

Code: 4G235

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

**Electrical Circuit Theory**

( Electronics and Communication Engineering )

Max. Marks: 70

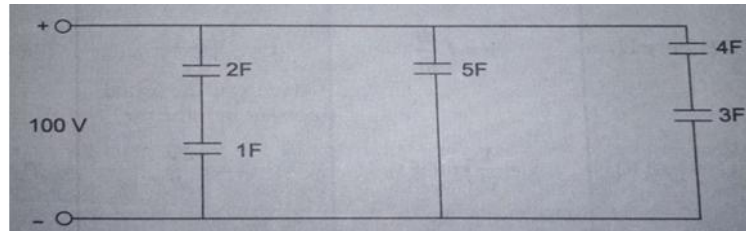
Time: 3 Hours

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

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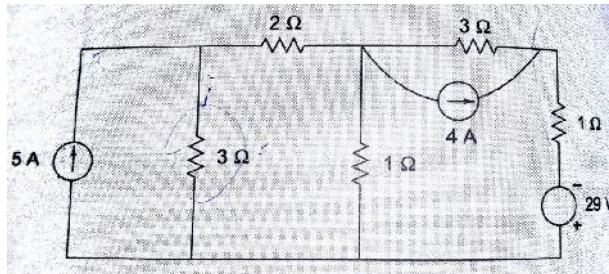
**UNIT-I**

- 1 a) Find the total equivalent capacitance, total energy stored if the applied voltage is 100V for the circuit as shown in Fig.



7M

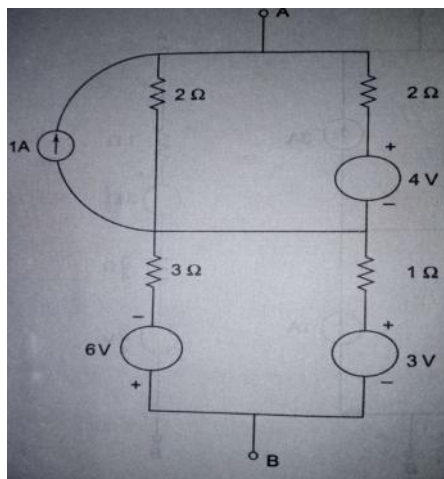
- b) Write and solve the equation for mesh current in network.



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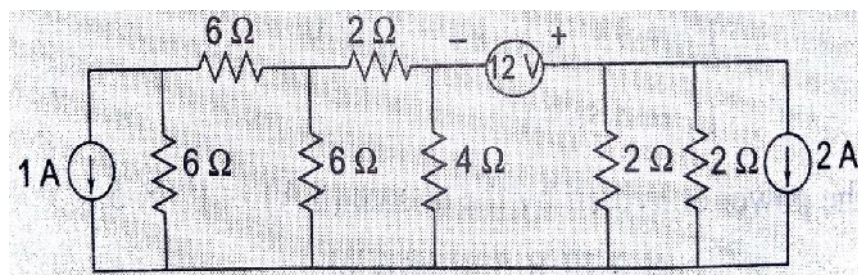
OR

2. a) Using source transformation, reduce the network between A and B into an equivalent voltage source.



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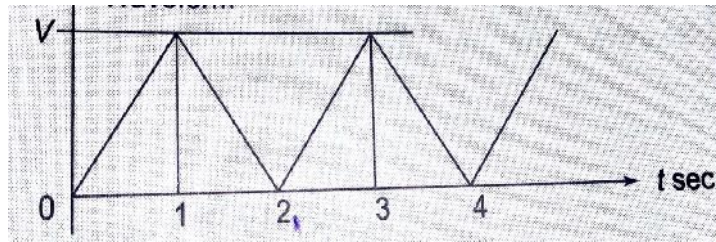
- b) Find the power supplied by 12V source as shown in fig. below



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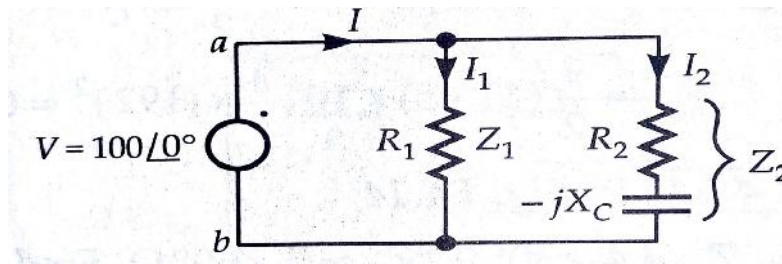
## UNIT-II

3. a) Find the form factor for the following waveform.



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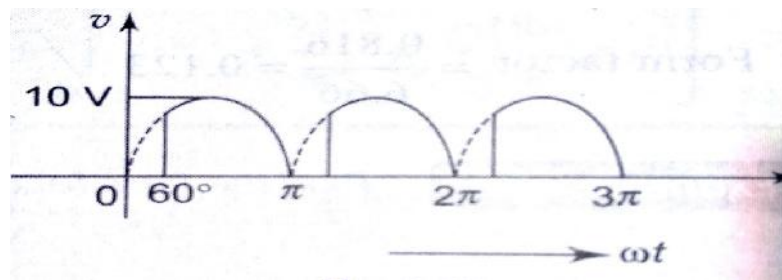
- b) In below fig  $R_1=3$  ohms,  $R_2=10$  ohms, and  $-jX_C=-j8$  ohms. Find  $I_1$ ,  $I_2$  and  $I$ . also obtain  $Z_{eq}$  across a-b.



8M

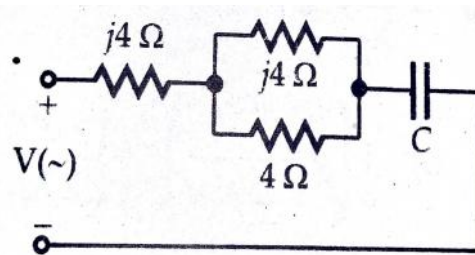
OR

4. a) The full wave rectified sine wave shown in below fig. has a delay angle of  $60^\circ$ . Calculate  $V_{avg}$  and  $V_{rms}$ .



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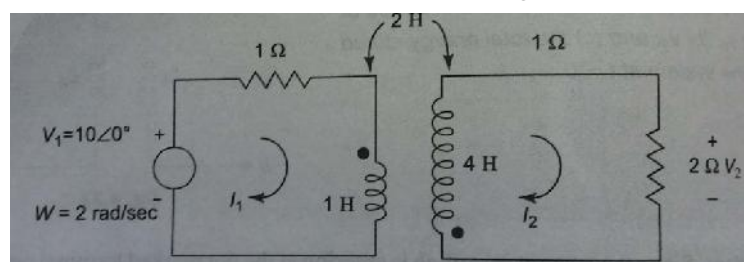
- b) What should be the value of C such that the input power factor is unity for any frequency of the source?



6M

## UNIT-III

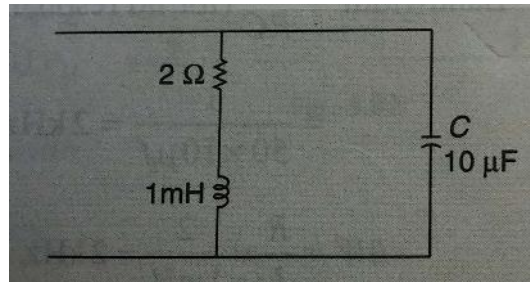
5. a) Derive the expression for coefficient coupling between pair of magnetically coupled coils. 6M  
b) Solve for the currents  $I_1$  and  $I_2$  in the circuit shown in Fig. Also, find the ratio of  $V_2/V_1$ .



8M

OR

6. a) In the parallel resonant circuit, determine the resonance frequency, dynamic resistance and bandwidth for the circuit shown in Fig. 3.



6M

- b) In a series RLC circuit  $R=1K$  ,  $L=120mH$ , and  $c=12\mu F$ . If a voltage of 200V is applied across the combination, determine
- Resonant frequency
  - Q factor
  - Half Power Frequencies
  - Band width and
  - The voltage across the inductance and the capacitance

8M

## UNIT-IV

7. a) A three phase balanced system supplies 110V to a delta connected load whose phase impedances are equal to  $(3.54+j3.54)$  ohm. Determine the line currents and draw the phasor diagram.
- b) A star connected alternator supplies a delta connected load. The impedance of each branch is  $(6+j8)$  ohm. The line voltage is 400V. Obtain the current in phase of the load. Also find the current in each phase of the alternator. What is the power drawn by the load and its power factor? Determine the reactive power of the load.

7M

7M

OR

8. a) The phase impedance of a delta connected load is  $(15+j20)$  ohms. What is the line current if the applied line voltage is 220V? Obtain the amount of power consumed per phase. What is the phasor sum of the three line currents?
- b) A star-connected alternator has 231V/Ph. It supplies a set of lighting loads at phase R, having phase impedance of  $40\angle 0^\circ$  ohms, a capacitive load of  $10\angle -60^\circ$  ohm at phase Y and an inductive load of  $5\angle 45^\circ$  ohm at phase B. The loads are connected in delta. Obtain the phase currents, line currents and line voltages.

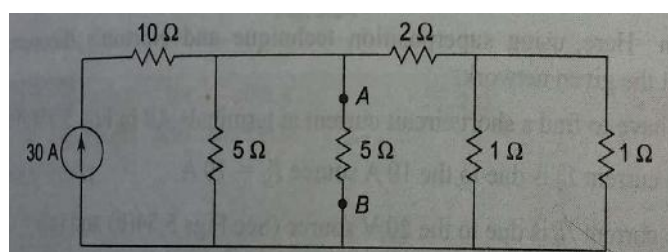
7M

7M

## UNIT-V

9. a) Explain the steps to apply Thevenin's theorem and draw the Thevenin's equivalent circuit.
- b) Determine the current flowing through the 5ohms resistor in the circuit shown in Fig. by using Norton's theorem.

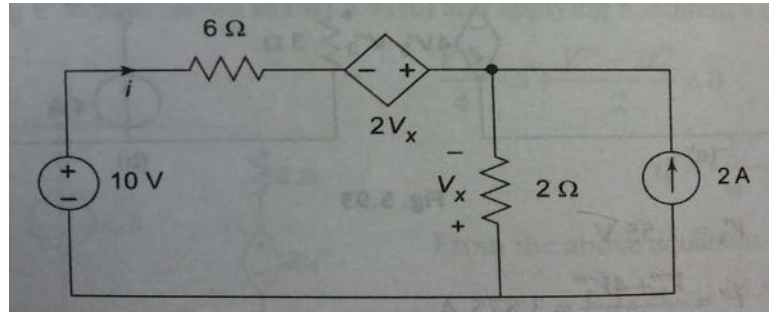
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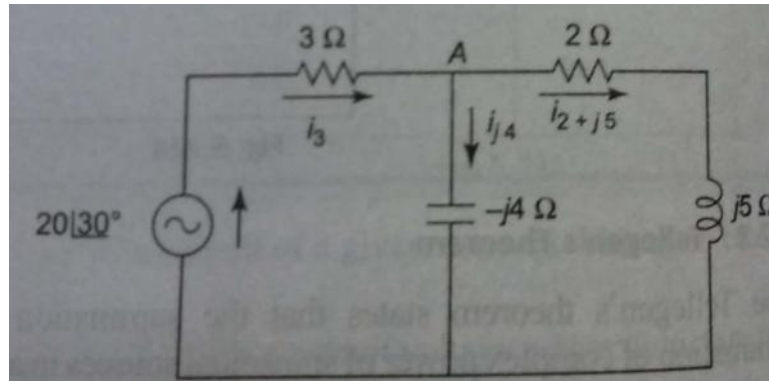
OR

10. a) Find the current  $I$  in the circuit shown in Fig. using superposition theorem.



8M

- b) Verify Tellegen's theorem for the network shown in Fig



6M

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Code: 4GC32

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

**Engineering Mathematics**

( Common to EEE &amp; 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
- $2x - y + 3z = 9$
- ,
- $x + y + z = 6$
- ,
- $x - y + z = 2$
- 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

$$\text{steps of } 0.1 \text{ if } \frac{dy}{dx} = x + y^2, \text{ given that } y = 1, \text{ where } x = 0.$$

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

$$\text{decimal places from } \frac{dy}{dx} = x^2 y - 1, \quad y(0) = 1.$$

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
- $\int_0^6 \frac{dx}{(1+x^2)}$

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  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  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  $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$  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  $[-f, f]$ .

Hence show that  $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{f^2}{12}$ .

7M

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

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  $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots = \frac{f^2}{6}$

7M

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

7M

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Hall Ticket Number :

Grid for Hall Ticket Number

R-14

Code: 4G333

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

Signals & Systems

( Electronics & Communication Engineering )

Max. Marks: 70

Time: 3 Hours

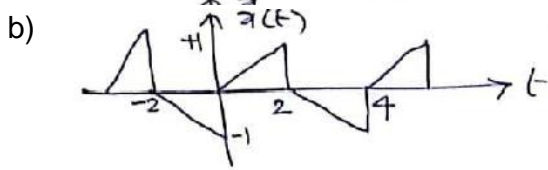
Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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UNIT-I

- 1. a) Define : and sketch i. delta(t+2) ii. mu(-t+1) iii. Signum function

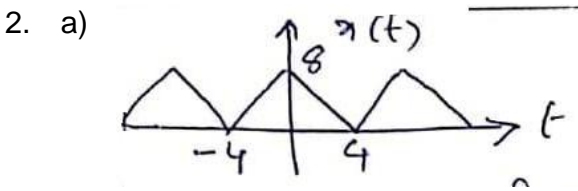
6M



Find T.F.S.

8M

OR



Find Enponential Fourier Series and Draw the spectrum

8M

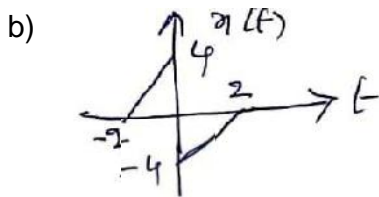
- b) Plot and Enponential Fourier Series and Draw the spectrum for x(n) = {1,2,3,4} i. x(2n) ii. x(0.5n) iii. x(n-2)

6M

UNIT-II

- 3. a) State and prove Frequency convolution property.

6M

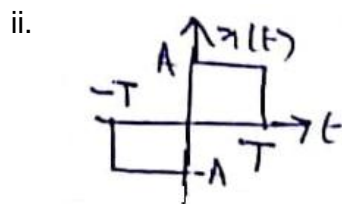
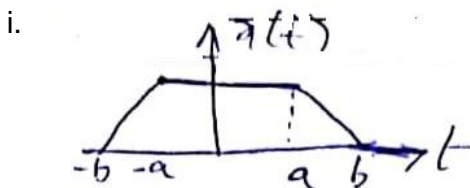


Find x(w)

8M

OR

- 4. Find Fourier Transformation using Fourier Properties.



14M

**UNIT-III**

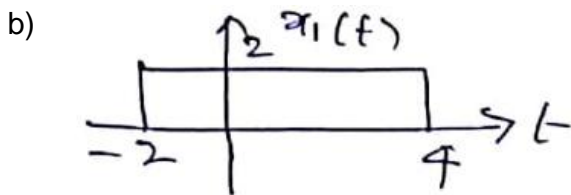
5. a) Test for Linearity, Time variance and causality for  
 i.  $y(t) = [x(t)]^2$  ii.  $y(t) = \log_{10}|x(t)|$  iii.  $y(t) = \sin at$  6M  
 b) Explain Paley-Weiner Criterion. 8M

**OR**

6. a) Test for Linearity, Time variance and causality for  
 i.  $y(t) = x(at)$  if i.  $\alpha < 1$  ii.  $\alpha > 1$  6M  
 b) Derive the condition for Distortion less Transmission and draw the magnitude & phase characteristics. 8M

**UNIT-IV**

7. a) Write Differences between auto and cross correlation and state any four properties of auto correlation. 6M



Find autocorrelation.

**OR**

8. a) Find the energy spectral density of the signal  $x(t) = 10 \sin 10\pi t$  so find its total energy. 6M  
 b) Define sampling theorem for time limited signal and find the Nyquist rate for  
 i.  $\text{rect } 300t$  ii.  $10 \sin 10\pi t \cos 300\pi t$

**UNIT-V**

9. a) Find unit ramp response of the system.  
 $F(S) = \frac{10}{s(s+10)}$  8M  
 b) Find step response of the system.  
 $X(Z) = \frac{1+2Z^{-1}+Z^{-2}}{1-3/3Z^{-1}+2Z^{-2}}$  find  $x(n)$  of i.  $|Z| > 1$  ii.  $\frac{1}{2} < |Z| < 1$  6M

**OR**

10. a) State and prove initial and final value theorem using L.T. 6M  
 b) State and prove initial and final value theorem using L.T.  
 i.  $x(n) = 2^n u(-n-1)$  ii.  $x(n) = u(n) - u(n-1)$   
 Find  $x(Z)$  and show Region of Convergence.

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