Hall Ticket Number :										

Code : 4GC32 **R-14**

II B.Tech. I Semester Supplementary Examinations May/June 2016

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. Find the half range cosine series for $f(x) = x(2-x)$ in $0 \le x < 2$ and hence find prove that $\frac{\pi^2}{12} = \frac{1}{1_2} - \frac{1}{2_2} + \frac{1}{3_2} - \frac{1}{4_2} + \frac{1}{5_2} - \frac{1}{6_2} + - - - - - - - - -$

OR

2. Find the Fourier cosine transform of $f(x) = \frac{1}{1+x^2}$. Hence, derive the Fourier sine transform of $\emptyset(x) = \frac{x}{1+x_2}$.

UNIT-II

3. a) Reduce the matrix $A = \begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ -8 & -1 & -3 & 4 \end{bmatrix}$ to the normal form and find its rank.

   b) Solve the equations $2x + y + z = 10; 3x + 2y + 3z = 18; x + 4y + 9z = 16$

OR

4. If $A = \begin{bmatrix} 3 & -2 & -5 \\ 4 & -1 & -5 \\ -2 & -1 & -3 \end{bmatrix}$ find the Eigen values and Eigen vectors of A.

UNIT-III

5. a) Find a real root of the equation $x^3 - 2x - 5 = 0$ using false position.

   b) Find the reciprocal of 18 using Newton-Raphson method.

OR

6. Apply the Fourth order Runge-Kutta method, to find an approximate value of y when $x = 1.2$ in steps of 0.1, given that: $y' = x^2 + y^2$, $y(1) = 1.5$

UNIT-IV

7. a) Find the cubic polynomial which takes the values:
   $y(0) = 1$, $y(1) = 0$, $y(2) = 1$ and $y(3) = 10$.

   b) Using Lagrange's formula find $f(4)$. Given

x	0	2	3	6
f(x)	-4	2	14	158

OR

8. Evaluate $\int_0^1 \sqrt{1+x^3}dx$ taking $h = 1$

   Using (i) Simpson's $\frac{1}{3}$rd rule (ii) Trapezoidal rule

UNIT-V

9. a) By the method of least squares, find the straight line that best fits the following data.

x	1	2	3	4	5
f(x)	14	27	40	55	68

b) Find the curve of best fit of the type $y = ae^{bx}$ to the following data by the method of least squares

x	1	5	7	9	12
y	10	15	12	15	21

OR

10. a) Form the partial differential equation by eliminating a, b from $ax^2 + by^2 + z^2 = 1$.

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

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Hall Ticket Number :										

Code : 4G231 **R-14**

II B.Tech. I Semester Supplementary Examinations May/June 2016

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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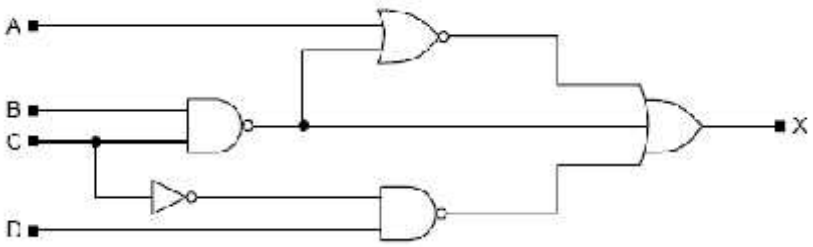
UNIT-I

1. a) Encode the decimal numbers 0 to 9 by means of the following weighted binary codes.
   i. 8 4 2 1
   ii. 2 4 2 1
   iii. 6 4 2 -3
   iv. Determine which of the above codes are self-complementing and why? 8M

   b) (i) Prove that AND-OR network is equivalent to NAND-NAND Network.
   (ii)State Duality theorem. List Boolean laws and their Duals. 6M

OR

2. a) Write the logic expression and simplify it as much as possible and draw a logic diagram that implements the simplified expression.



5M

   b) Obtain the Dual of the following Boolean expressions.
   $i.(AB' + AC')(BC + BC')(ABC)$
   $ii.AB'C + A'BC + ABC$
   $iii.(ABC)'(A + B + C)'$ 9M

UNIT-II

3. a) Minimize the following Boolean function using K-map in SOP form and realize using NAND gates. $F(A,B,C,D) = \sum_M (0,1,2,3,7,8,9,,10,11,12,13)$ 6M

   b) Simplify the Boolean functions using tabular method.
   F(A, B, C, D, E) = ∑(0, 1, 4, 5, 16, 17, 21, 25, 29, 30) 8M

OR

4. a) Use a karnaugh map to simplify the given function to a minimum sum-of-products form and Draw logic diagrams for them using only (**i**) NAND, (**ii**) NOR are gates, assuming inputs A, B, C, and D only available.
   $X = \overline{A}\overline{B}\overline{C} + \overline{A}CD + \overline{A}B\overline{C} + B\overline{C}\overline{D} + A\overline{B}C + AB\overline{D} + A\overline{B}C\overline{D}$ 8M

   b) Explain the determination of all possible minimal expressions from a reduced prime implicant chart. 6M

UNIT-III

5. a) Design a two-bit comparator with the following inputs and outputs:
Inputs : Numbers N1 and N2 to be compared.
N1 = AB
N2 = CD.
Outputs : LT, GT, EQ
LT = 1 when AB < CD
GT = 1 when AB > CD
EQ = 1 when AB = CD 10M

b) A ROM chip of 4,096 × 8 bits has two clip select inputs and operates from a 5-volt power supply. How many pins are needed for the integrated circuit package? Draw the block diagram of this ROM. 4M

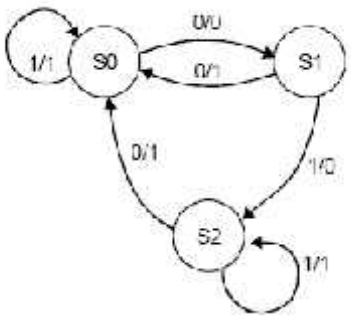
OR

6. a) Design a 2X2 bit multiplier :
Inputs : Numbers N1 and N2 to be multiplied
N1 = A1 A0
N2 = B1 B0
Outputs : products : P8, P4, P2, P0
P0 = Product with weighting $2^0 = 1$
P2 = Product with weighting $2^1 = 2$
P4 = Product with weighting $2^2 = 4$
P8 = Product with weighting $2^3 = 8$. 10M

b) Implement Full adder circuit using ROM and Verify the working. 4M

UNIT-IV

7. a) Design a circuit that implements the state diagram.



7M

b) Design Mod-4 synchronous counter using **D** flip –flops. . 7M

OR

8. a) In a 4-bit ripple up-counter how many clock pulses will you apply, starting from state 0 0 0 0, so that the counter outputs are as follows?
(i) 0 0 1 0
(ii) 0 1 1 1
(iii) 1 0 0 1
(iv) 1 1 1 0 6M

b) Design Mod-12 synchronous counter using J-K flip -flops. 8M

UNIT-V

9. a) Compare Mealy and More models with block diagram. 4M

   b) Determine minima state equivalent of the state table shown below.

PS	NS,Z	
	X=0	X=1
1	1,0	1,0
2	1,1	6,1
3	4,0	5,0
4	1,1	7,0
5	2,0	3,0
6	4,0	5,0
7	2,0	3,0

10M

OR

10. a) Explain the salient features of ASM chart. 5M

    b) Draw the state diagram and ASM chart for 2bit up-down counter having mode control input.

    M=1 up counting

    M=0 Down counting

    The circuit should generate an output 1, whenever count below minimum or maximum. 9M

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Hall Ticket Number :										

Code : 4G232

R-14

II B.Tech. I Semester Supplementary Examinations May/June 2016

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) Give the materials and functions of the following parts of a DC machine
   (i) Field poles
   (ii) Yoke
   (iii) Commutator
   (iv) Commutating poles
   (v) Armature 10M
   b) Give the advantages and uses of lap and wave windings 4M

OR

2. a) Derive the power balance equation for a DC machine 5M
   b) Explain why dummy coils are used in the DC machines? What happens if they are not used? 5M
   c) What is an equalizer ring and why is it used in DC machine? 4M

UNIT-II

3. a) Discuss how commutation is improved by emf method? Explain brush shifting method 7M
   b) An 8 pole wave wound armature has 850 conductors. It supplies 120A current. The brush shift is 3 degrees. Calculate **i)** demagnetizing amp-turns per pole **ii**) cross magnetizing amp-turns per pole, & **iii**) additional field current required to neutralize the effect of demagnetization of the field winding if the field has 1000 turns per pole. 7M

OR

4 a) What is reactance voltage? How is it produced in a DC machine? Also explain its effects on the performance of the DC machine 7M
   b) In a DC machine total iron loss is 10kW at rated speed and excitation. If the excitation is kept constant but the speed is dropped by 30%, the iron loss is 6kW. Find the hysteresis and eddy current loss at **(i)** full speed and **(ii)** half rated speed. 7M

UNIT-III

5. In a substation 5 DC generators are running in parallel at the same speed and with equal induced emf. Each has armature resistance of 0.2Ω. Each generator supplies equal share of a total load of 500kW at a terminal voltage of 500V. Now the field current of one generator is increased by 5%, the other remaining unchanged. Find the output power of the each machine and their terminal voltage under this condition. Assume that their speed remains constant and flux is proportional to the field current. 14M

OR

6. a) What is parallel operation? Why are the generators connected in parallel 5M
   b) What are the applications of DC generators 4M
   c) What happens if the equalizer or cross connection of field winding is not used? 5M

UNIT-IV

7. a) A 250V, 30kW, 1200rpm, DC shunt motor has a full load efficiency of 88%. The armature resistance is 0.3Ω and total brush drop is 2V. The value of the field current is 2A. Find **(i)** full load line current **(ii)** full load shaft torque, and **(iii)** total resistance in the motor starter to limit the starting current to 1.5 times the full load current 7M
   b) Explain the method of speed control by changing the motor excitation. 7M

OR

8. a) The input power of 250V, DC shunt motor is kW. The armature and shunt field resistances are 0.5Ω and 125Ω resp. The no load speed of the machine is 1160rpm and no load current is 4A. Find **(i)** the torque developed, **(ii)** the efficiency, and **(iii)** the speed at this load. 7M
   b) Compare 3 point starter and 4 point starter. What are the advantages of 4 point starter over 3 point starter? 7M

UNIT-V

9. a) What are the applications of DC motors? 3M
   b) How large series motors are tested 3M
   c) In Hopkinson's test, the line current is 50A at 150 V and the motor armature current is 350A not including the field currents of 5A and 5.5A. The armature resistance of each machine is 0.025Ω. Find the efficiency of each machine. 8M

OR

10. a) Why is the retardation test performed on DC motor only? How is it performed 6M
    b) A DC shunt generator produces full load output of 250kW at 500V. the following test results are obtained.
       (i) When it runs as a motor on no load at full speed , the line current is 35A , the field current is 12A, and the supply voltage is 500V
       (ii) With the machine at rest, a potential drop of 5 volt is produced and an armature current of 400A flows through the armature.
       Find the efficiency of the generator at full load and half load conditions 8M

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Hall Ticket Number :										

Code: 4G233 **R-14**

II B. Tech. I-Semester Supplementary Examinations May/June 2016

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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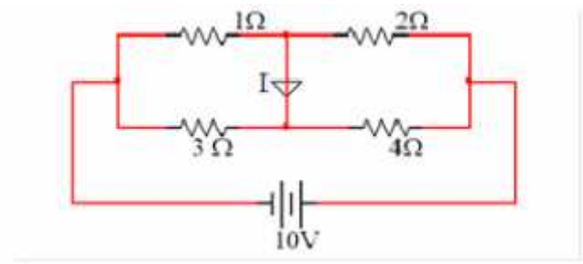
UNIT-I

1. a) Explain the differences between ideal and practical sources of voltage and current. 7M

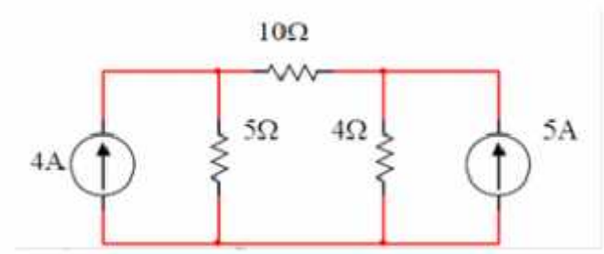
   b) Find the current 'I' for the circuit shown in figure



7M

OR

2. a) Find the power absorbed by 5Ω resistor for the circuit shown in figure

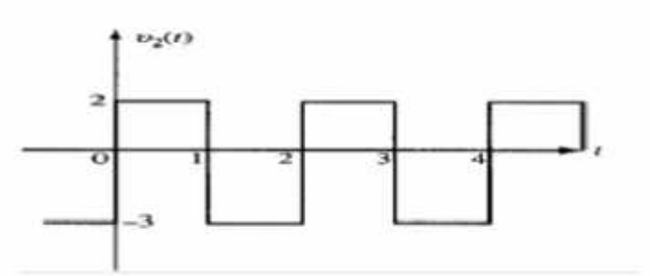


7M

   b) Explain how a delta connected network is transformed to an equivalent star network. 7M

UNIT-II

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



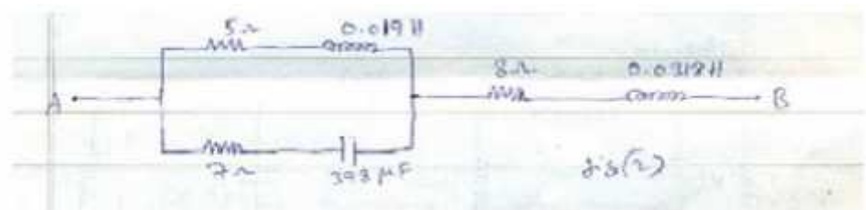
7M

   b) Explain the terms real power, reactive power, complex power and power factor. Write the relation between them. 7M

OR

4. a) A series RLC circuit has a resistance of 20Ω, inductance of 0.05H and capacitance of 10mF. Find resonant frequency, bandwidth and quality factor of the circuit 7M

   b) In the circuit shown in figure, how much voltage must be applied across AB such that 10A current flow in the capacito

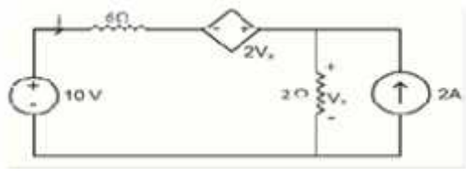


7M

UNIT-III

5. a) Derive the condition for Maximum power transfer in AC circuits 7M

   b) Find the current 'i' for the circuit shown in figure using superposition theorem.

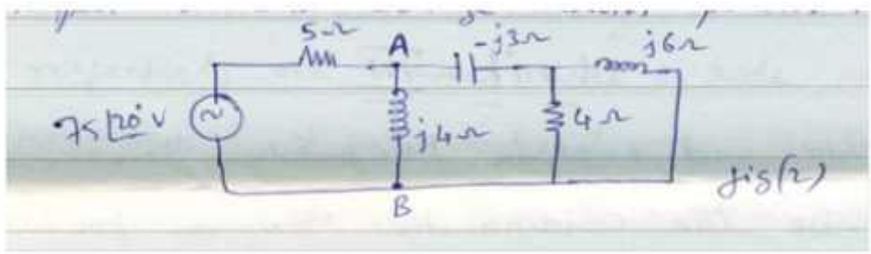


7M

OR

6. a) State and explain Tellegen's theorem 7M

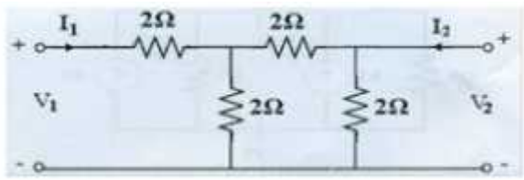
   b) Find the Thevenin's equivalent between terminals A and B for the circuit shown in figure.



7M

UNIT-IV

7. a) Find the open circuit impedance parameters for the circuit shown in figure.

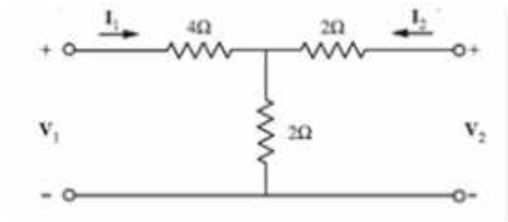


7M

   b) Express Z-Parameters in terms of Transmission parameters 7M

OR

8. a) Find hybrid parameters for the two-port network shown in figure



7M

   b) Find the combined network parameters for 2 cascade connected two-port networks 7M

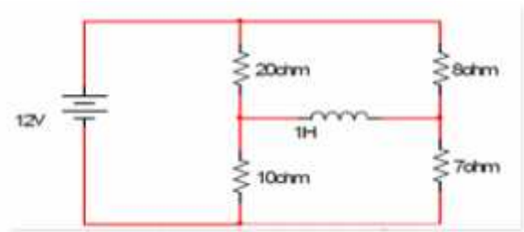
UNIT-V

9. a) Define the terms self and mutual inductance and explain Dot conversion. 7M

   b) Obtain the equivalent inductance of two mutually coupled coils connected in parallel aiding. 7M

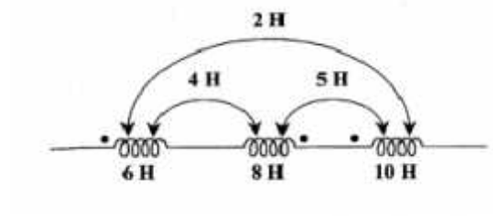
OR

10. a) Obtain the basic tie set matrix for the network shown in figure



7M

   b) Obtain the effective inductance for the three mutually coupled coils shown in figure



7M

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Hall Ticket Number :										

R-14

Code : 4G234

II B.Tech. I Semester Supplementary Examinations May/June 2016

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 expression for electric field E at any general point due to uniformly distributed charge along an infinite straight line? 7M

   b) A circular disc of 10 cm radius is charged uniformly with a total charge of 10^{-6} C. Find the electric intensity at a point 30 cm away from the disc along the axis? 7M

OR

2. a) A thin square loop carries a uniform charge of ρ_L. Show that the potential at the center of the loop is $V = 2\rho_L/\Pi\varepsilon_0 \ln(1+\sqrt{2})$ 7M

   b) Define potential, potential difference and potential gradient? 7M

UNIT-II

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

   b) A dipole having moment $P = 3a_x - 5a_y + 10 a_z$ nCm is located at Q (1,-2,-4) in the space. Find V at P (2, 3, 4)? 7M

OR

4. a) Give the expression for the boundary conditions at dielectrics? 7M

   b) The electric field between two concentric cylindrical conductors ar r = 0.01 m and r = 0.05 m is given by $E = (10^6/r)\, a_r$ V/m. find the energy stored in 1.0 m length of conductor. Assume free space? 7M

UNIT-III

5. a) Obtain an expression for the magnetic field intensity due to infinitely long current carrying conductor? 7M

   b) A round copper conductor is carrying a current of 250 A. Determine the magnetizing force and flux density at a distance of 10 cm from the conductor? 7M

OR

6. a) State and explain Biot-Savarts law? 7M

   b) If the vector potential A is given as $A=10 (x^2+y^2+z^2)\, a_x$. Find out flux density? 7M

UNIT-IV

7. a) State and prove boundary conditions for magnetic field? 7M

   b) Two wires carrying in the same direction of 500 A and 800 A are placed with their axes 5 cm apart. Calculate the force between them? 7M

OR

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

   b) A solenoid with N1 = 1000, r1 = 1.0 cm, and l1= 50 cm is concentric within a second coil of N2 = 2000, r2 = 2.0 cm and l2 = 50 cm. find the mutual inductance assuming free space conditions? 7M

UNIT-V

9. a) Obtain the Maxwell's equations for conducting medium and free space in integral and point form? 10M

   b) Find the amplitude of the displacement current density inside a capacitor where $\varepsilon_r = 600$ and $D = 3 \times 10^{-6}$? 4M

OR

10. a) Write down the Maxwell's equations for time periodic fields and show that the divergence equations follow from curl equations and the continuity equation? 10M

    b) If the electric field intensity is $\sin\Pi t$, then compare the conduction and displacement current densities in a conductor having $\sigma = 5.8 \times 10^7$? 4M

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