Hall Ticket Number :										

R-15

Code: 5G332

II B.Tech. I Semester Supplementary Examinations May 2018

Digital Design

(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) Convert the number (17.125)16 to base 10, base 4, base 5 and base 2. 4M
   b) Formulate a weighted binary code for the decimal digits using weights 6,3,1,1 10M

OR

2. a) Realize XOR function using AOI logic and NAND logic 6M
   b) A receiver has received a message code 1110110 which is an even parity Hamming code. Determine whether the message code has any error. If so correct the error. Give proper reasoning for your answer 8M

UNIT–II

3. a) Design a combinational logic circuit with 4 inputs A,B,C,D. The output is HIGH if and only if A and C inputs go HIGH. Draw the truth table. Minimize the Boolean function using K-Map. Draw the circuit diagram 10M
   b) Design a combinational circuit whose input is a 3 input binary number and whose output is a 2's complement of the input number 4M

OR

4. a) Use tabular method and simplify the following functions
      (i) $F=\sum m(2,3,5,6,7,9,12,14,15)$
      (ii) $F=\sum m(0,1,6,7,8,9,13,14,15)$ 10M
   b) Determine the minimal sum of product form of
      $F(W,X,Y,Z) = \sum m(4,5,7,12,14,15) + d(2,8,10)$ 4M

UNIT–III

5. a) Implement the following functions using multiplexer.
      $F1=\sum m(2,3,6,8,12)$, $F2=\sum m(1,3,5,6,7,8,10)$, $F3= \sum m(1,3,4,5,6,13,14)$ 10M
   b) Design full adder using only NAND gates 4M

OR

6. a) Realize $F(W,X,Y,Z)=\sum m(0,1,5,7,8,10,14,15)$ using PLD's 8M
   b) Compare PLA, PAL and ROM 6M

UNIT–IV

7. a) Compare latch and flip-flop 4M
   b) Draw the logic diagram and write functional table of an SR-latch using NAND gates. Explain the operation 10M

OR

8. a) Design a Mod-6 synchronous counter using JK flip-flops 10M
   b) Compare merits and demerits of ripple and synchronous counters 4M

UNIT–V

9. a) What are the rules to develop a merge chart? 4M

   b) How do you indicate Moore outputs and Mealy outputs in an ASM block? 10M

OR

10. a) Explain the minimization procedure of completely specified sequential machines 4M

    b) Construct the compatibility graph and obtain the minimal cover table for the sequential machine described by the state table given

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

10M

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Hall Ticket Number :										

R-15

Code: 5G331

II B.Tech. I Semester Supplementary Examinations May 2018

Electronic Circuits

(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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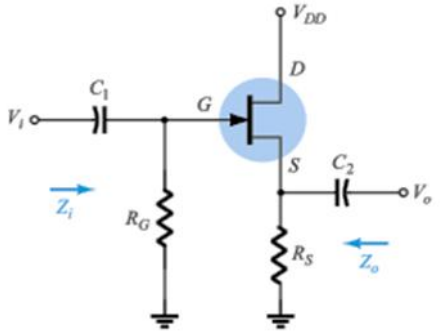
UNIT–I

1. a) Using the *small signal analysis of JFET*, obtain the expressions for input impedance, output impedance and voltage gain of the circuit given below.

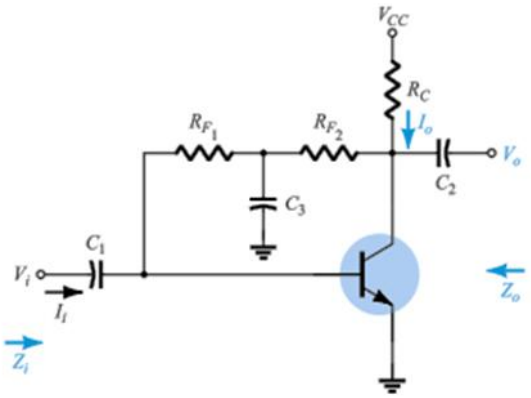


9M

b) Explain with an example, the application of unity gain source follower as an impedance matching circuit. 5M

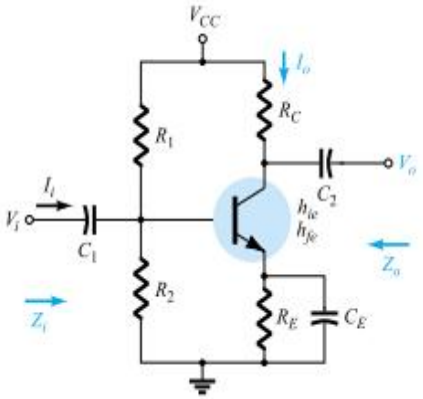
OR

2. a) Collector DC feedback configuration is given below. Using r_e model obtain the expressions for input impedance, output impedance and voltage gain of the circuit given above.



7M

b) Using the *h – parameter* model of the transistor, obtain the expressions for input impedance, output impedance and voltage gain of the circuit given below.



7M

UNIT–II

3. a) Obtain the expression for short circuit current gain of CE amplifier 9M

   b) Explain the significance of Gain Bandwidth product. 5M

OR

4. a) What is Emitter follower? Why it is called so? Explain the application of Emitter follower as impedance matching Circuit. 7M

   b) With a circuit diagram, explain the behavior of Emitter follower at High frequencies. 7M

UNIT–III

5. a) Compare the input impedance, output impedance and gain of Voltage series and voltage shunt negative feedback amplifiers. 10M

   b) Prove that negative feedback increases the bandwidth. 4M

OR

6. a) Prove that negative feedback helps in stabilization of gain. 4M

   b) Compare the input impedance, out impedance and gain of Current series and current shunt negative feedback amplifiers. 10M

UNIT–IV

7. a) With a circuit diagram explain the working of crystal oscillator. What is the advantage of using crystal oscillator? 7M

   b) Explain with a circuit diagram the working of Colpitts Oscillator. 7M

OR

8. a) Explain the Barkhausen criteria for oscillations. 5M

   b) Derive the expression for frequency of oscillation of Weinbridge oscillator. 9M

UNIT–V

9. a) Derive the efficiency of Class B Amplifier. 7M

   b) Explain crossover distortion in Class B power amplifier. 7M

OR

10. a) What is the significance of Q factor in a tuned amplifier? 6M

    b) Compare the operation of capacitive coupled and inductive coupled amplifiers. 8M

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Hall Ticket Number :										

R-15

Code: 5G235

II B.Tech. I Semester Supplementary Examinations May 2018

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)

****

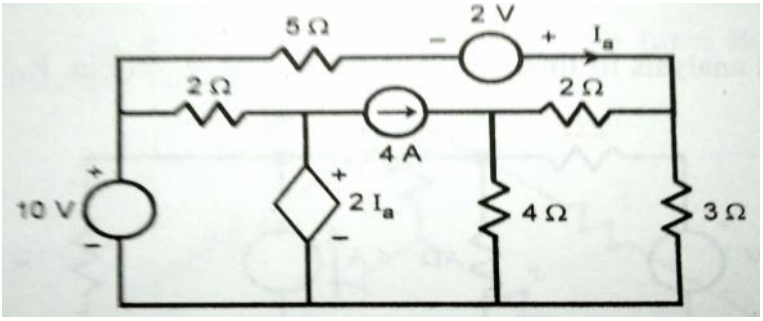
UNIT–I

1. a) A current $i=10\ e^{-t}$ is applied to
   a) a 3Ω resistor
   b) a 2H inductor and
   c) a 0.1 F capacitor

   What are the respective voltages?

   Write down the expressions for power in each case? 6M

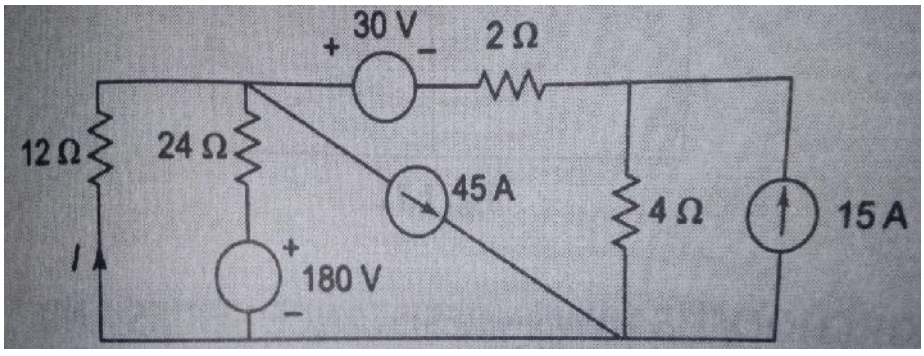
   b) Use nodal analysis to find the power delivered by the 4 A current source shown in figure :



8M

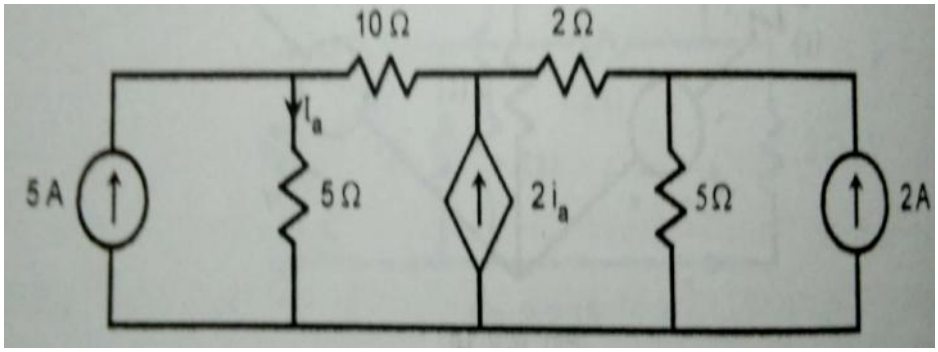
OR

2. a) Reduce the network shown in Fig. to a single loop network by successive source transformation, to obtain the current in the 12ohms resistor.



6M

   b) Use mesh analysis to find the current I_a shown in figure:

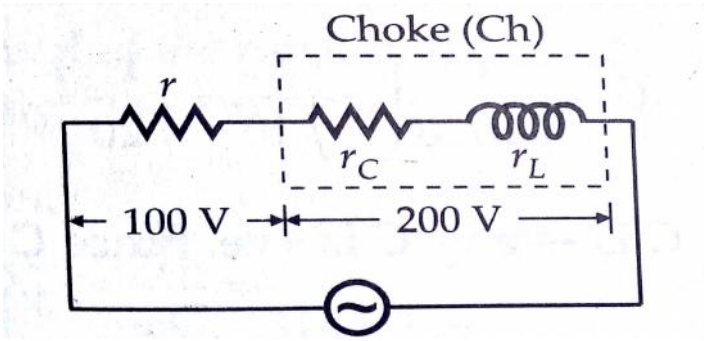


8M

UNIT–II

3. a) The voltage of a circuit is v=200 sin(ωt+30^0), the current is i= 50 sin(ωt+60^0). Calculate the average power, reactive volt amps and apparent power. 6M

   b) In below fig "r" is a pure resistance and "CH" the choke coil, connected in series. Power dissipated in 'r' being 250W and that in choke 50w, find the value of the reactance in the choke and the value of the supply voltage.



8M

OR

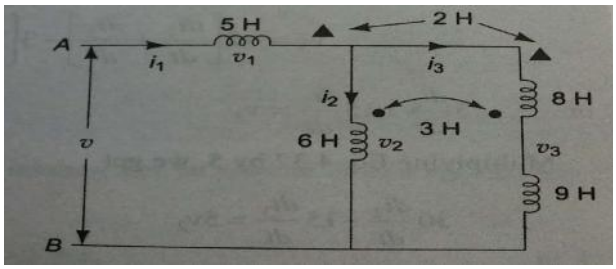
4. a) Add the following currents:

   i_1=5 sinωt
   i_2=10 cos(ωt+30^0)
   i_3= -5 sin(ωt-30^0) 6M

   b) A resistor and a capacitor are in series with a variable inductor. When the circuit is connected to a 200volt 1 phase 50Hz a.c supply, a maximum current of 0.314 amps was obtained by varying the inductance. The voltage across the capacitance was then 300volts. Calculate the circuit constants. 8M

UNIT–III

5. a) Calculate the effective inductance of the circuit shown in Fig. across AB.



8M

   b) Write the analogy between magnetic and electric circuit. 6M

OR

6. a) A constant voltage at a frequency of 1MHz is applied to an inductor in series with a variable capacitor when the capacitor is set to 500PF, the current has the max. value, while it is reduced to one half when capacitance 600PF, find (i) resistance (ii) inductance (iii) Q factor of inductor. 8M

   b) Compare series and parallel resonant circuits. 6M

UNIT–IV

7. a) Explain the relation between line and phase voltages and currents in a star connection. 6M

   b) A delta connected load with impedance Z_{AB}= 10∠30^o Ohms, Z_{BC}= 25∠0^o Ohms, Z_{CA}= 20∠-30^o Ohms is connected to a three phase three wire 500Volts system. If the phase sequence is ABC, calculate the line currents and total power. 8M

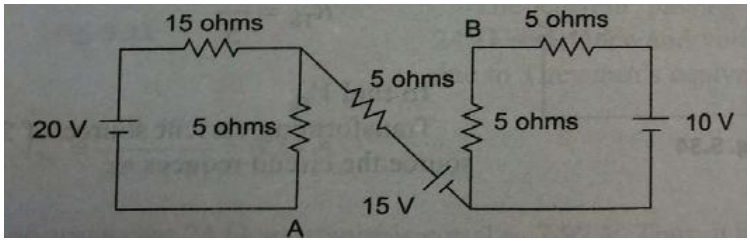
OR

8. a) Three inductors each of resistances 2 Ohms and an inductive reactance of 8 Ohms are connected in star and supplied from a three phase 230 V, 50 Hz supply. What are the line and phase currents and voltages? Also calculate the power input and power factor. 6M

   b) The power delivered to a balanced delta connected load by a 400 Volt, 3 phase supply is measured by two wattmeter method. If the readings of the two watt meters are 2000 and -1500 watts respectively, calculate the magnitude of the impedance in each arm of the delta load and its resistive component. 8M

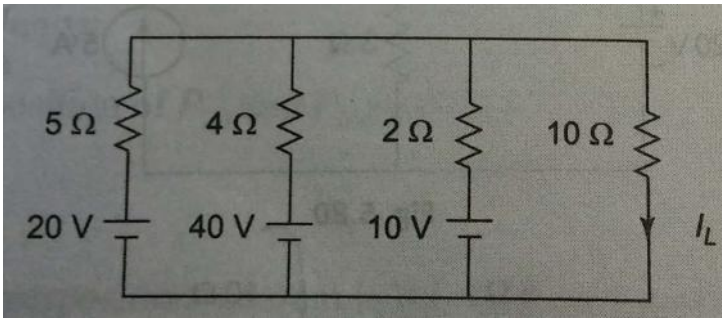
UNIT–V

9. a) Determine the Thevenin's equivalent across the terminals A and B as shown in Fig.



8M

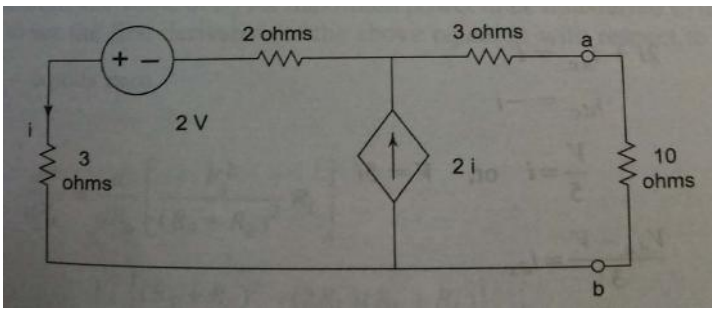
   b) Find the current I_L. Use Millman's theorem.



6M

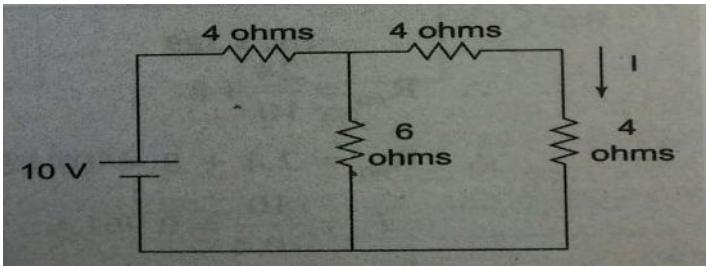
OR

10. a) Find the Norton's equivalent across the terminals ab as shown in Fig. Hence find current through 10 ohms.



8M

   b) Verify reciprocity theorem for the network shown in Fig.



6M

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Hall Ticket Number :										

R-15

Code: 5GC34

II B.Tech. I Semester Supplementary Examinations May 2018

Environmental Science

(Common to ECE & IT)

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 the need for studying Environmental issues? 7M

   b) what are two main causes of the Environmental crisis 7M

OR

2. a) Describe the important components of the Environment. 7M

   b) What is the role of public & institutions in protecting the Environment 7M

UNIT–II

3. a) With a help of case study explain the effects of extracting mineral resources 7M

   b) Express role of an individual in the conservation of natural resources. 7M

OR

4. a) Explain how almost every source of energy has its limits 7M

   b) Outline the importance of land as a natural resource. predict the serious effect of water logging and soil salinity 7M

UNIT–III

5. a) Explain the types and characteristic features of
   i) Grass land ecosystem **ii**) Aquatic ecosystem 7M

   b) Outline nutrient cycles **i**) bio geo chemical cycle **ii**) nitrogen cycle 7M

OR

6. a) Summarize the values of Biodiversity 7M

   b) How to conserve biodiversity? 7M

UNIT–IV

7. a) Explain the causes, sources and effects of marine pollution 7M

   b) Explain the causes, sources and effects of outdoor air pollution 7M

OR

8. a) Explain causes, effects and control measures of urban solid wastes. 7M

   b) What is thermal pollution? How is it controlled? 7M

UNIT–V

9. a) Explain the practice of rain water harvesting. 7M

   b) Write a note on i)wet land reclamation ii) Acid rain 7M

OR

10. a) Summarize the salient features of the wild life protection act? 7M

    b) Write a note on value based education in relation to environment. 7M

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Hall Ticket Number :										

R-15

Code: 5GC32

II B.Tech. I Semester Supplementary Examinations May 2018

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) Find the rank of a matrix A by reducing it into Echelon form where

$$A=\begin{bmatrix} 2 & 1 & 3 & 5 \\ 4 & 2 & 1 & 3 \\ 8 & 4 & 7 & 13 \\ 8 & 4 & -3 & -1 \end{bmatrix}$$ 7M

b) Solve $x+y+z=9,\quad 2x-3y+4z=13,\quad 3x+4y+5z=40$ by Gauss elimination method. 7M

OR

2. a) Find the Eigen values and the corresponding Eigen vectors of the matrix

$$A=\begin{bmatrix} 2 & 1 & -1 \\ 1 & 1 & -2 \\ -1 & -2 & 1 \end{bmatrix}.$$ 7M

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

UNIT–II

3. a) Find the real root of the equation $x\log_{10} x=1.2$ by Regula-falsi 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 $\frac{dy}{dx}=x+y^2$, given that $y=1$, where $x=0$. 7M

OR

4. a) Find the positive root of the equation $x^4-x=10$ by Newton-Raphson method correct to four decimal places. 7M

b) Using Euler's method, find an approximate value of $y(1)$ when $\frac{dy}{dx}=x^2+y^2$ and $y(0)=1$ in five steps (i.e. $h=0.2$). 7M

UNIT–III

5. a) Find the cubic polynomial which takes the following values:

x	0	1	2	3
$f(x)$	1	2	1	10

Hence evaluate $f(4)$. 7M

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

OR

6. a) Estimate the value of $f(x)$ for $x = 2.5$ from the following table:

x	1	2	3	4
$f(x)$	1	8	27	64

Using Lagrange's interpolation formula. 7M

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

x	1.5	2.0	2.5	3.0	3.5	4.0
y	3.375	7.0	13.625	24.0	38.875	59.0

7M

UNIT–IV

7. a) Fit a second degree parabola to the following data by the method of least squares:

x	10	12	15	23	20
y	14	17	23	25	21

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	0	1	2	3
y	1.05	2.10	3.85	8.30

7M

b) Solve $z^2 = pqxy$ by the Charpit's method.

UNIT–V

9. a) Obtain Fourier series for the function $f(x) = \begin{cases} \pi x, & 0 \le x \le 1 \\ \pi(2-x), & 1 \le x \le 2 \end{cases}$. Hence show that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots\cdots = \frac{\pi^2}{8}$ 7M

b) Find the Fourier transform of the function $f(x) = \begin{cases} 1 - x^2, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$.

Hence evaluate $\int_0^\infty \left(\frac{\sin x - x\cos x}{x^3} \right) dx$. 7M

OR

10. a) Obtain the half-range Cosine series for the function $f(x) = \begin{cases} kx, & 0 \le x \le l/2 \\ k(l-x), & l/2 \le x \le l \end{cases}$. 7M

b) Solve the integral equation $\int_0^\infty f(\lambda)\cos(\alpha\lambda)\,d\lambda = \begin{cases} 1-\alpha, & 0 \le \alpha \le 1 \\ 0, & \alpha > 1 \end{cases}$. Hence evaluate $\int_0^\infty \left(\frac{\sin^2 t}{t^2} \right) dt$. 7M

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Hall Ticket Number :										

R-15

Code: 5G333

II B.Tech. I Semester Supplementary Examinations May 2018

Signals and Systems

(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

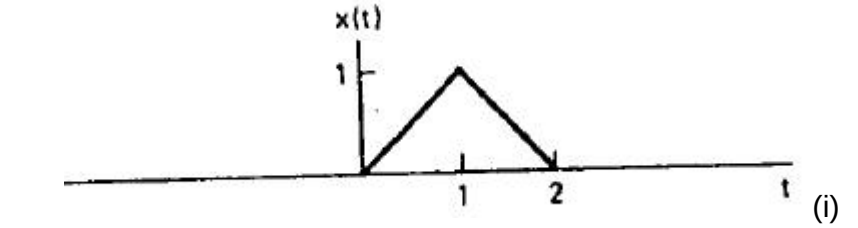
1. a) Categorize each of the following signals as an energy or power signals, and find the energy or power of the signal.

i. $x[n] = \begin{cases} n, & 0 \le n \le 5 \\ 10 - n, & 5 \le n \le 10 \\ 0, & otherwise \end{cases}$

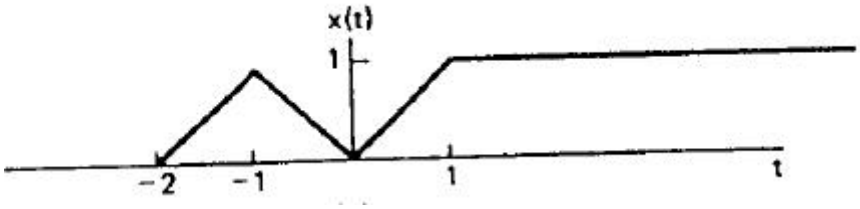
ii. $x(t) = \begin{cases} 5\cos(\pi t), & -0.5 \le t \le 0.5 \\ 0, & otherwise \end{cases}$

iii. $x(t) = 5\cos(\pi t) + 5\sin(5\pi t), \quad -\infty < t < \infty$ 7M

b) Determine and sketch the even and odd parts of the signals depicted in the Fig. 1 (i) and (ii). Label your sketches carefully.



(i)



(ii)

Fig. 1 7M

OR

2. a) Find the Trigonometric Fourier series for the triangular periodic signal *x*(*t*) shown in Fig.2, and sketch the amplitude and phase spectra for *x*(*t*).

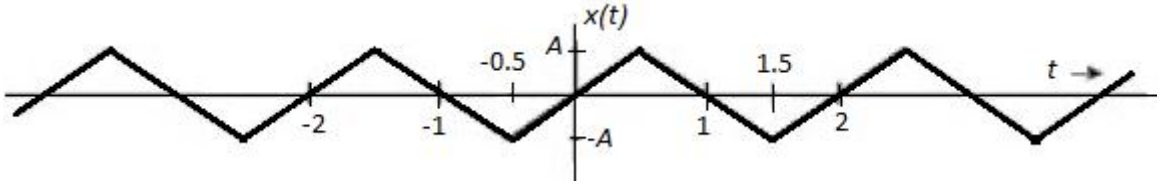


Fig. 2

9M

b) Determine whether or not each of the following signals is periodic. If a signal is periodic, determine its fundamental period.

i. $x(t) = 2\cos\left(3t + \frac{\pi}{4}\right)$

ii. $x(t) = e^{j(\pi t - 1)}$

5M

UNIT–II

3. a) State and prove time convolution property of Fourier Transform. 4M

   b) Obtain the Fourier transform of the trapezoidal pulse shown in the following Fig. 3.

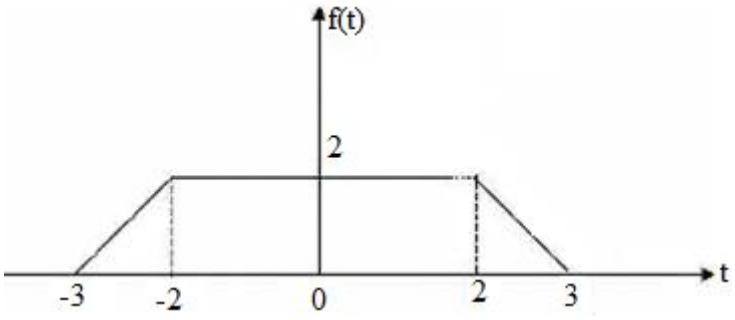


Fig. 3 10M

OR

4. a) Find the Fourier transform of the following signals:

   $i. x(t) = A\ sin\omega_o t$

   $ii. x(t) = A\ cos\ \omega_o t$

   Also, Draw the spectrums of those. 7M

   b) Define Hilbert transform in both time domain and frequency domain. Also, list its properties. 7M

UNIT–III

5. a) Obtain the conditions for the distortion-less transmission through a system. Also, elaborate meaning of those with examples. 7M

   b) Derive the relation between bandwidth and rise time of a system. 7M

OR

6. a) Explain the characteristics of an ideal LPF, HPF and BPF. Also, explain why these cannot be realized. 10M

   b) Define Impulse Response and Transfer function. Also, give the relation between the two. 4M

UNIT–IV

7. a) Define Nyquist Rate and then find the Nyquist Rate for the following signals:
   i) Rect (300t) ii) 10 Cos 300πt. 5M

   b) Find the graphical convolution between the signals $[u(t) + u(t-\tau)]$ and $e^{-t}u(t)$. 9M

OR

8. a) State and prove properties of Auto-correlation and Cross-correlation. 7M

   b) Explain how a signal is reconstructed from its Samples with corresponding equations and waveforms. 7M

UNIT–V

9. a) Find the Laplace transform and ROC of signal $x(t) = e^{-at}cos\omega_o t\, u(t)$. 6M

   b) Find the Inverse Z-transform of $x(z) = \frac{1}{(1+z)} + \frac{2z}{(z-0.2)}$ for different possible ROCs. 8M

OR

10. a) State and prove any FOUR properties of Z-transform. 8M

    b) Find Z – transform, ROC and pole – zero locations of $x[n] = (\frac{1}{4})^n u[n] + (\frac{1}{3})^n u[-n-1]$. 6M

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