed ratio 2, flow ratio 0.65 and total efficiency 85%. The diameter of the boss is 1/3 diameter of the runner. Find the diameter of the runner its speed, and the specific speed on the turbine. 10M

UNIT–V

9. a) Explain the working principles of a centrifugal pump and its applications. 4M
   b) Derive an expression for the starting speed of the centrifugal pump. 10M

OR

10. a) How will you classify the reciprocating pumps? 4M
    b) A single acting reciprocating pump having a bore of 150mm and a stroke of 300mm length, discharges 250L of water per meter at 50rpm. Neglecting losses, find theoretical discharge, coefficient of discharge and slip of the pump. 10M

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Hall Ticket Number :										

Code: 5GC32

R-15

II B.Tech. I Semester Supplementary Examinations May 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) Prove that if A and B are equivalent matrices, there exist non-singular matrices P and Q such that B=PAQ. 6M

   b) Find the values of ª and « for which the system of equations $3x+2y+z=6$; $3x+4y+3z=14$; $6x+10y+ª z=«$ has (i) unique solution, (ii) no solution and (iii) infinite number of solutions. 8M

OR

2. a) Define Rank of a Matrix. Reduce the matrix $\begin{bmatrix} 3 & 2 & -1 \\ 4 & 2 & 6 \\ 7 & 4 & 5 \end{bmatrix}$ to the normal form and hence find its rank. 8M

   b) Prove that the characteristic roots of a Hermitian matrix are real. 6M

UNIT–II

3. a) Find the order of convergence of Newton-Raphson method. 6M

   b) Given $\frac{dy}{dx}=\frac{y-x}{y+x}$ with initial condition $y=1$ at $x=0$. Find y for $x=0.1$ by Euler's method. 8M

OR

4. a) Use Milne's method to find $y(0.3)$ from $y'=x^2+y^2$, $y(0)=1$. Find the initial values $y(-0.1)$, $y(0.1)$, $y(0.2)$ from the Taylor's series method. 7M

   b) Find a real root of the equation $x\log_{10}x=1.2$ by Regula-Falsi method correct to four decimal places. 7M

UNIT–III

5. a) Find the missing term in the table

x	2	3	4	5	6
y	45	49.2	54.1	--	67.4

   7M

   b) Velocity V of a particle at distances from a point on its linear path is given by the following table. Estimate the time taken by the particle to traverse the distance of 20 meters.

S(m)	0	2.5	5.0	7.5	10.0	12.5	15	17.5	20
V(m/sec)	16	19	21	22	20	17	3	11	9

   7M

OR

6. a) From the following table, find $e^{1.02}$, using Newton's forward formula

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
e^x	2.7183	2.8577	3.0042	3.1582	3.3201	3.4903	3.6693

   7M

   b) Find $f'(7.5)$ from the following table:

x	7.47	7.48	7.49	7.50	7.51	7.52	7.53
$f(x)$	0.193	0.195	0.198	0.201	0.203	0.206	0.208

   7M

UNIT–IV

7. a) Fit a second degree parabola to the following data

x	1989	1990	1991	1992	1993	1994	1995	1996	1997
y	352	356	357	358	360	361	361	360	359

7M

b) Solve the partial differential equations $4\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}=3u$, given $u=3e^{-y}-e^{-5y}$ when $x = 0$. 7M

OR

8. a) Solve by Charpit's method $z=p^2x+q^2y$. 7M

b) An experiment data of the relation $V=at^b$ is given by

V (ft/min)	350	400	500	600
t (min)	61	26	7	2.7

Find the best possible values of *a* and *b*. 7M

UNIT–V

9. a) Expand $f(x)=\sqrt{1-\cos x},\ 0<x<2\pi$ in a Fourier series. Hence evaluate $\frac{1}{1.3}+\frac{1}{3.5}+\frac{1}{5.7}+\cdots\cdots$ 7M

b) If $f, tf, t^2f, \cdots\cdot t^nf$ are absolutely integrable and *F(ω)* is Fourier transform of *f*, then prove that $\frac{d^n}{d\mu^n}(F(\mu))=(-i)^n F\{t^n f(t)\},\ n=1,2,\cdots\cdots$ 7M

OR

10. a) Find the Fourier series expansion of $f(x)=2x-x^2$ in $(0, 3)$ and hence deduce that $\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+\cdots\cdots\infty=\frac{\pi^2}{12}$ 7M

b) Show that the inverse finite Fourier sine transform of $F_S(x)=\frac{1}{\pi}\left\{1+\cos n\pi-2\cos\frac{n\pi}{2}\right\}$ is $f(x)=\begin{cases}1, & 0<x<\pi/2\\ -1, & \pi/2<x<\pi\end{cases}$ 7M

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Hall Ticket Number :										

Code: 5G231

R-15

II B.Tech. I Semester Supplementary Examinations May 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)

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UNIT–I

1. a) Solve the Following
   i) $(446.25)_{10} = (\_\_\_\_\_)_{16}$
   ii) $(1010111.001)_2 = (\_\_\_\_\_)_8$
   iii) $(11C.DC)_{16} = (\_\_\_\_\_)_2$ 6M

   b) i) Perform 1's and 2's complementary subtraction on $(11010 - 10011)_2$
   ii) Generate the hamming code for 1011 8M

OR

2. a) i) State and prove Demorgan's theorem for three variables
   ii) What are Universal gates? Realize AND and OR gates using NAND gates. 7M

   b) i. What are error correcting and error detecting codes? Explain how hamming code can be use to detect and correct 4 bit data.
   ii. Realize XOR gate using minimum member of NAND gates. 7M

UNIT–II

3. a) i. Expand $Y = A + B^1C$ in SSOP form
   ii. Simplify the given expression using K Map.
   $F = \sum m\,(1, 2, 3, 5, 9, 12, 14, 15) + \sum d\,(4, 8, 11)$ Implement the simplified expression using NOR gates only. 7M

   b) i. Show that $A + BC = (A + B)(A + C)$
   ii. Demonstrate by means of truth table the validity of
   I. Identity Law
   II. Distribute Law 7M

OR

4. a) i. Prove that AND – OR Network is equal to NAND – NAND gate.
   ii. Simplify the following Boolean expressions
   I. $ABC^1+A^1BC+ABC+A^1BC^1$
   II. $(yz^1 + x^1w)(xy^1+ zw^1)$ 7M

   b) Simplify $F = \sum m\,(0, 1, 4, 5, 6, 9, 11, 12, 13, 14, 15) + \sum d\,(7, 8)$ using tabular method and implement using NOR gates only 7M

UNIT–III

5. a) i. Design a 3 bit Binary to Gray code converter
   ii. Implement the Boolean expression using 16x1 Multiplexer.
   $F = \sum m\,(0, 1, 2, 3, 4, 5, 6, 7, 9)$ 8M

   b) Implement the following expressions using PLA
   $F_1 = \sum m\,(1, 2, 4, 6, 7)$, $F_2 = \sum m\,(0, 1, 2, 4, 6,)$ 6M

OR

6 a) i) Explain a 4 bit parallel adder with an example.
   ii) Implement 4-16 decoder using 3-8 decoder 7M

   b) i) Implement full adder using NAND gates
   ii) What is magnitude comparator? Explain with circuit diagram a 1 bit magnitude comparator 7M

UNIT–IV

7 a) i. Convert JK Flip-Flop into SR Flip-Flop.
ii. Design a mod-6 synchronous counter using JK Flip-Flop. 8M

b) i. Compare combinational and sequential circuits.
ii. What is race around condition how it can be eliminated 6M

OR

8 a) i. Design a four bit ring counter. Explain with example.
ii. Write the excitation table of SR & D Flip-Flops 7M

b) i. Explain with truth table D Flip-Flop and T Flip-Flop
ii. Design a 3 bit synchronous binary counter using T Flip-Flop 7M

UNIT–V

9 a) i) What are the limitations of FSM
ii) Define the state equivalence and machine equivalence with reference to sequential machines. Reduce the state table below.

PS	NS/Z	
	X=0	X=1
A	F|0	B|0
B	D|0	C|0
C	F|0	E|0
D	G|1	A|0
E	D|0	C|0
F	F|1	B|1
G	G|0	G|0
H	G|1	A|0

8M

b) i) State Melay and Moore machines. Give their comparisons
ii) Discuss the various blocks of ASM chart. 6M

OR

10 a) Draw the ASM chart and state diagram for the following state transitions, start from the initial state T_1, then if XY=00 go to T_2, if XY=01 go to T_3, if XY=10 go to T_1, otherwise go to T_3 7M

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

7M

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