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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

QUESTION BANK

II YEAR

ELECTRONICS AND COMMUNICATION ENGINEERING

ODD SEMESTER

ACADEMIC YEAR 2025 – 2026

HOD **ACOE** **PRINCIPAL** **CHAIRMAN**

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24MABS303

Transforms & Partial Differential Equations

UNIT –I

PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations –Solutions of standard types of first order partial differential equations – Lagrange's linear equation -- Linear partial differential equations of second and higher order with constant coefficients of homogeneous.

Q.No	Question	CO	BTL	Marks
	PART A			
1	Form the PDE by eliminating the arbitrary constants a &b from z = $(x^2+a)(y^2+b)$	1	UN	2
2	When is p.d.e said to be linear	1	RE	2
3	Form the PDE by eliminating the arbitrary constants a &b from z = ax^2+by^2	1	UN	2
4	Eliminate the arbitrary function f from z = $f\left(\frac{y}{x}\right)$	1	UN	2
5	Mention three types of solution of p.d.e	1	RE	2
6	Solve $(D^2 – 4DD'^2 +3D'^2)$ z = 0	1	UN	2
7	Find P.I of $(D^3 -3DD'^2 +2D'^3) = e^{2x-y}$	1	RE	2
8	Find P.I of $(D^2 -3DD' +3D'^2) = e^{3x+4y}$	1	RE	2
9	Solve $(D^2 – 2DD'^2 + D'^2)$ z = 0	1	UN	2
10	Find P.I of $(D^2 – 2DD' -2D'^2)$ = sin (x-y)	1	RE	2
11	Find the general solution of px +qy = z	1	RE	2
12	Find the P.D.E of all spheres whose centre use on the z- axis	1	RE	2
13	Find the singular solution of the equation z = p x + q y + p^2 + q^2	1	RE	2
14	Find the complete solution of the equation Z = px + qx - $2\sqrt{pq}$	1	RE	2

15	Find P.I of $(D^2+4DD')\, z = e^x$	1	RE	2

PART B

1	Solve $x(y^2 - z^2)\, p + y(z^2 - x^2)\, q = z(x^2 - y^2)$.	1	AP	8
2	Solve $(mz - ny)p + (nx - lz)q = ly - mx$	1	AP	8
3	Solve $pq + p + q = 0$	1	AP	8
4	Solve $(D^3 - 2D^2D')z = 2e^{2x} + 3x^2y$.	1	AP	8
5	Solve $(x-2z)p + (2z - y)q = y - x$	1	AP	8
6	Solve $(mz - ny)p + (nx - lz)q = ly - mx$	1	AP	8
7	Solve $(D^2 - 2DD' + D'^2)z = \cos(x - 3y) + e^{y-2x}$	1	AP	8
8	Solve $(D^2+2DD'+D'^2)\, z = x^2y + e^{3x+y}$	1	AP	8
9	Solve $Z = px + qx + p^2 + pq + q^2$	1	AP	8
10	Solve $\sqrt{p}+\sqrt{q} = 1$	1	AP	8

UNIT –II

FOURIER SERIES

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series and Cosine series – Parseval's identity.

Q.No	Question	CO	BTL	Marks
	PART A			
1	Define Fourier series	2	RE	2
2	State the Dirichlet's conditions for a function f(x) to be expanded as a Fourier series	2	RE	2
3	Write a_0, a_n in the expansion of $x + x^3$ as a Fourier series in (- π, π).	2	RE	2
4	Find the b_n expansion of $f(x) = x^2$ as a Fourier series in (- π, π).	2	RE	2
5	Find the constant term in the Fourier series of (x) $=\cos^2 x$ in (- π, π).	2	RE	2
6	Find the sum of the Fourier Series for $f(x) = \begin{cases} x, 0 < x < 1 \\ 2, 1 < x < 2 \end{cases}$ at $x = 1$.	2	RE	2
7	If $f(x) = \begin{cases} \cos x, 0 < x < \pi \\ 50, \pi < x < 2\pi \end{cases}$, Find the sum of the Fourier Series for $f(x)$ at $x = \pi$	2	RE	2
8	If f(x) is an odd function defined in (-L, L) what are the values of a_0 and a_n.	2	RE	2
9	If f(x) = 2x in the interval (0, 4) then the value of a_2 in the Fourier series expansion.	2	RE	2
10	Expand f(x) = 1 in a sine series in $0< x< \pi$	2	RE	2
11	Find the Fourier constant b_n for x sinx in $(-\pi, \pi)$	2	RE	2
12	State Parseval's identity.	2	RE	2
13	Find the value of b_{25} while expanding the function	2	RE	2

	$f(x) = \begin{cases} 1+\frac{2x}{l}, -l \le x \le 0 \\ 1-\frac{2x}{l}, 0 \le x \le l \end{cases}$ as a fourirer series.			
14	Write the formula for Fourier constants to expand f(x) as a cosine series in (0, L).	2	RE	2
15	If f(x) = $x^2 + x$ is expressed as a Fourier series in the interval (-2,2) to which value this series converge at x = 2	2	RE	2

PART B

1	Find the Fourier series x^2 in (- π, π) . Use Parseval's identity to prove $1+\frac{1}{2^4}+\frac{1}{3^4}+\frac{1}{4^4}+\cdots=\frac{\pi^4}{90}$	2	AP	16
2	Find the Fourier series expansion of the function with period 2π $f(x) = (x) = \begin{cases} x & 0<x<\pi \\ 2\pi - x & \pi < x < 2\pi \end{cases}$ Hence deduce that $1+\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\cdots=\frac{\pi^4}{8}$	2	AP	16
3	Obtain the Fourier series for f(x) of period 2l and defined as follows f(x) = $\begin{cases} l-x & 0<x\le l \\ 0 & l \le x < 2l \end{cases}$ hence deduced that $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\cdots=\frac{\pi}{4}$ and $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\cdots=\frac{\pi^2}{8}$	2	AP	16
4	Expand $f(x)=\frac{1}{2}(\pi - x)$ as a Fourier Series in (0, 2 π) and hence deduce the sum of $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\cdots=\frac{\pi}{4}$.	2	AP	16
5	Expand the Fourier series of f(x) = $2x - x^2$ for the interval (0, 2L) for 0<x<3.	2	AP	16
6	Find the half range cosine series for the function f(x) = x (π – x) in 0 < x < π.	2	AP	16
7	Find the Half range sine series for f(x) = x(π - x) in (0,π) $\frac{1}{1^3}-\frac{1}{3^3}+\frac{1}{5^3}+\cdots=\frac{\pi^3}{32}$	2	AP	16
8	Find the Fourier series of $f(x) = x + x^2$ in (- π, π) of periodicity 2 π. Hence deduce that $\sum_{n=1}^{\infty}\frac{1}{n^2} = \frac{\pi^2}{6}$	2	AP	16

UNIT –III

APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Classification of PDE – Method of separation of variables – Fourier series solutions of one dimensional wave equation – One dimensional equation of heat conduction.

Q.No	Question	CO	BTL	Marks
	PART A			
1	Find the nature of the partial differential equation $4u_{xx}+4u_{xy}+u_{yy}+2u_x - u_y = 0$.	3	RE	2
2	Classify $u_{xx} - y^4 u_{yy} = 2y^3 u_y$	3	UN	2
3	Write the assumptions made in the derivation of one dimensional wave equation.	3	RE	2
4	A rod 30 cm long has its ends A& B kept at 20^0C & 80^0 C respectively. until steady state conditions prevail. Find this steady state temperature in the rod.	3	RE	2
5	State one dimensional heat equation with the initial and boundary conditions.	3	RE	2
6	Classify the P.D.E $u_{xx} + 2u_{xy} + u_{yy} = 0$.	3	UN	2
7	Classify the P.D.E $3\frac{\partial^2 z}{\partial x^2} - 4\frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} = 0$	3	UN	2
8	Classify the following P.D.E $x^2 \frac{\partial^2 u}{\partial x^2} + (1 - y^2)\frac{\partial^2 u}{\partial y^2} = 0$ $-\infty < x < \infty, -1 < y < 1$.	3	UN	2
9	The ends a and b of a rod of length 10 cm have their temperature kept at 20^0C & 70^0 C. find the steady state temperature distribution on the rod.	3	RE	2
10	Classify the P.D.E $u_{xx} - u_{yy} = 2Y^3 u_y$	3	RE	2
11	What are the assumptions made while deriving the one dimensional heat equation.	3	RE	2
12	Write PDE of the one dimensional heat flow	3	RE	2
13	why α^2 is used in the heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$	3	RE	2

14	What is the basic difference between the solution of one dimensional wave equation and one dimensional heat equation.	3	RE	2
15	What is meant steady state condition in heat flow	3	RE	2

PART B

1	Using the method of separation of variables solve $\frac{\partial u}{\partial t} = 2\frac{\partial u}{\partial t} + u$ where u(x,0) = 6 $6e^{-3x}$	3	AP	16
2	A string is stretched and fastened to two points x= 0 and x= l apart.Motion is started by displacing the string into the form $y = k(lx - x^2)$ from which it is released at time t = 0. find the displacement of any point on the string at a distance of x from one end at time t.	3	AP	16
3	If a string of length is initially at rest in its equilibrium position and each of its points is given the velocity $v_0 \sin\frac{3\pi x}{l}$ 0 < x < L,determine the displacement of a point distant x from one at time t.	3	AP	16
4	The ends A & B of a bar 30 cms long have this temperature kept at 20^oC and 80^oC until steady state prevails. The temperature at each end suddenly reduced to 0^oC and maintained so, find the resulting temperature distribution in the bar at time t	3	AP	16
5	The ends A and B of a rod 30cms long have their temperature kept at 20^o C and the other at 80^oC until steady state conditions prevail. The temperature of the end B is then suddenly reduced to 60^o C and kept so while the end A is raised to 40^oC.find the temperature distribution in the rod after time t.	3	AP	16

UNIT –IV

FOURIER TRANSFORMS

Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Parseval's identity.

Q.No	Question	CO	BTL	Marks
	PART A			
1	State Fourier transform pair	4	RE	2
2	State Change of scale property	4	RE	2
3	Find the Fourier sine transform of $\frac{1}{x}$	4	RE	2
4	Find the Fourier cosine transform of e^{-x}	4	RE	2
5	State Parseval's Identity	4	RE	2
6	Find the Fourier sine transform of e^{-3x}	4	RE	2
7	Find the Fourier cosine transform of $f(x) = \begin{cases} cosx & if \quad 0 < x < a \\ 0 & if \quad \|x\| \geq a. \end{cases}$	4	RE	2
8	State the Fourier transform of the derivatives of a function	4	RE	2
9	Define self-reciprocal with respect to Fourier transform.	4	RE	2
10	Define Shifting property	4	RE	2
11	State Modulation property	4	RE	2
12	Define fourier Cosine transform	4	RE	2
13	Define Sine transform	4	RE	2
14	Find the Fourier sine transform of $3e^{-2x}$	4	RE	2
15	Does Fourier Sine transform of f(x) = k, $0 \leq x < \infty$ exist. justify your answer.	4	UN	2

PART B

1	Find the Fourier transform of $f(x) = \begin{cases} 1 & \lvert x \rvert < a \\ 0 & \lvert x \rvert \geq a. \end{cases}$ Where a is positive real number and hence deduce that i) $\int_0^\infty \frac{sint}{t} dt = \frac{\pi}{2}$ and ii) $\int_0^\infty \frac{(sint)^2}{t^2} dt = \frac{\pi}{2}$.	4	AP	16
2	Find the Fourier transform of the function f(x) defined by $f(x) = \begin{cases} 1 - x^2 \ in \ \lvert x \rvert \leq a \\ 0 \ in \ \lvert x \rvert > a > 0. \end{cases}$ Hence prove that $\int_0^\infty \frac{sint - tcost}{t^3} \cos(\frac{t}{2}) dt = \frac{3\pi}{16}$. Also show that $\int_0^\infty \frac{(tcost - sint)^2}{(t^3)^2} dt = \frac{\pi}{15}$.	4	AP	16
3	i)Show that the function $e^{-\frac{x^2}{2}}$ is self -reciprocal under Fourier transform ii) Show that the function $e^{-a^2x^2}$ is self -reciprocal under Fourier transform	4	AP	16
4	i)Evaluate $\int_{-\infty}^{\infty} \frac{x^2 dx}{(x^2+4)(x^2+9)}$ using Fourier sine transform ii)Evaluate $\int_0^\infty \frac{dx}{(x^2+a^2)(x^2+b^2)}$ using Fourier transform.	4	AP	16
5	i)Using Parseval's identity evaluate the following integral $\int_0^\infty \frac{x^2 dx}{(a^2+x^2)^2}$ ii)Using Parseval's identity evaluate the following integral $\int_0^\infty \frac{dx}{(a^2+x^2)^2}$	4	AP	16
6	Find Fourier cosine transform of $\frac{e-ax}{x}$. Hence find Fc $[\frac{e^{-ax} - e^{-bx}}{x}]$.	4	AP	16
7	Find the Fourier transform of $f(x) = \begin{cases} 1 - \lvert x \rvert & \lvert x \rvert < 1 \\ 0 & \lvert x \rvert \geq 1. \end{cases}$ Where a is positive real number and hence deduce that i) $\int_0^\infty (\frac{sint}{t})^2 dt = \frac{\pi}{2}$ and ii) $\int_0^\infty (\frac{sint}{t})^4 dt = \frac{\pi}{3}$.	4	AP	16
8	Find the Fourier transform of the function f(x) defined by $f(x) = \begin{cases} a^2 - x^2 \ in \ \lvert x \rvert \leq a \\ 0 \ in \ \lvert x \rvert > a > 0. \end{cases}$ Hence prove	4	AP	16

that $\int_0^{\infty} \frac{sint - tcost}{t^3} dt = \frac{\pi}{4}$. Also show that $\int_0^{\infty} \frac{(sint - tcost)^2}{(t^3)^2} dt = \frac{\pi}{15}$.

UNIT –V

Z -TRANSFORMS AND DIFFERENCE EQUATIONS

Z- transforms - Elementary properties – Convergence of Z-transforms – Inverse Z – transform using partial fraction and convolution theorem- Formation of difference equations – Solution of difference equations using Z- transforms.

Q.No	Question	CO	BTL	Marks
	PART A			
1	Find Z[1/ n!]	5	RE	2
2	Find Z([a^n]	5	RE	2
3	Find Z[1/ (n+1)!]	5	RE	2
4	State convolution theorem on Z- transform	5	RE	2
5	Form the difference equation byeliminating arbitrary constant A from $y_n = A3^n$	5	UN	2
6	Form the the difference equation from u_n = a 2^{n+1}	5	UN	2
7	Form the difference equation from $y_n = a+ b3^n$	5	UN	2
8	Form the difference equation by eliminating arbitrary constant A from y_n = A+B(-2)n	5	UN	2
9	Find Z$\left[\frac{a^n}{n!}\right]$	5	RE	2
10	Using Convolution theorem find $Z^{-1}\left[\frac{Z^2}{(Z-1)(Z-3)}\right]$	5	UN	2
11	Find the Z- transform of (n+2)	5	RE	2
12	Find the inverse Z transform of $\left[\frac{Z}{(z-1)^2}\right]$	5	RE	2
13	Define two sided Z transform	5	RE	2
14	Define Linearity property	5	RE	2

15	Find Z[e^{-at}]	5	RE	2

PART B

1	Find the Z – transform of $\frac{2n+3}{(n+1)(n+2)}$	5	AP	8
2	Using Partial fraction method find $Z^{-1}\left[\frac{10z}{(z-1)(z-2)}\right]$	5	AP	8
3	Using Convolution theorem find $Z^{-1}\left[\frac{z^2}{(z-a)(z-b)}\right]$.	5	AP	8
4	Using Convolution theorem find $Z^{-1}\left[\frac{8Z^2}{(2Z-1)(4Z-1)}\right]$.	5	AP	8
5	Solve using Z-transform technique the difference equation $y_{n+2} + 4y_{n+1} + 3y_n = 3^n$ with $y_0 = 0$, $y_1 = 1$	5	AP	16
6	Solve $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ given $y_0 = y_1 = 0$	5	AP	16
7	Solve using Z-transform technique the difference equation $u_{n+2} + 3u_{n+1} + 2u_n = 0$ with $u_0 = 1$, $u_1 = 2$.	5	AP	16
8	Using partial fraction method find $Z^{-1}\left[\frac{z^3}{(z-1)^2(z-2)}\right]$	5	AP	8

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24ECPC301

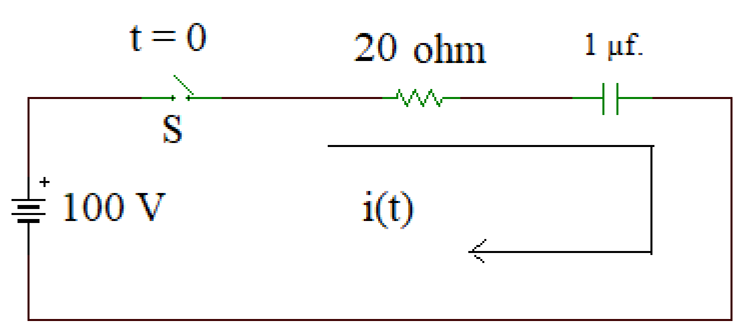
Circuit and Network Analysis

UNIT I

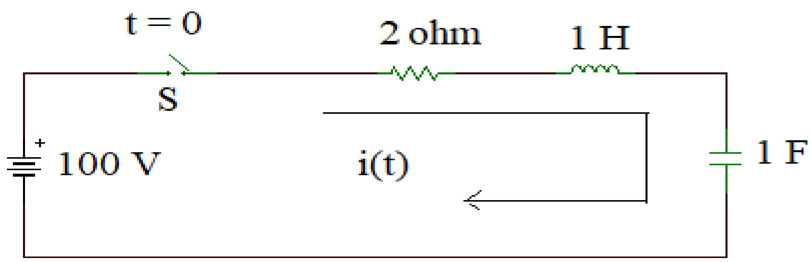
TRANSIENT RESPONSE AND DUALITY

Natural response and forced response – Transient response of RC and RL for step input – Complete response of RLC circuits for step input. Duals, Dual circuits. Analysis using dependent current sources and voltage sources.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is meant by transient and transient time?	1	RE	2
2.	Illustrate the concept of transient response in a circuit.	1	UN	2
3.	Explain steady-state condition and the significance of the initial condition in circuit analysis.	1	UN	2
4.	Define natural and forced response in an electric circuit.	1	RE	2
5.	Derive the expression for current in an RL circuit and RC circuit excited by a step input.	1	UN	2
6.	Define the term time constant for RC and RL circuits.	1	RE	2
7.	Interpret the meaning of time constant for an RL circuit and RC circuit.	1	UN	2
8.	A DC voltage of 100 V is applied to a series RL circuit with R = 25 ohm. What will be the current in the circuit at twice the time constant?	1	AP	2
9.	In the circuit shown in figure, find the time when the voltage across the capacitor becomes 25 V and current at the circuit $i(t) = 5e^{-50000\,t}$, after the switch is closed at t = 0.	1	AP	2



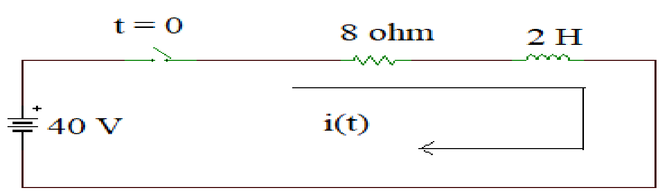
10.	For the circuit shown in figure, determine the current in the circuit when the switch is closed at t = 0. Assume that there is no initial charge on the capacitor or current in the inductor.	1	AP	2



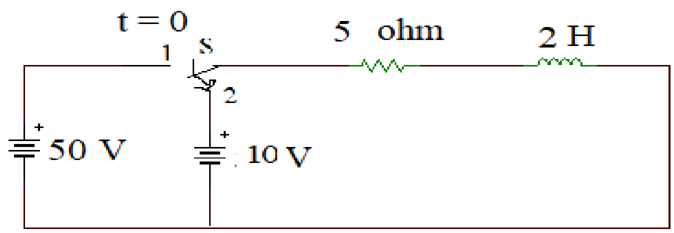
11.	Define dual networks. List out the four pairs of dual quantities.	1	RE	2
12.	Draw the dual of the network shown in figure.	1	RE	2
13.	Explain the principles of duality in network theory.	1	UN	2
14.	Define VCVS and CCCS and give one example.	1	RE	2
15.	Compare independent and dependent sources in terms of control variables and circuit behaviour.	1	UN	2

PART B

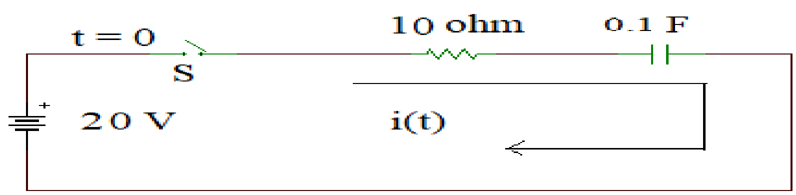
1.	Explain the complete response of a series RL circuit when it is excited by a step input voltage, and illustrate its waveform.	1	UN	16
2.	Explain the complete response of a series RC circuit when it is excited by a step input voltage, and illustrate its waveform.	1	UN	16
3.	Explain the complete response of a series RLC circuit when it is excited by a step input voltage, and illustrate its waveform.	1	UN	16
4	(i) In the circuit shown in figure, find the transient current, initial rate of growth of current, voltage across the resistor and inductor when the switch is closed at t = 0.	1	AP	8



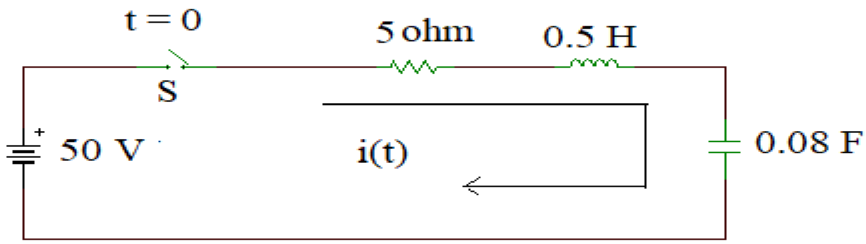
	(ii) In the circuit shown below switch S is in position 1 for a long time and brought to position 2 at time t = 0. Determine the circuit current.			8



5.	(i) A series RC circuit consists of a resistor of 10 ohm and a capacitor of 0.1 F as shown in figure. A constant voltage of 20 V is applied to the circuit at t = 0. Determine the current equation, voltage across the resistor and capacitor.	1	AP	8

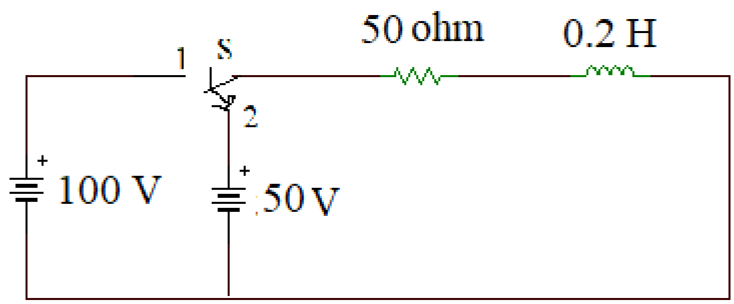


	(ii) In the circuit shown in figure, find the transient current when the switch is closed at t = 0. Assume zero initial conditions.			8



6.	Write short notes on duality and explain the construction of dual networks in detail.	1	UN	16
7.	A series RLC circuit with R = 100 Ω, L = 0.1 H and C = 100 μF has a DC voltage of 200 volts applied to it at t = 0 through a switch. Find the expression for the transient current. Assume initially relaxed circuit conditions.	1	AP	16

8.	In the circuit shown in figure the switch S is closed on position 1 at t = 0. At t = 1 mSec, the switch is moved the position 2. Obtain the equations for the current in both intervals and draw the transient current curve.	1	AP	16



UNIT II

RESONANCE AND COUPLED CIRCUITS

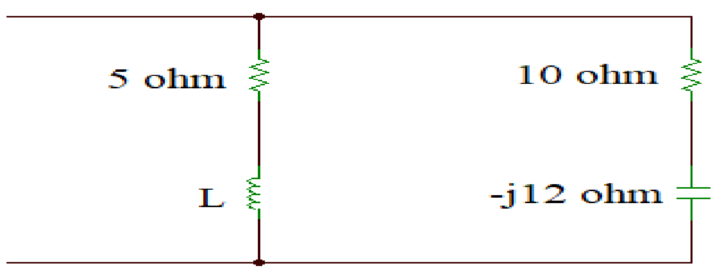
Series and Parallel resonance - Variation of impedance and current with frequency, bandwidth, Q-factor, selectivity. Coupled circuits - Self-inductance, Mutual inductance, Coefficient of coupling, Dot rule, Linear Transformer, Ideal Transformer.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Explain resonance in electrical circuits with a short note.	2	UN	2
2.	Define quality factor of a coil and selectivity.	2	RE	2
3.	Derive the expression for resonant frequency of an RLC series circuit.	2	UN	2
4.	Define series resonance. What is the frequency of resonance?	2	RE	2
5.	A circuit has the resonant frequency of 60 Hz and lower half-power frequency of 40 Hz. What is its bandwidth?	2	AP	2
6.	What is dynamic resistance of parallel resonant circuit? Why it is called dynamic resistance?	2	RE	2
7.	Draw the frequency response characteristics of series and parallel resonant circuit?	2	RE	2
8.	List any four properties of series and parallel resonant circuits.	2	RE	2
9.	What is meant by coupled circuits and magnetically coupled circuits?	2	RE	2
10.	Illustrate the concepts of self and mutual inductance.	2	UN	2
11.	What is meant by coupling coefficient?	2	RE	2
12.	State dot rule for coupled coils.	2	RE	2
13.	What is transformer? What are the standard assumptions of ideal transformer?	2	RE	2
14.	An RLC parallel circuit consists of a resistance of 1000 Ω, an inductance of 100mH and a capacitance of 10 μf. Find the Q factor of the circuit.	2	AP	2

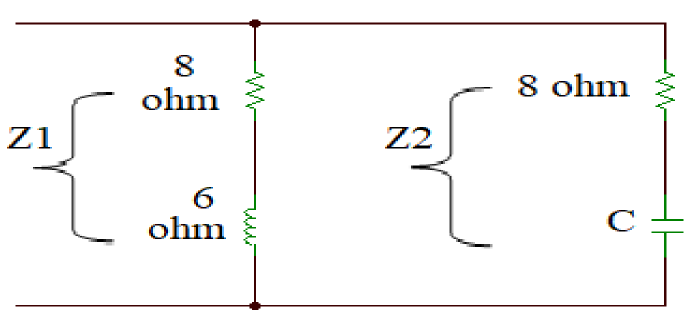
15.	Two inductively coupled coils have self-inductance L_1 = 50 mH and L_2 = 200 mH. If the coefficient of coupling is 0.5 (i) Find the value of mutual inductance between the coils (ii) What is the maximum possible mutual inductance?	2	AP	2

PART B

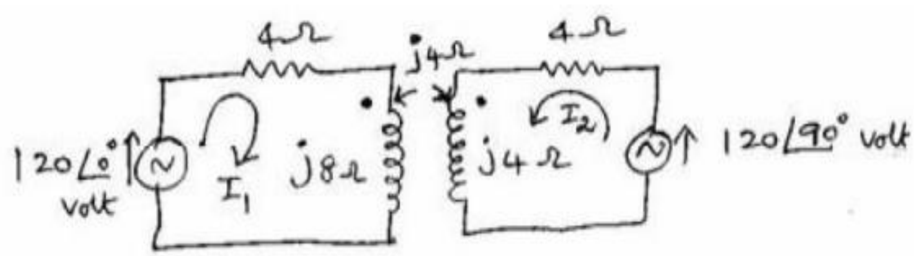
1.	Derive an expression for resonant frequency of series RLC circuit, bandwidth, Q factor and Selectivity.	2	AN	16
2.	(i) A series RLC circuit with R = 5 Ω, L = 40 mH and C = 1 μF. Calculate the Q of the circuit, the separation between half power frequencies, the resonant frequency and the half power frequencies.	2	AP	8
	(ii) A coil of inductance 0.75 H and a resistance 40 Ω is a part of a series resonant circuit having a resonant frequency of 160 Hz. If the supply voltage is 230 V, 50 Hz. Find (a) Current (b) power factor (c) Voltage across the coil.			8
3.	(i) Find the value of L at which the circuit resonates at a frequency of 1000 rad/sec in the circuit shown in figure.	2	AP	8



	(ii) For the circuit shown in figure, determine the value of C at which it resonates when f = 100 Hz.			8



4.	Explain how the expression for the resonant frequency of a parallel RLC circuit is obtained.	2	UN	16
5.	Explain how the expression for the coefficient of coupling can be written in terms of self-inductances and mutual inductance of coils.	2	UN	16
6.	With relevant diagrams explain the characteristics of ideal transformer.	2	UN	16
7.	With relevant diagrams explain the characteristics of linear transformer.	2	UN	16
8.	(i) In this circuit as shown in figure, find the values of I_1 and I_2 and also the real power supplied by each source.	2	AP	16



(ii) Two coupled coils of self-inductances L_1 = 2 H and L_2 = 4 H are coupled in series aiding, parallel aiding, series opposing and parallel opposing. If the mutual inductance is 0.5 H, find the equivalent inductance in each case.

UNIT III

NETWORK TOPOLOGIES

Network topology – graph, tree and loops - incidence matrix - fundamental cut sets – cut set matrix – tie sets – fundamental tie sets – tie set matrix – relationships among incidence matrix, cut set matrix and tie set matrix - Kirchoff's laws in terms of network topological matrices.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define oriented and unoriented graph.	3	RE	2
2.	Differentiate between planar graph and non-planar graph with suitable example.	3	UN	2
3.	Define tree. List out its properties.	3	RE	2
4.	Write short notes on loop and explain its properties.	3	UN	2
5.	Write short notes on incidence matrix and its types.	3	RE	2
6.	Compare the complete and reduced incidence matrix.	3	UN	2
7.	Illustrate the properties of a complete incidence matrix.	3	RE	2
8.	Differentiate between tie-set and cut-set.	3	UN	2
9.	What is a fundamental tie set?	3	RE	2
10.	Define tie-set matrix and its application in KVL.	3	RE	2
11.	Define cut-set and mention its relevance in circuit analysis.	3	RE	2
12.	Demonstrate Kirchhoff's Current Law (KCL) using the incidence matrix method.	3	UN	2
13.	Explain the concept of rank of a graph with a suitable example.	3	UN	2
14.	The complete incidence matrix of a graph is as follows. Draw the oriented graph for given matrix.	3	AN	2

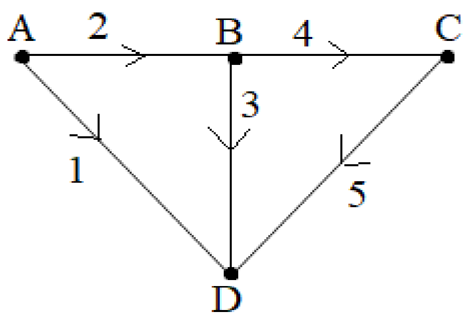
$$A = \begin{pmatrix} 0 & 0 & -1 & 1 & 1 \\ -1 & 1 & 1 & 0 & 0 \\ 1 & -1 & 0 & -1 & -1 \end{pmatrix}$$

15.	Reduced incidence matrix of certain graph is as follows. Determine number of all possible trees of the graph.	3	AN	2

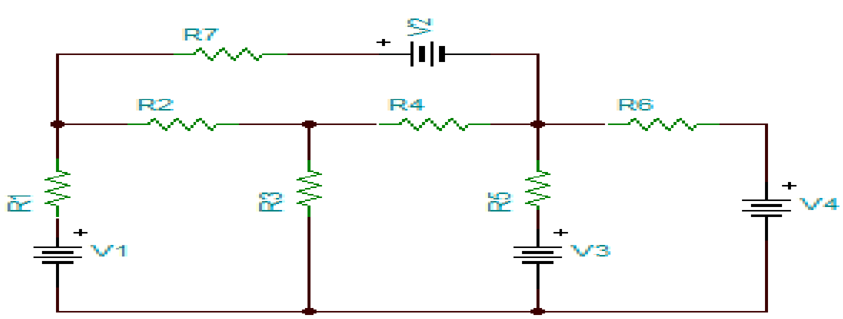
$$A = \begin{pmatrix} -1 & 0 & -1 & -1 \\ 1 & 1 & 0 & 0 \end{pmatrix}$$

PART B

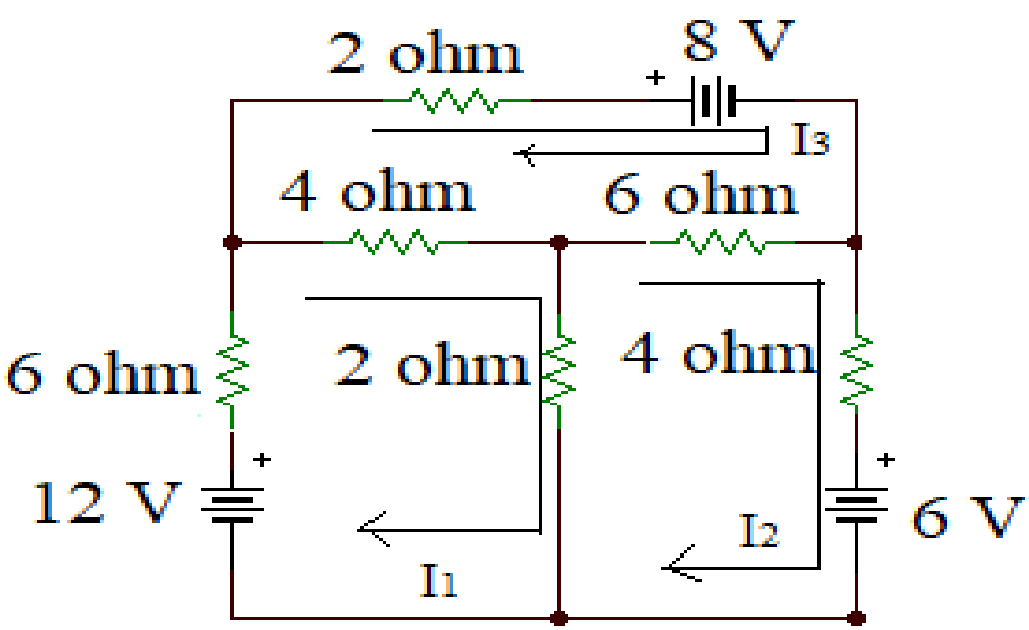
1.	Define the following terms and explain each with an example. (a) Node (b) Tree (c) Graphs (d) Link (e) Loop (f) Path (g) Cotree (e) Twig	3	UN	16
2.	What is complete incidence matrix? How is reduced incident matrix obtained from it? Explain with suitable example.	3	UN	16
3.	For the given oriented graph write the complete incidence matrix. Also write the reduced incidence matrix. Determine the number of possible trees for given network.	3	AN	16



4.	Illustrate the role of spanning tree selection in determining tie-set and cut-set matrices.	3	UN	16
5.	Draw the oriented graph of the given network and write tieset matrix, cutset matrix, fundamental tieset matrix and cutset matrix with neat diagrams.	3	AP	8
				8



6.	The reduced incidence matrix is $$A = \begin{pmatrix} 1 & 0 & 0 & 0 & -1 \\ -1 & -1 & -1 & 0 & 0 \\ 0 & 0 & 1 & -1 & 0 \end{pmatrix}$$ (i) Draw the graph (ii) How many trees are possible (iii) Write tieset and cutset matrix	3	AN	16
7.	Discuss the procedure for obtaining network equilibrium equations through loop and node analysis.	3	UN	16
8.	For the network shown in figure, calculate i_1, i_2, i_3 using graph theory and network equilibrium equation based on KVL.	3	AN	16



UNIT IV

NETWORK FUNCTIONS

Network functions - driving point and transfer functions - Poles and Zeros, their locations and effects on the time and frequency domain responses - Restriction of poles and zeros in the driving point and transfer function.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define network function.	4	RE	2
2.	What is a driving point function?	4	RE	2
3.	What is a transfer function in a network?	4	RE	2
4.	Differentiate between driving point and transfer function.	4	UN	2
5.	Define pole and zero of a network function.	4	RE	2
6.	Explain the physical significance of poles and zeros.	4	Un	2
7.	What is the condition for the physical reliability of a driving point impedance function?	4	RE	2
8.	State the properties of driving point impedance function.	4	RE	2
9.	Describe the restrictions on poles and zeros of a driving point function.	4	UN	2
10.	Describe the restrictions on poles and zeros of a transfer function.	4	UN	2
11.	What is meant by stability in terms of poles?	4	RE	2
12.	Explain the effect of complex conjugate poles on the time response.	4	UN	2
13.	Give one example each of a network with only real poles and another with complex poles.	4	RE	2
14.	Sketch and explain a typical pole-zero pattern of a second-order stable network.	4	UN	2
15.	List and explain two effects of pole locations on the frequency response.	4	UN	2
	PART B			

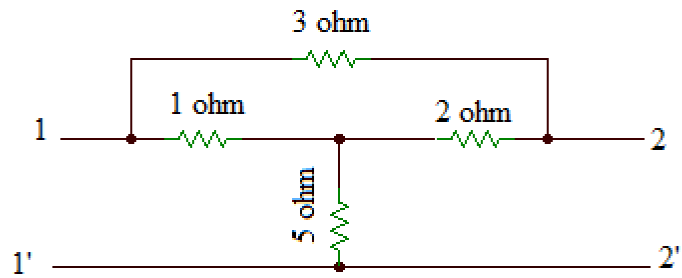
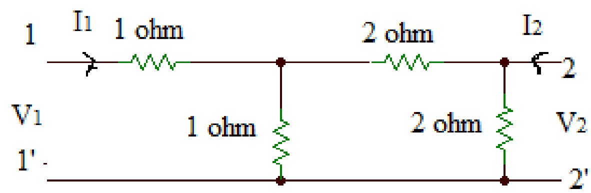
1.	Explain the meaning of a driving-point function. Describe how the driving-point impedance and admittance of a given RLC circuit are obtained.	4	UN	16
2.	Derive the general form of a driving point function. State and explain the conditions for physical reliability.	4	AN	16
3.	Derive the transfer function of a given two-port RLC network using mesh or nodal analysis. Determine poles and zeros.	4	AN	16
4.	Illustrate with a pole-zero plot how pole positions govern the transient characteristics (rise time, overshoot, peak time, settling time) of a second-order system.	4	AN	16
5.	Determine time-domain characteristics and frequency response. For the function of H(s) = $\frac{10(s+3)}{s^2+4s+20}$	4	AN	16
6.	Derive and explain the frequency response of a second-order low-pass filter using transfer function analysis.	4	AN	16
7.	List the necessary conditions for a rational function to represent a physically realizable network. Include symmetry, pole-zero location, and reliability.	4	UN	16
8.	Analyze the restrictions imposed on the pole–zero locations of driving point functions by applying the concept of positive real functions.	4	AN	16

UNIT V

TWO PORT NETWORKS

Two port networks - Z parameters, Y parameters, Transmission (ABCD) parameters, Hybrid (H) Parameters, Interconnection of two port networks, Symmetrical properties of T and π networks.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	State the assumptions made during the analysis of two port networks.	5	RE	2
2.	Describe how the network parameters of a two-port network can be determined.	5	UN	2
3.	What is meant by network parameters?	5	RE	2
4.	Discuss how many parameter sets exist for a two-port network and name them.	5	UN	2
5.	Write the equations for z and y parameters.	5	RE	2
6.	Derive and explain the equations for h and ABCD parameters.	5	UN	2
7.	Why y – parameters are called short circuit admittance parameters?	5	RE	2
8.	Why z – parameters are called open circuit impedance parameters?	5	RE	2
9.	Why h – parameters are called hybrid parameters?	5	RE	2
10.	Discuss the conditions of symmetry and reciprocity for y and h parameters.	5	UN	2
11.	What is the use of h parameters?	5	RE	2
12.	Why ABCD parameters are called transmission parameters?	5	RE	2
13.	Interpret the concept of a symmetrical network.	5	Un	2
14.	What do you mean by reciprocal network?	5	RE	2
15.	For a given two port network, z parameters are as follows: $z_{11} = z_{22} = 20\ \Omega$, $z_{12} = z_{21} = 10\ \Omega$. Calculate the y parameters of the two port networks.	5	AP	2
	PART B			

1.	Determine the z parameters for the network shown in figure.  	5	AN	16
2.	Discuss the method of determining y-parameters and transmission parameters with neat illustrations.	5	Un	16
3.	Apply h-parameter analysis to the given network.  	5	AP	16
4.	Obtain y parameters interms of z and transmission parameters.	5	AN	16
5.	Obtain h parameters interms of y and transmission parameters.	5	AN	16
6.	The z parameters of a two port network are z_{11} = 20 Ω, z_{12} = z_{21} = 10 Ω and z_{22} = 30 Ω. Determine the y-parameters and transmission parameters of the given network.	5	AP	16
7.	Describe the way in which the characteristic impedance and propagation constant of a symmetrical T-network are related to its open-circuit and short-circuit impedances.	5	UN	16
8.	Derive an expression for characteristics impedance of symmetrical π network interms of series and shunt arm impedances and propagation constant.	5	AN	16

24ECPC302

Digital System Design

UNIT I

BASIC CONCEPTS

Code converters, completely and incompletely specified functions, K map – 5 varaible , don't care conditions , Implementation of Boolean expressions using universal gates, Tabulation methods.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	State De-Morgan's theorem and mention its use.	1	Re	2
2.	Write short notes on weighted binary codes.	1	Re	2
3.	What is the significance of BCD code	1	Re	2
4.	a) Convert $(11001010)_2$ into gray code. b) Convert a Gray code (11101101) into binary code.	1	Ap	2
5.	Prove that ABC+ABC'+AB'C+A'BC=AB+AC+BC.	1	Ap	2
6.	Show that (X+Y'+XY)(X+Y')(X'Y)=0	1	Ap	2
7.	Reduce AB+(AC)'+AB'C(AB+C)	1	Ap	2
8.	What are the methods adopted to reduce Boolean function?	1	Re	2
9.	State the limitations of karnaugh map.	1	Re	2
10.	Describe the importance of don't care conditions.	1	Re	2
11.	Minimize the function using K-map: F=∑m(1,2,3,5,6,7).	1	Ap	2
12.	Implement the following using NOR gate F = (X+Y). (Y+Z).	1	Un	2
13.	Implement the following using NAND gate F = W.X.Y + X.Y.Z + Y.Z.W	1	Un	2
14.	What are Universal Gates? Why are they called so?	1	Re	2
15.	What is a prime implicant?	1	Re	2

PART B

1.	a) Design and implement a 8241 to gray code converter. b) Explain Decimal to BCD encoder with neat logic diagram.	1	Ap	8+8
2.	a) Design a circuit that converts 8421 BCD code to Excess-3. b) Realize the functions of NOT, AND, OR , EX-OR and NOR gates only with NAND gates.	1	Ap	8+8
3.	a) Realize the functions of NOT, AND, OR, EX-OR and NAND gates only with NOR gates. b) Design a logic circuit that accepts a 4 bit Gray code and converts it into 4 bit binary code.	1	App	8+8
4.	Minimize the following 5 variable SOP function using K map:F(A,B,C,D,E)=∑m(0,5,6,8,9,10,11,16,20,24,25,26,27)	1	Ap	16
5.	Minimize the following 5 variable SOP function using K map:F(A,B,C,D,E)=∑m(3,6,7,11,24,25,27,28,29)+ ∑d(2,8,9,12,13,26)	1	Ap	16
6.	a) Obtain the minimum SOP using Quine Mc Clusky's method for the function Σm(0,1,3,7,5,9,11,15) b) Find the F(A, B,C,D) = ∑m(1,4,6,10) + ∑d (0,11) using K-Map method and Draw the logical circuit of the minimal expression.	1	Ap	8+8
7.	Obtain the minimum SOP using Quine Mc Clusky's method for the function Σm(0,1,2,8,9,15,17,21,24,25,27,31)	1	Ap	16
8.	Simplify the following function using tabulation method Y(a.b,c,d) = ∑m(0,1,2,5,6,8,9,10) +∑d(7,14) and implement logical gates.	1	Ap	16

UNIT II

COMBINATIONAL LOGIC CIRCUITS

Problem formulation and design of combinational circuits, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Mux/Demux,

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define Combinational circuit	2	Re	2
2.	Design procedure for combinational circuits.	2	Un	2
3.	Design the combinational circuit with 3 inputs and 1 output. The output is 1 when the binary value of the input is less than 3. The output is 0 otherwise.	2	An	2
4.	Illustrate 4-bit Binary parallel adder?	2	Un	2
5.	What do you mean by carry propagation?	2	Re	2
6.	What do you mean by comparator?	2	Re	2
7.	Design a single bit magnitude comparator.	2	Un	2
8.	List the applications for parity checker and parity generator.	2	Re	2
9.	Difference between Decoder and Demux.	2	Un	2
10.	What is an encoder?	2	Re	2
11.	Draw the truth table and circuit diagram of 4 to 2 encoder.	2	Re	2
12.	What is priority encoder?	2	Re	2
13.	Write the truth table of 4:1 multiplexer.	2	Re	2
14.	Difference between Mux and Demux.	2	Un	2
15.	Draw a 2 to 1 multiplexer circuit.	2	Re	2

PART B

1.	Implement the following Boolean function with 4 X 1 multiplexer and external gates. Connect inputs A and B to the selection lines. The input requirements for the four data lines will be a function of variables C and D these values are obtained by expressing F as a function of C and D for each four cases when AB = 00, 01, 10 and 11. These functions may have to be implemented with external gates. $F(A, B, C, D) = \Sigma (1, 2, 5, 7, 8, 10, 11, 13, 15)$.	2	Ap	16
2.	Explain the concepts of Binary Parallel adder with neat logic diagram.	2	Un	16
3.	a) Explain the concepts of carry look ahead adder with neat logic diagram. b) Explain the concepts of BCD adder with neat logic diagram.	2	Un	8+8
4.	Design a 4-bit magnitude comparator.	2	Ap	16
5.	Implement the following Boolean function $F= \sum m (0,3,5,8,9,10,12,14)$. Using 8:1 Mux	2	Ap	16
6.	a) Design and explain a 1 of 8 demultiplexer. b) Implement the following functions using a multiplexer. $F(W,X,Y,Z)= \sum m (0,1,3,4,8,9,15)$.	2	Ap	8+8
7.	a) Explain in detail about parity generator and parity checker. b) Design a 1X4 De-multiplexer circuit.	2	Ap	10+6
8.	Construct a 5 to 32 line decoder using 3 to 8 line decoders and 2 to 4 line decoder.	2	Ap	16

UNIT III

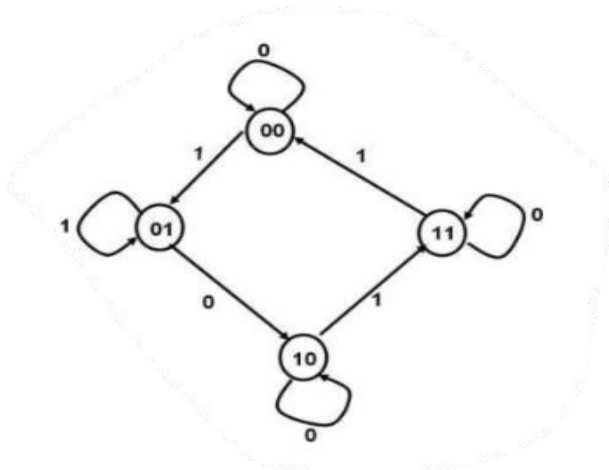
SYNCHRONOUS SEQUENTIAL CIRCUITS

Latches, Flip flops – SR, JK, T, D, Controllers / subordinate FF, Triggering of FF, Analysis and design of clocked sequential circuits – Design - Moore/Mealy models, state minimization, state assignment, lock - out condition circuit implementation - Counters, Shift registers, Universal Shift Register.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Differentiate Latches and flip flops	3	Un	2
2.	Give the comparison between combinational circuits and sequential circuits.	3	Un	2
3.	Define race around condition in flip flop.	3	Re	2
4.	What is edge triggered flip flop?	3	Re	2
5.	Write the excitation table for SR FF.	3	Re	2
6.	Distinguish Stable and Unstable states	3	Un	2
7.	How does a JK flip flop differ from the SR flip flop in its basic operation?	3	Un	2
8.	Draw the master-slave configuration using D flip-flop?	3	Re	2
9.	Write the characteristic equation of JK FF.	3	Re	2
10.	How are the outputs of Mealy and Moore model decided?	3	Un	2
11.	How the lock-out condition can be avoided?	3	Un	2
12.	How many filp flops are needed for a mod 60 counter?	3	Un	2
13.	Find the minimum number of flip flop required to build Modulo N counter.	3	Un	2
14.	List the uses of ring counter.	3	Re	2
15.	What is shift register? and its types.	3	Re	2
	PART B			
1.	a) Write the characteristic table and characteristic equation of SR and D flip flop. b) Explain the characteristic table and characteristic	3	Un	8+8

equation of JK and T flip flop.

2	Design the clocked sequential circuit using JK flip-flops whose state diagram is given below.	3	Ap	16



3.	a) Compare Moore and Mealy circuits. b) Draw and explain the block diagram of Meal circuit.		Un	8+8
4.	Design a sequential circuit with four flip-flops ABCD. The next states of B, C, and D are equal to the present states of A, B, C respectively. The next state of A is equal to the EX- OR of present states of C and D.	3	Ap	16
5.	a) Reduce the number of states in the following state table and tabulate the Reduced state table.	3	Ap	10+6

Present State	Next State		Output	
	X = 0	X = 1	X = 0	X = 1
a	f	b	0	0
b	d	c	0	0
c	f	e	0	0
d	g	a	1	0
e	d	c	0	0
f	f	b	1	1
g	g	h	0	1
h	g	a	1	0

b) Starting from state a, and the input sequence 01110010011, determine the output sequence for the given and reduced states table.

6.	Using SR flip flops, design a synchronous counter which counts in the sequence 000, 111, 101, 110,001,010,000	3	Un	16
7.	Design a Mod-14 up-down counter using T flip-flops.	3	Un	16

8.	Explain the working of BCD Ripple Counter with the help of state diagram and logic diagram.	3	Un	16
9	a) Design a Ring counter and explain in detail. b) Design a Johnson counter and explain in detail.	3	Un	8+8
10.	a) Explain the shift registers and its types. b) Explain the universal shift registers.	3	Un	10+6

UNIT IV

ASYNCHRONOUS SEQUENTIAL CIRCUITS

Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Fundamental and Pulse mode sequential circuits, Design of Hazard free circuits.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Compare the synchronous sequential circuits asynchronous sequential circuits	4	Un	2
2.	Define state assignment	4	Re	2
3.	Short notes on state reduction.	4	Re	2
4.	What is meant by excitation table?	4	Re	2
5.	State the types of sequential circuits.	4	Re	2
6.	What is meant by Race?	4	Re	2
7.	Compare the fundamental mode and pulse mode operation of asynchronous sequential circuits.	4	Un	2
8.	Differentiate between critical and non-critical race in asynchronous sequential circuits.	4	Un	2
9.	What is clock skew?	4	Re	2
10.	Define Flow table.	4	Re	2
11.	Define Primitive Flow table.	4	Re	2
12.	What is finite state Machine?	4	Re	2
13.	List the general requirements for Essential hazard formation.	4	Re	2
14.	What do you mean by Hazards? and give its types.	4	Re	2
15.	How to eliminate the hazard?	4	Re	2
16.	What is One-Hot assignment?	4	Re	2
	PART B			
1.	Explain the fundamental & pulse mod asynchronous sequential circuit.	4	Un	16
2.	Define flow table. Derive a logic circuit diagram for the	4	Ap	16

flow table given below.

	x_1x_2 = 00	01	11	10
a	(a), 0	(a), 0	(a), 0	b, 0
b	a, 0	a, 0	(b), 1	(b), 0

3.	Design a negative-edge triggered T flip flop. The circuit has two inputs, T (toggle) and G (clock), and one output, Q. The output state is complemented if T= 1 and the clock changes from 1 to 0 (negative-edge triggering). Otherwise, under any other input condition, the output Q remains unchanged.	4	Ap	16
4.	An asynchronous sequential circuit has two internal states and one output. The excitation and output functions describing the circuit are $Y_1=x_1 x_2+x_1y_2' +x_2'y_1$ $Y_2=x_2+x_1y_1'y_2+x_1'y_1$ $Z= x_2+y_1$ (i) Draw the logic diagram of the circuit. (ii) Derive the transition table and output map. (iii)Obtain a flow table for the circuit.	4	Ap	16
5.	Draw the state diagram and obtain the primitive flow table for a circuit with two inputs x_1, x_2 and two outputs z_1, z_2 that satisfies the following conditions. When x_1x_2= 00 output z_1z_2= 00, when x_1= 1 and x_2 changes from 0 to 1 the output z1z2= 01, when x_2= 1 and x_1 changes from 0 to 1 the output z_1z_2= 10 otherwise output does not change.	4	Ap	16
6.	Define hazards. List and explain the types of hazards. Identify the ways in reducing hazards in sequential circuits?	4	Un	16
7.	Taking relevant examples, explain the various types of races that occur in sequential circuits. Also briefly explain about the race free state assignment.	4	Un	16
8.	a) Design a hazard-free circuit to implement the following function. F (A, B, C, D) = Σm (1, 3, 6, 7, 13, 15) b) Design a hazard-free circuit to implement the following function. F (A, B, C, D) = Σm (1, 3, 4, 5, 6, 7, 9, 11, 15).	4	Ap	8+8

UNIT V

LOGIC FAMILIES AND PROGRAMMABLE LOGIC DEVICES

Logic families-Propagation Delay , Fan-In and Fan-Out-Noise Margin-RTL,TTL,ECL, CMOS - Comparison of Logic families - Implementation of combinational logic/sequential logic design using standard ICs, PROM, PLA and PAL, basic memory, static RAM ,ROM,EPROM,EEPROM EAPROM.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define Propagation delay.	5	Re	2
2.	Define Fan-In and Fan-Out.	5	Re	2
3.	Define Noise Margin.	5	Re	2
4.	Define Bit time & Word time.	5	Re	2
5.	State advantages and disadvantages of TTL.	5	Re	2
6.	What is the major difference between ECL and TTL?	5	Re	2
7.	Explain output switching times using waveform.	5	Re	2
8.	List the applications of PAL.	5	Re	2
9.	Mention the applications of PLA.	5	Re	2
10.	Differentiate between PAL and PLA?	5	Un	2
11.	Draw the structure of a Static RAM cell.	5	Re	2
12.	Compare a static and dynamic RAM cell.	5	Un	2
13.	What is Memory refresh?	5	Re	2
14.	What is Volatile and Non-Volatile memory?	5	Re	2
15.	How many data inputs, data outputs and address inputs are needed for a 1024 × 4 ROM?	5	Un	2
	PART B			

1.	Write short notes on TTL, ECL and CMOS digital logic families.	5	Un	16
2.	Implement the functions using PAL W=∑m(2,12,13), X=∑m(7,8,9,10,11,12,13,14,15), Y=∑m(0,2,3,4,5,6,7,8,10,11,15), Z= ∑m(1,2,8,12,13)	5	Ap	16
3.	Design a BCD to Excess-3 code converter and implement using suitable PLA.	5	Ap	16
4.	Draw the circuits of two input NAND and two input NOR gates using CMOS.	5	Un	16
5.	Show a BCD to Graycode converter can be designed using a 16 words X 4bits ROM.	5	Un	16
6.	Differentiate static and dynamic RAM. Draw the circuits of one cell of each and explain its working principle.	5	Un	16
7.	Discuss the working of the following programmable logic devices: i) PROM, ii) FPGA, iii) PLD iv)EAPROM	5	Un	16
8.	Select a 4096 X 8 bit ROM memory to store the driver program of the Robotic design. The memory chip has two chip select input and operates from a 5V power supply. How many pins are needed for the integrated circuit package? Draw a block diagram and label all input and output terminals in the ROM.	5	Ap	16

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24ECPC303
Electronic Devices and Circuits

UNIT I

AMPLIFIERS

Load line, operating point, biasing methods for CB, CC amplifiers- Gain and frequency response – MOSFET small signal model–Analysis of CS, CG and Source follower – Gain and frequency response- High frequency analysis.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Name the factors that affect stability of Q point of a transistor amplifier.	1	Rem	2
2.	Define current amplification factor and stability factor.	1	Rem	2
3.	What is the need for biasing in transistor amplifier?	1	Rem	2
4.	An amplifier operating from + or – 3 V and provide a 2.2 V peak sine wave across a 100 Ω load when provide with a 0.2 V peak sine wave as an input from which 1 mA current is drawn. The average current in each supply is measured to be a 20 mA. What is the amplifier efficiency?	1	Und	2
5.	What is a Q-point and thermal runway?	1	Rem	2
6.	Compare bias stabilization and compensation techniques.	1	Und	2
7.	What are the types of transistor biasing and explain its?	1	Rem	2
8.	List out the importance of selecting the proper operating point.	1	Rem	2
9.	What is DC load line? How is Q point plotted on the DC load line?	1	Rem	2
10.	Why gain of an amplifier reduces at high frequencies?	1	Rem	2
11.	What is the impact of temperature on drain current of MOSFET?	1	Rem	2
12.	Why capacitive coupling is used to connect a signal source to an amplifier?	1	Rem	2
13.	What are the types of transistor biasing?	1	Rem	2
14.	Why temperature compensation is required?	1	Rem	2

15.	Why is the input impedance of FET more than that of BJT?	1	Rem	2

PART B

1.	(i) Explain the fixed bias circuit for BJT. Discuss the merits and demerits of fixed bias circuit. (ii) Explain the voltage divider biasing for MOSFET.	1	Und	16
2.	Derive an expression for current gain, voltage gain, input impedance and output admittance for a BJT low frequency h-parameter model for (i) CE configuration (ii) CB configuration and (iii) CC configuration.	1	App	16
3.	(i) Give the MOSFET small signal model. (ii) Analyze CS amplifier for finding voltage gain, input impedance and output impedance.	1	App	16
4.	(i) Explain the operation of power transistor. (ii) Explain any two applications of BJT.	1	Und	16
5.	Explain the various biasing methods for BJT.	1	Und	16
6.	The hybrid parameters for a transistor in CE configuration are h_{ie} =150, h_{re} = 1.2 x 10^{-4}, h_{oe} = 25 x 10^{-6} Ω, RL = 1000 Ω, h_{fe} = 0 KΩ, RS = 5 KΩ. Find the values of input impedance, output impedance, current gain and voltage gain.	1	Rem	16
7.	Derive the expression for current gain, input impedance and voltage gain of a CE transistor amplifier.	1	App	16
8.	An emitter follower has circuit parameter RS = 500Ω, R1=R2=50 K Ω, RL= 2 K Ω, hfe = 100, hie = 1.1 K Ω. Find the input impedance, output impedance, K Ω, current gain and voltage gain.	1	Rem	16

UNIT II

MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER

Cascode amplifier, Differential amplifier – Common mode and Difference mode analysis – MOSFET input stages – tuned amplifiers – Gain and frequency response – Neutralization methods.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Find the Q-factor value of a tuned circuit with resonant frequency of 1600 KHz and the bandwidth of 10 KHz.	2	Rem	2
2.	Define CMRR. Give its ideal value.	2	Rem	2
3.	List out various coupling methods for multistage amplifiers.	2	Rem	2
4.	List out some of the features of Differential amplifier.	2	Rem	2
5.	Which type of connection is made for cascode amplifier?	2	Rem	2
6.	Write the hybrid parameters equation for transistor amplifier?	2	Rem	2
7.	What is BiCMOS amplifier?	2	Rem	2
8.	What is the need for neutralization method in tuned amplifiers? List out the advantages and disadvantages of tuned amplifier.	2	Rem	2
9.	List out some of the applications of tuned amplifier.	2	Rem	2
10.	What is a tuned amplifier?	2	Rem	2
11.	List the purpose of Differential amplifier.	2	Rem	2
12.	State the importance of Coupling capacitor in amplifier.	2	Rem	2
13.	What is common mode gain?	2	Rem	2
14.	List various configuration of differential amplifier.	2	Rem	2
15.	Compare single and double tuned amplifier.	2	Rem	2

PART B

1.	(i) Explain the BJT based cascode amplifier and its advantages. (ii) Explain the working of differential amplifier and derive the expression for CMRR.	2	Und	16
2.	An amplifier rated at 40 W output is connected to a 10 Ω speaker. (i) Calculate the input power required for full power output if the power gain is 25 dB (ii) Calculate the input voltage for rated output if the amplifier voltage gain is 40 dB.	2	App	16
3.	Why neutralization is needed and explains the Hazeltine neutralization method.	2	Und	16
4.	Explain different methods used for coupling multistage amplifiers with their frequency response.	2	Und	16
5.	Explain the effects on cut off frequencies and bandwidth of multistage amplifier MOSFET frequency response.	2	Und	16
6.	Draw the equivalent circuit of single-tuned amplifier and derive the expressions for the gain as a function of frequency	2	Und	16
7.	An amplifier rated at 40W output is connected to 10Ω speaker. i) Calculate the input power required for full power output if the power gain is 25db.	2	Und	7
	ii) Calculate the input voltage for rated output if the amplifier voltage gain is 40db.		Und	6
8.	Derive the frequency response of Single tuned amplifier.	2	App	16

UNIT III

FEEDBACK AMPLIFIER AND OSCILLATOR

Advantages of negative feedback – Voltage / Current - Series & Shunt feedback Amplifiers – positive feedback – Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitt's and crystal Oscillators.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define piezoelectric effect.	3	Rem	2
2.	State Barkhausen criterion for sustained oscillation. What will happen to the oscillation if the magnitude of the loop gain is greater than unity?	3	Rem	2
3.	What is feedback amplifier and give its types?	3	Rem	2
4.	List the advantages of negative feedback amplifiers.	3	Rem	2
5.	List the characteristics of Negative feedback.	3	Rem	2
6.	What are the factors needed to choose type of oscillators?	3	Rem	2
7.	What are the necessary conditions for oscillation?	3	Rem	2
8.	Define frequency stability of Oscillator.	3	Rem	2
9.	What will happen to the oscillation if the magnitude of the loop gain is greater than unity?	3	Rem	2
10.	What is transition and diffusion capacitance?	3	Rem	2
11.	List the characteristics of Positive feedback.	3	Rem	2
12.	What are the advantages of crystal oscillator?	3	Rem	2
13.	List out the steps to improve frequency stability.	3	Rem	2
14.	Name a low frequency and high frequency oscillator.	3	Rem	2
15.	Define sampling and mixing.	3	Rem	2

PART B

1.	Draw the block diagram of voltage series feedback amplifier and derive the equation for input impedance, voltage gain and output impedance.	3	Und	16
2.	With neat diagram and explain the RC phase shift oscillator. Derive the frequency of oscillation.	3	Und	16
3.	With neat diagram and explain the Wien bridge oscillator. Derive the frequency of oscillation.	3	Und	16
4.	Draw and explain the Hartley oscillator. Derive the frequency of oscillation.	3	Und	16
5.	Draw and explain the colpitts oscillator. Derive the frequency of oscillation.	3	Und	16
6.	Draw the block diagram of voltage shunt and current series feedback amplifier and derive the equation for input impedance, voltage gain and output impedance.	3	Und	16
7.	Explain pierce crystal oscillator and derive the equation for oscillation.	3	Und	16
8.	Draw the block diagram of feedback amplifier and discuss the effect of negative feedback with respect to closed loop gain, bandwidth and distortion.	3	Und	16

UNIT IV

POWER AMPLIFIERS AND DC/DC CONVERTERS

Power amplifiers- class A-Class B-Class AB-Class C-Power MOSFET-Temperature Effect- Class AB Power amplifier using MOSFET –DC/DC convertors – Buck, Boost, Buck-Boost analysis and design.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is a DC to DC bidirectional converter?	4	Rem	2
2.	Define the following modes of operation (a) Class AB (b) Class C.	4	Rem	2
3.	List out the functions of DC-DC converters.	4	Rem	2
4.	State the advantages and disadvantages of complementary symmetry class B power amplifier.	4	Rem	2
5.	What is cross-over distortion? How it can be eliminated?	4	Rem	2
6.	Define class A operation of power amplifier.	4	Rem	2
7.	Differentiate Buck and Boost converter.	4	Und	2
8.	What are the features of power amplifier? What are the types of distortion?	4	Rem	2
9.	List out the various configurations of switched mode DC to DC converters.	4	Rem	2
10.	List out some of the advantages and disadvantages of step down switching regulator.	4	Rem	2
11.	Compare Class A and Class B amplifier.	4	Rem	2
12.	List the basic three types of DC/DC converters.	4	Rem	2
13.	What is power MOSFET?	4	Rem	2
14.	List the operating point and conduction angle of Class A amplifier.	4	Rem	2
15.	Why is heat sink required in power amplifier?	4	Rem	2

PART B

1.	With neat diagram and explain the working of class AB power amplifier using power MOSFET and state the advantages of using power MOSFET over BJT.	4	Und	16
2.	In an amplifier, the output power is 1.5 W at 2 KHz and 0.3 W at 20 Hz, while the input power is constant at 10 mW. Calculate by how many decibels gain at 20 Hz is below that at 2 KHz.	4	App	16
3.	What is boost converter and buck converter? How does a buck-boost circuit work?	4	Und	16
4.	With neat diagram, derive the expression for output voltage of a buck – boost converter.	4	Und	16
5.	Explain the working of Buck type DC/DC convertor with relevant circuits diagram.	4	Und	16
6.	Describe the working of Class A and Class B amplifier using BJT.	4	Und	16
7.	Explain the structure of power MOSFET and explain its V-I Characteristics and list out the features of power MOSFET.	4	Und	16
8.	Explain complementary-symmetry class B power amplifier and derive its efficiency.	4	Und	16

UNIT V

APPLICATIONS OF SEMICONDUCTOR DEVICES

Applications of Diode: Clippers - Clampers - Voltage Doubler - Zener Diode as Voltage Regulator. Applications of BJT: SMPS - UJT Relaxation oscillator. Applications of FET: Voltage controlled resistor – FET in Fiber Optic system – UPS. TRIAC – Structure, VI characteristics, Role of TRIAC in SSR and Control circuitry for TRIAC based SSRs.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	What is Clipper?	5	Rem	2
2.	Why Zener diode is called as Voltage Regulator?	5	Rem	2
3.	List the applications of Zener diode.	5	Rem	2
4.	What is a voltage doubler?	5	Rem	2
5.	What is the role of BJT in SMPS?	5	Rem	2
6.	Define a UJT relaxation oscillator.	5	Rem	2
7.	How does a FET act as a voltage-controlled resistor?	5	Und	2
8.	What is the role of FET in UPS?	5	Rem	2
9.	What is the structure of a TRIAC?	5	Rem	2
10.	What is the role of TRIAC in SSR?	5	Rem	2
11.	Draw the VI characteristics of TRIAC.	5	Rem	2
12.	List the uses of FET in fiber optic systems.	5	Rem	2
13.	What are the types of Clipper and Clamper?	5	Rem	2
14.	What is Zener diode?	5	Rem	2
15.	What is Clamper?	5	Rem	2

PART B

1.	Explain the working and types of clipper and clamper circuits with waveforms.	5	Und	16
2.	Explain how a Zener diode is used as a voltage regulator. Include circuit and characteristics.	5	App	16
3.	Explain the working of a BJT in SMPS with block and circuit diagrams.	5	Und	16
4.	Describe the UJT relaxation oscillator using waveform and application examples.	5	Und	16
5.	Describe how FET can be used as a voltage-controlled resistor. Include circuit and operation.	5	Und	16
6.	Describe the structure and VI characteristics of TRIAC in detail.	5	Und	16
7.	Explain the working of TRIAC-based Solid State Relay (SSR) with control circuitry.	5	Und	16
8.	Describe the working of a voltage doubler circuit with diagrams.	5	Und	16

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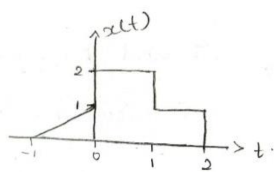
24ECPC304
Signals And Systems

UNIT I

Classification of Signals and Systems

Standard signals Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids: Representation of Signals; Classification of signals: Continuous time (CT) and Docrete Time (DT) signals, Periodic & aperiodic signals, Deterministic & Random signals, Energy & Power signals; CT systems and DT systems- Classification of systems.

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Distinguish between continuous and discrete time signal.	1	Und	2
2	Sketch the signal $[n] = [n] - u[n-5]$.	1	App	2
3.	State the classification of CT Signals	1	Rem	2
4.	Define Deterministic and Random Signal	1	Rem	2
5.	Compare Power and Energy Signals	1	Und	2
6.	Define Periodic Signal	1	Rem	2
7.	State the Classification of CT and DT Systems	1	Rem	2
8.	Define linear and non –linear Systems	1	Rem	2
9	Difference between Periodic and Aperiodic Signals	1	Und	2
10	For the signal shown in figure, find x(2t+3) 	1	Ana	2
11	Determine whether the system y(n)=log (1+(x(n)))	1	Ana	2
12	Check whether the Discrete Time Signal sin3n is periodic	1	Ana	2
13	Check for Periodicity of cos (0.01πn)	1	Ana	2
14	Determine whether the Signal x(t)= cos (π/2) is periodic	1	Ana	2

15	Define DT Signal	1	Rem	2

PART B

1.	Define Unit Step, Ramp, Impulse and Exponential Signals	1	Rem	16
2.	How are the Signals classified?	1	Und	16
3.	List the properties of System.	1	Rem	16
4	a. Draw the waveform for the signal $x(t)=r(t)–2r(t-1) + r(t-2)$	1	App	8
	b. A Continuous Time Signal x(t) is shown in fig below, Sketch and Label each of the following signals (i). $x(t+2)$ (ii). $x(2t+3)$ (iii). $x((3/2) t)$ (iv) $x(-t+1)$	1	App	8
5	a. Draw the waveforms of the following function (i). $f_1(t)=k.u(t-1)$ (ii). $f_2(t)=u(2-t)$	1	App	8
	b. A Time Signal is given below. Sketch the following: 1. $x((3/2) t+1)$ 2. $x((-3/2) t+1)$	1	App	8
6	a. Draw the Waveforms represented by following step functions (i). $f_1(t)=2u(t-1)$ (ii). $f_2(t)=-2u(t-2)$ (iii). $f(t) = f_1(t) + f_2(t)$ (iv). $f(t)=f_1(t)–f_2(t)$	1	App	8
	b. Determine whether the following signals are periodic or not? 1. $x(t)=\cos (t+ (\pi/4))$ 2. $x(t)=\sin((2\pi/3) t)$ 3. $x(t)=\sin 10\pi t$ 4. $x(t)=e^{j5t}$	1	App	8
7	a. Find even and odd components of the signal $x(t)=3+2t+5t^2$	1	App	8
	b. Check whether the signal is energy or power $x(n)=(1/3)^n.u(n)$	1	App	8

8	a. Check whether the system is Time Independent or Not 1. y(t)=sinx(t) 2.y(t)=x(2t) 3.y(t)=x(-t)	1	Ana	8
	b. Check whether the following systems are stable 1. y(t)=u(t) 2. y(t)=e^{-2t}. u(t) 3. y(t)=t.x(t)	1	Ana	8

UNIT II

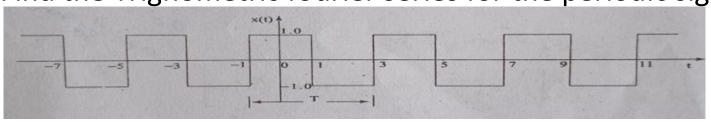
Analysis of Continuous Time Signals

Introduction to continuous Time Fourier Series (CTFS), representation of CT a periodic signals by continuous time Fourier Transform (CTFT), CTFT, of CT Periodic signals convergence of CTFT, Laplace Transforms (LT) in signal analysis properties of LT

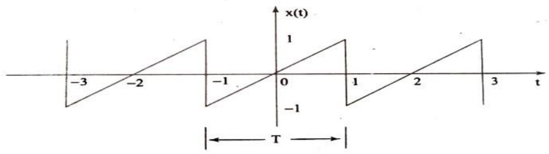
Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define Fourier series	2	Rem	2
2	State Dirichlet Conditions for Fourier Series	2	Rem	2
3.	Difference between Fourier Series and Fourier Transform??	2	Und	2
4.	State Parseval's Power Theorem	2	Rem	2
5.	State Rayleigh's Energy Theorem	2	Rem	2
6.	State Initial Value Theorem	2	Rem	2
7.	What is the relation between Fourier Transform and Laplace Transform? (or) Define Laplace Transform	2	Und	2
8.	What is the Fourier transform of a DC Signal of amplitude 1?	2	Rem	2
9	Determine Laplace Transform of $x(t)=e^{-at}\sin\omega(t)u(t)$	2	App	2
10	Define Bilateral and Unilateral Laplace Transform	2	Rem	2
11	Find the Laplace transform of signal u(t)	2	App	2
12	Write the Equation for Trigonometric and Exponential Fourier Series	2	Und	2
13	Solve the following Laplace Transform of s(t)and u(t)	2	App	2
14	Define Quadrature Fourier series	2	Und	2
15	Find the inverse Laplace Transform of $x(s)=1/(s+1)(s+2)$	2	App	2

PART B

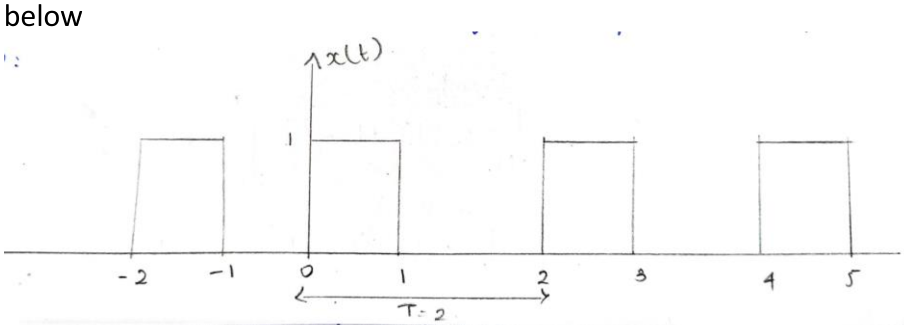
1. Find the Trignometric fourier series for the periodic signal x(t). 2 App 16



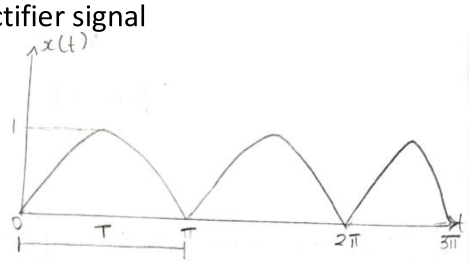
2. Find the Trignometric fourier series for the periodic signal x(t). 2 App 16



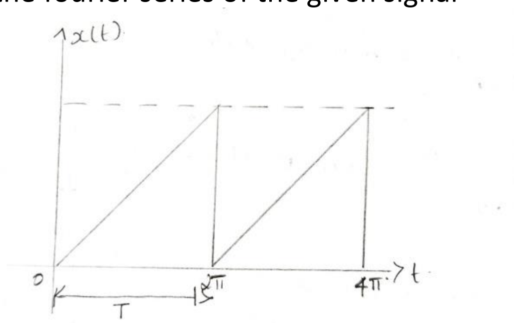
3. Find the trigonometric fourier series for the periodic signal given below 2 App 16



4. Find the trigonometric Fourier series expansion for full wave rectifier signal 2 App 16



5 a. Find the fourier series of the given signal 2 App 16



	b. List the properties of the fourier transform			
6	a. Obtain the Fourier transform of the following function 1. $x(t) = \delta(t)$ 2. $x(t) = 1$ 3. $x(t) = sgn(t)$ 4. $x(t) = u(t)$	2	Rem	8
	b. List the properties of Fourier series	2	Und	8
7	Find the Laplace transform and ROC of the following signals. a. $X(t) = e^{at}.u(t)$ b. $X(t) = -e^{at}.u(t)$ c. $X(t) = e^{-at}.u(t)$	2	App	16
8	Find the laplace transform and ROC of the given signal. $X(t) = e^{-3t}.u(-t) + e^{-2t}.u(-t)$	2	Ana	16

UNIT III

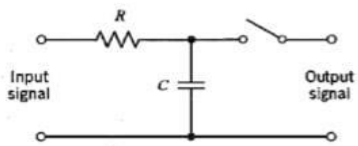
Linear Time Invariant Continuous Time Systems

Differential Equation; Block diagram representation: Direct form i and Il, Convolution Integrals: Graphical Method, Step response and impulse response of LTI systems; Fourier and Laplace Transforms in analysis of LTI systems

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Write convolution integral of x(t).	3	Rem	2
2	List the properties for convolution integral.	3	Rem	2
3.	Define impulse response of a continuous system.	3	Rem	2
4.	Define transfer function in CT systems.	3	Rem	2
5.	Define eigen value and eigen function of LTI-CT systems. (OR)How complex exponential are referred as eigen signals of LTI systems.	3	Und	2
6.	Give four steps to compute convolution integral. (OR) What are the basic steps involved in convolution integrals.	3	Und	2
7.	What are the three elementary operations in block diagram representation of continuous time system?	3	Rem	2
8.	State the sufficient condition for an LTI continuous time system to be causal	3	Rem	2
9	What is meant by impulse response of any system?	3	Rem	2
10	The impulse response of the LTI-CT system is given as $h(t)=e^{-t}.u(t)$Determine transfer function and check whether the system is causal and stable.	3	App	2
11	Consider an LTI system with transfer function H(s) is given by H(s)=1/(s+1) (s+3) Re(s)>3; determinant(t).	3	App	2
12	Convolve the following signals u(t-1) and δ(t-1).	3	App	2

13	Find whether the following system whose impulse response is given is causal and stable .H (t) $=e^{-2t}$. u(t-1).	3	Ana	2
14	What is the overall impulse response h(t)when two systems with impulse response $h_1(t)$ and $h_2(t)$ are in parallel and in series?	3	Und	2
15	What is the transfer function of a system whose poles are at –0.3±j0.4and a zero at -0.2?	3	App	2

PART B

1.	a. Find the convolution of the following signals. (i)$X_1(t)=e^{-at}.u(t)$ (ii)$X_2(t) = e^{-bt}.u(t)$.	3	App	8
	b. Find the impulse response of the system  FIGURE P4.4	3	App	8
2.	a. Determine the response of the system with impulse response h(t)=u(t)for input $x(t) = e^{-2i}$. u(t).	3	App	8
	b. Find the impulse response of the system given by, RC. (dy(t))/(dt)+y(t)=x(t).	3	App	8
3.	Consider an LTI system with input $x(t)=e^{-t}.u(t)$ and impulse response $h(t)=e^{-2t}$. u(t) a. Determine the Laplace transform of x(t) and h(t). b. Using the convolution property, determine the Laplace transform Y(s) of the output y(t) c. From the Laplace transform of y(t) as obtained in part (b), determine y(t). d. Verify your result in part (b) by explicitly convolving x(t) and h(t).	3	App	16
4	a. The LTI system is described by the differential equation, $(d^2.y(t))/(dt^2)$–(dy(t))/(dt)–2y(t)=x(t) Obtain impulse response for following conditions	3	Ana	8
	(i) Causal system	3	Ana	8

(ii) Stable system

(iii) Neither causal nor stable system.

b. The input-output relation of a system at initial l rest is given by, $(d^2.\ y(t))/(dt^2) + 4(dy(t))/(dt) + 3y(t) = (dx(t))/(dt) + 2x(t)$. Find the system transfer function, frequency response and impulse response.

5 (i)Explain any three properties of convolution integral — 3 Und 8

(ii)Explain how CT signal is represented by impulse functions. — 3 Und 8

6 Find the convolution of x(t) and h(t)

x(t)=1&0<=t<=2\0&otherwise

h(t)= 1&0<= t<=3\ 0&otherwise. — 3 App 16

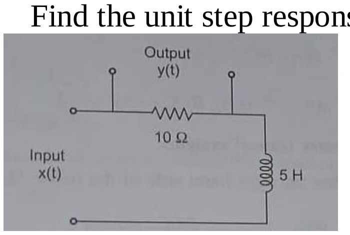
.

7

a. Find and plot the magnitude spectrum of the transfer function, $H(j\omega) = (e^{j\omega} + \alpha)/(e^{j\omega} + 1/\alpha)$. — 3 App 8

b. A system has the transfer function H(s) = (3s – 1)/ ((s + 3)(s – 2)). Find the impulse response assuming the system is stable, and the. H(s) = (3s –1)/((s+3) (s –2)). — 3 App 8

8 Find the unit step response of the circuit shown in Figure — 3 App 16



UNIT IV

Analysis of Discrete Time Signals

Baseband sampling of CT Signals, Sampling Theorem Introduction to Discrete Time Fourier Series and Discrete Time Fourier Transform (DTFT): 2 Transform: ROC, Inverte Transform using Residue Method, Partial Fraction Methods Properties of 2 Transform

Q.No	Question	CO	BTL	Marks
	PART A			
1.	State sampling theorem?	4	Rem	2
2	What is aliasing? Explain with the help of an example	4	Und	2
3.	Difference between DTFT and IDTFT?	4	Und	2
4.	Examine the Nyquist rate of the signal x(t)=cos200πt+sin400πt.	4	App	2
5.	Compare Fourier transform of discrete and continuous time signals.	4	Und	2
6.	Determine the system function of the discrete time system described by the difference equation. Y[n]-1/2y[n-1] +1/4y[n-2] =x[n]-x [n-1	4	App	2
7.	What is the drawback in DTFT?	4	Rem	2
8.	Find the z transform of x(n)= {1,2,3,4}.	4	App	2
9	What are the properties of ROC of z-transform?	4	Rem	2
10	Define Parseval's theorem.	4	Rem	2
11	Solve DTFT of u(n).	4	App	2
12	Define Z-transform or two-sided z-transform?	4	Rem	2
13	State the Convolution property of Z-transform.	4	Rem	2
14	What is the inverse z-transform of $1/(1-az^{-1})$	4	App	2
15	What is region of convergence?	4	Rem	2

PART B

1.	(i) State and prove Sampling theorem.	4	Und	8
	(ii) Determine the z-transform of (a). $x(n)=a^n/n!$ for n>=0 (b). x(n)=nu(n) for n>=0	4	App	8
2.	a) State and prove any four properties of DTFT	4	Und	16
3.	State and prove the following: (i) Convolution theorem of DTFT	4	Und	5
	(ii) Initial value theorem of z-transform	4	Und	5
	(iii)Relationship between z-transform and DTFT	4	Und	6
4	Find the inverse z-transform of (i)$X(z)=(z+4)/(z^2-4z+3)$ (ii)$X(z)= (1-1/3.\ z^{-1})/((1-z^{-1})\ (1+2z^{-1}))$, $\|z\|>2$	4	App	16
5	Consider the analog signal, x(t)=2cos2000πt+ 5sin4000πt+ 12cos2000πt. (i) Obtain the Nyquist sampling rate. (ii) If the analog signal is sampled aFs=5000Hz, formulate the discrete time signal obtained by sampling.	4	App	16
6	Determine the z-transform and sketch the pole zero plot with the ROC for each of the following signals i) x(n) = (0.5) n u(n)– (1/3) n u(n) ii) x(n) = (1/2) nu(n) +(1/3) n u(n-1)	4	App	16
7	Find the Z transform and sketch the ROC of the following sequence, X[n] = 2nu[n] + 3nu(-n-1).	4	App	16
8	(i). Prove following properties of z-transform (a) Time shifting property (b) Convolution in time domain property	4	App	8
	(ii). Describe the sampling operation and explain how aliasing error can be prevented.	4	Und	8

UNIT V

Linear Time Invariant-Discrete Time Systems

Difference equations, Block Diagram Representations direct form I and II. Cascade and Parallel: Linear and Circular Convolutions, Pole-Zero plot: Analysis and characterization of LTI systems using 2 Transform: step response and Impulse response of LTI systems Frequency response of DT systems, Stability and causality

Q.No	Question	CO	BTL	Marks
	PART A			
1.	Define convolution sum with its equation?	5	Rem	2
2	List the steps involved in finding convolution sum?	5	Und	2
3.	Define FIR system?	5	Rem	2
4.	Define non recursive and recursive systems?	5	Und	2
5.	Define system function?	5	Rem	2
6.	Define butterfly computation?	5	Rem	2
7.	How unit sample response of discrete time system is defined?	5	Und	2
8.	If u(n) is the impulse response of the system, what is its step response?	5	Und	2
9	Determine the range of values of the parameter 'a', for which the linear time invariant system with impulse response $h(n)=a^n.u(n)$ is stable.	5	Und	2
10	Find the stability of the system whose impulse response is h (n) = 2^nu (n).	5	Und	2
11	Convolve the following two sequences: X (n) = {1, 1, 1, 1}, h (n) = {3, 2}	5	App	2
12	Convolve the following signals x(n) = {1, 2, 3} and h(n) = {1, 1, 2}.	5	App	2
13	State the maximum memory requirement of N point DFT including twiddle factors?	5	Rem	2
14	Convolve the two sequences x(n)= {1,2,3} and h(n)= {5,4,6,2}	5	App	2
15	How unit sample response of discrete time system is	5	Und	2

defined?

PART B

1.	A system is governed by a linear constant coefficient difference equation y(n) = 0.7 y (n - 1) - 0.1 y (n 2) + 2x (n) -x (n - 2). Find the output response of the system y(n) for an input x(n) = u(n).	5	App	16
2.	Obtain the cascade realization of y(n)-1/4 y(n-1)-1/8y(n-2) =x(n)+3x(n-1) +2x(n-2).	5	Ana	16
3.	Find the impulse response of the difference equation y(n) – 2y(n-2) +y(n-1) +3y(n-3) = x(n)+2x(n-1)	5	Ana	16
4	(a). Find the linear convolution of x(n)= {1,2,3,4} and h(n)= {2,3,4,1}	5	App	6
	(b). Compute the linear convolution of x(n)= {1,1,0,1,1} and h(n)= {1, -2, -3,4}	5	App	6
	(c). What is the impulse response x(n) of the system if the poles and zeros are radially moves k times their original location?	5	App	4
5	Analyse on recursive and non -recursive systems with an example.	5	Ana	16
6	Find the output sequence y(n) of the system described by the equation y(n)=0.7 y(n-1)-0.1 y(n-2) +2x(n)-x(n-2). For the input sequence x(n)=u(n).	5	App	16
7	(a). A causal LTI system is described by the difference equation, y(n)=y(n-1) +y(n-2) +x(n-1) i) find the system function of the system ii) find the unit impulse function of the system.			
	(b). A casual discrete-time LTI system is described by y[n]-3/4. y [n - 1] + 1/8. y [n - 2] = x[n] Where x[n] and y[n] are the input and output of the system respectively	5	Ana	8
	(i). Determine the system function H[z]. (ii). Find the impulse response h[n] of the system. (iii)Step response of the system. (8)	5	Ana	8
8	(i)A difference equation of a discrete time system is given below:	5	Cre	6
	y(n) – 3/4y (n -1) + 1/8 y (n-2) = x(n) + 1/2x(n-1). Draw direct form-I and direct form-II structures	5	Ana	6
				4

5 Und

(ii) Find the impulse response of the discrete-time system described by the differential equation,
y(n-2)-3y(n-1) +2y(n)=x(n-1).

(iii)Discuss the block diagram representation for LTI discrete time systems

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