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K J Somaiya Institute of Engineering and Information Technology
An Autonomous Institute permanently affiliated to University of Mumbai
Accredited NAAC and NBA, Approved by AICTE, New Delhi

Department of Electronics and Telecommunication Engineering

Academic Year 2021-22

Semester: IV **Year: SY**

Subject: Application of Mathematics in Engineering - II **Course Code: 1UEXC401**

Question bank

Question No.	Module No. (Topic Name)	BT Level	CO
	Module 1 (Complex Integration)	**3**	**1**
Q1.	If f(a)=$\int_c \frac{4z^2+z+5}{z-a}dz$ where c is an ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ then evaluate f(i).		
Q2.	Find the value of the integral $\int_0^{1+i}(x^2-iy)\,dz$ along the path y = x .		
Q3.	Evaluate $\int_0^{1+i}(x^2+iy)(dz)$ along the path y = 0 where x varies from 0 to 1.		
Q4.	Evaluate using Cauchy's Integral formula $\oint_C \frac{dz}{z^3(z+4)}$ where C is the circle $\|z\|=2$.		
Q5.	Evaluate $\int_C \frac{z+6}{z^2-4}\,dz$, where C is the circle $\|z\|=1$.		
Q6.	Evaluate $\int_0^{1+i} z\,dz$ along $y=x$.		
Q7.	Find the residue at the pole z =-1 of $f(z)=\frac{1}{(z+1)(z-2)^2}$.		
Q8.	If $f(z)$ is analytic inside and on closed curve C of simply connected region R and if $z=2$ be any point within C, then find $\int_C \frac{f(z)}{z-2}\,dz$.		
Q9.	Evaluate $\int_c \frac{7z-1}{(z-3)(z+5)}dz$, where c is the circle $\|z\|$ =1.		
Q10.	Identify the type of singularity of the function $f(z)=\frac{sinhz}{z^7}$.		
Q11.	Obtain Laurent 's series for $\frac{2}{(z-2)(z-3)}$ $in\ the\ region$: $2<\|z\|<3$.		
Q12.	Evaluate $\oint_C \frac{sin\pi z^2+cos\pi z^2}{(z-2)(z-3)}dz$ where C is the circle $\|z\|$ =4.		
Q13.	Evaluate using Cauchy's Residue Theorem, where C is a curve $\|z-1\|=3$ for $\int_C \frac{2z+1}{(z-1)^2(z-3)}dz$.		
Q14.	Evaluate the given complex integral $\int_0^{3+i}(\bar{z})^2\,dz$ along a parabola $x=3y^2$.		

Q15. Evaluate: $\int_c \frac{z^2}{(z-1)^2(z-2)}dz$; c *is* $|z| = 2.5$.

Q16. Expand: f(z)=$\frac{7z-2}{z(z+1)(z-2)}$ *about* $z = -1, for\ 1 < |z+1| < 3$ as a Laurent's Series.

Q17. Evaluate $\int_c \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)}dz$; c *is* $|z| = 3$.

Q18. Obtain Laurent's series expansions of f(x) = $\frac{z-1}{z^2-2z-3}$; $|z| > 3$.

Q19. Evaluate $\int_C (xy + y^2)dx + x^2dy$ where C is the closed curve of the region bounded by $y = x$ and $y = x^2$.

10. Find Laurent's series for $f(z) = \frac{4z+3}{z(z-3)(z+2)}$ valid for

(i) $2 < |z| < 3$ (ii) $|z| > 3$

11. Evaluate $\int_C \frac{z^2+3}{z^2-1}dz$ where C is circle $|z-1| = 1$.

12. Find all possible Laurent's expansion $\frac{z}{(z-1)(z-2)}$ about z = **-2.**

13. Using Cauchy's Residue theorem evaluate $\int_c \frac{\sin\sin 3z}{z+\frac{\pi}{2}}dz$.

14. Evaluate $\int_C \frac{z^2-3z+2}{(z-3)(z-4)}dz$, C: $|z| = 3.5$.

15. Evaluate the following integral using Cauchy-Residue theorem.

$I = \int_C \frac{z^2+3z}{\left(z+\frac{1}{4}\right)^2(z-2)}dz$ where C is the circle $\left|z-\frac{1}{2}\right| = 1$.

	Module 2 (Statistical Techniques)	3	2

Q1 Find Karl Pearson coefficient of correlation between the height (X) and weight (Y) of a group of people in city from the following sample data

X	48	56	66	76	85	59
Y	18	28	51	70	80	65

Q2 Calculate the coefficient of correlation between X and Y from the given data

X	3	6	4	5	7
Y	2	4	5	3	6

Q3 Calculate the correlation coefficient between X and Y from the following data: $N=10$, $\Sigma X=225$, $\Sigma Y=129$, $\Sigma (X-22)^2=85$, $\Sigma (Y-19)^2=25$ and $\Sigma (X-22)(Y-19)=42$

Q4 Compute the Spearman's rank correlation coefficient R between X and Y from given data

X	12	17	22	27	32
Y	113	119	117	115	121

Q5 Find the rank correlation coefficient between X and Y for the following data

X	10	12	18	18	15	40
Y	12	18	25	25	50	25

Q6 Find the spearman's rank correlation coefficient between X and Y

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

Q7 Find the equation of the line of regression of Y on X for the following data

X	10	12	13	16	17	20	25
Y	19	22	24	27	29	33	37

Q8 For the following data, find the coefficients of regression b_{xy} and b_{yx} and the coefficient of correlation (r).

X	100	110	120	130	140	150	160	170	180	190
Y	45	51	54	61	66	70	74	78	85	89

Q9 Given two lines of regression
$6y = 5x + 90$, $15x = 8y + 130$
Find (i) $\bar{x}$, $\bar{y}$ (ii) correlation coefficient r

Q10 Given two lines of regression
$4x - 5y + 33 = 0$, $20x - 9y - 107 = 0$. Find
(i) r (ii) $\bar{x}$, $\bar{y}$ (iii) Standard deviation of y if standard deviation of X is 3.

Q11 Fit a straight line to the following data:

X	5	10	15	20	25	30	35	40	45	45
y	17	24	31	33	37	37	40	40	42	41

Q12 Fit a parabola to the following data

X	3.0	3.5	4	4.5	5	5.5	6
y	3.1	3.3	3.6	4	4.7	5.4	6.1

Q13 Using least square method fit a parabola $y = a + bx + cx^2$ to the following data

X	−2	−1	0	1	2
y	−3.150	−1.390	0.620	2.880	5.378

Q14 State the normal equations for fitting a straight

line and normal equations for fitting a parabola.

Q15 Fit a straight line to the given data.

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

Q16 → State true or false with reasonity

Q16 The two regression coefficients are both positive or both negative.

Q17 The values of r and R can never be equal. → State whether true or false.

Q18. State the equations of lines of regression of y on x and also of line of regression of x on y

Q19 Find the equations of lines of regression for the following data. Also find r and estimate Y when X = 15

X	7	8	9	10	11	12	13
Y	13	16	16	17	14	19	18

Q20 If ranks of 10 girls in a beauty contest judged by two judges A and B are as follows then compute Spearman's Rank correlation coefficient R

Rank by Judge A	6	8	9	7	10	5	2	1	4	3
Rank by Judge B	3	1	8	4	2	7	5	6	10	9

	Module 3 (Probability and distribution)	3	3

Q1 A discrete random variable A has the following probability distribution function

X	-2	-1	0	1	2	3
P(X=x)	0.1	k	0.2	2k	0.3	3k

Find (i) k (ii) $P(X \geq 2)$ (iii) $P(-2 < x < 2)$

Q2 A continuous random variable has probability density function as follows:

$F(x) = kx$, $0 \leq x \leq 1$

$= k$, $1 \leq x \leq 2$

$= 3k - kx$, $2 \leq x \leq 3$

$= 0$, elsewhere

(i) Find k (ii) Find $P(1 \leq X \leq 2.5)$ (iii) $P(X \leq 2)$

Q3 Probability density function of a random variable x is

x	-2	-1	0	1	2	3
P(x)	0.1	3k	0.2	2k	0.3	5k

Find (i) k (ii) mean (iii) standard deviation

Q4 A bag contains 7 red and 3 black balls and other bag contains 4 red and 5 black balls. One ball is transferred from the first bag to the second bag and then a ball is drawn from the second bag. If this ball happens to be red, find the probability that a black ball was transfered

Q5 Three factories A, B, C produce 30%, 50% and 20% of the total production of an item. Out of their production 80%, 50% and 10% are defective. An item is

chosen at random and found to be defective. Find the probability that it was produced by the factory A.

Q6 A newly constructed flyover is likely to collapse. The chance that the design is faulty is 0.5. The chance that the flyover will collapse if the design is faulty is 0.95 otherwise it is 0.30. The flyover collapsed. What is the probability that it callapsed due to faulty design?

Q7 Three urns contain respectively 3 green and 2 white balls, 5 green and 6 white balls, 2 green and 4 white balls. One ball is drawn from each urn. Find the expected number of white ball drawn.

Q8 Find out the fallacy if any in the following statement
"If X is a Poisson variate such that $P(X=2) = 9\,P(X=4) + 90\,P(X=6)$ then mean of $X = 1$".

Q9 A transmission channel has a per-digit error probability $p = 0.01$. Calculate the probability of more than 1 error in 10 received digits using Poisson distribution

Q10 If the variance of a Poisson distribution is 1.2. Find the probabilities of $x = 1, 2, 3, 4$ using recurrance relation.

Q11 In sampling a large number of parts manufactured by a machine the mean number of defectives in a sample of 20 is 2. Out of 100 such samples, how many would you expect to contain 3 defectives using Poisson distribution.

Q12 The marks obtained by students in a college are normally distributed with mean 65 and variance 25. If 3 students are selected at random from this college what is the probability that at least one of them would have scored more than 75 marks?

Q13 Monthly salary X in a big organization is normally distributed with mean Rs. 3000 and standard deviation of Rs. 250 What should be the minimum salary of a worker in this organization so that the probability that he belongs to top 5% workers?

Q14 In an intelligence test administered to 1000 students, the average was 42 and standard deviation was 24. Find the number of students (i) exceeding the score 50 and (ii) between 30 and 54

Q15 An insurance company found that only 0.01% of the population is involved in a certain type of accident each year. If its 1000 policy holders were randomly selected from

the population, what is the probability that no more than two of its clients are involved in such accident next year?

Q16 Define Poisson distribution. Also state its mean and moment generating function.

Q17 i) Define Normal distribution.
ii) State recurrance relation for Poisson distribution.

Q18 Can we have a Poisson distribution with mean 4 and variance 5? Justify your answer.

Q19 If X is a Poisson variate and $P(X=0) = 6\,P(X=3)$, find $P(X=2)$.

Q20 In a distribution exactly normal 7% of items are under 35 and 89% are under 63. What are the mean and standard deviation?

	Module 4 (Vector Spaces)	3	4

Q1 State and prove Cauchy-Schwarz inequality in R^2.

Q2 Verify Cauchy-Schwartz inequality for the vectors $u=(2,1,1)$ and $v=(2,0,1)$

Q3 For real values of a, b and θ, show that $(a\cos\theta + b\sin\theta)^2 \leq a^2+b^2$ using Cauchy-Schwarz inequality.

Q4 Let $V = F(-\infty, \infty)$ be the set of all real valued functions defined on $(-\infty, \infty)$. For any f and g and for any scalar k, we define (i) $f=g$ if and only if $f(x)=g(x)$ for all x.
(ii) $(f+g)(x) = f(x)+g(x)$
(iii) $(kf)(x) = kf(x)$.
Then is V a vector space?

Q5 Examine whether the set of 2×2 matrices defined as $\begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}$ with usual addition of matrices and scalar multiplication is a vector space.

Q6 Show that any plane passing through the origin is a sub-space of R^3.

Q7 Is $W = \{(a,1,1) / a \in R\}$ a subspace of R^3?

Q8 Determine whether the following vectors span the vector space of all polynomials of second order. $p_1 = 1-x+2x^2$; $p_2 = 5-x+4x^2$
$p_3 = -2-2x+2x^2$

Q9 Define: (i) Basis of vector space
(ii) Dimension of a vector space
(iii) Orthogonal set

Q10 Verify that the vectors $v_1=\left(\frac{-3}{5},\frac{4}{5},0\right)$, $v_2=\left(\frac{4}{5},\frac{3}{5},0\right)$, $v_3=(0,0,1)$ form an orthonormal basis in R^3 w.r.t. the Euclidean inner product. Express the vector $(3,-7,4)$ as a linear combination of v_1, v_2, v_3.

Q11 Let R^3 have the Euclidean inner product. Use Gram-Schmidt process to transform the basis $\{u_1,u_2,u_3\}$ into an orthonormal basis where $u_1=(1,1,1)$, $u_2=(-1,1,0)$, $u_3=(1,2,1)$.

Q12 Let R^3 have the Euclidean inner product. Use the Gram-Schmidt process to transform the basis $\{u_1,u_2,u_3\}$ into orthonormal basis where $u_1=(1,0,0)$, $u_2=(3,7,-2)$, $u_3=(0,4,1)$.

Q13 Find an orthonormal basis for the subspaces of R^3 by applying Gram-Schmidt process where $S=\{(1,2,0),(0,3,1)\}$

Q14 Check whether $\left(\frac{1}{\sqrt{6}},\frac{1}{\sqrt{6}},\frac{-2}{\sqrt{6}}\right)$, $\left(\frac{1}{\sqrt{3}},\frac{-1}{\sqrt{3}},0\right)$ are orthogonal with respect to the Euclidean inner product.

Q15 Determine whether $v_1=(2,-1,3)$, $v_2=(4,1,2)$ $v_3=(8,-1,8)$ span a vector space in R^3.

	Module 5 (Quadratic Forms)	3	5

Q1 Find the singular value decomposition of the matrix $A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 3 & 1 \end{bmatrix}$.

Q2 Find the singular value decomposition of the matrix $\begin{bmatrix} 2 & 3 \\ 0 & 2 \end{bmatrix}$

Q3 ~~Find the singular val~~ Reduce the quadratic form $x^2+2y^2+2z^2-2xy-2yz+2zx$ to canonical form. Also find its rank and signature.

Q4 Find the linear transformation $Y=AX$ which carries $X_1=(1,0,1)'$, $X_2=(1,-1,1)'$, $X_3=(1,2,-1)'$ on to $Y_1=(2,3,-1)'$, $Y_2=(3,0,-2)'$, $Y_3=(-2,7,1)'$.

Q5 Obtain the transform of the quadratic form $2x_1^2+2x_2^2+3x_3^2+2x_1x_2-4x_1x_3-4x_2x_3$ under the linear transformation $x_1=y_1-y_2+2y_3$, $x_2=2y_2+2y_3$, $x_3=3y_3$ and interpret your result.

Q6 Obtain the transform of the quadratic form $6x_1^2+3x_2^2+3x_3^2-4x_1x_2+4x_1x_3-2x_2x_3$ under the linear transformation $x_1=y_1+\frac{1}{3}y_2-\frac{2}{7}y_3$, $x_2=y_2+\frac{1}{7}y_3$, $x_3=y_3$

Q7- Define Normal form or Canonical form of a Quadratic form.
- Define Rank of the quadratic form.

Q8 Define index and signature of the quadratic form.

Q9 State whether the given statement is true or false and justify your answer.
"If the rank of a matrix is even then it's signature is also even."

Q10 Reduce the matrix of the quadratic form $6x_1^2 + 3x_2^2 + 3x_3^2 - 4x_1x_2 + 4x_1x_3 - 2x_2x_3$ to the diagonal form through congruent transformation and interpret your result.

Q11 Reduce the quadratic form $x^2 + 2y^2 - 3z^2 + 5w^2 - 4xy + 8yz + 2yw - 2zx$ to the diagonal form through congruent transformat

Q12 State the value classes of Quadratic form and define each of them.

Q13 Determine value class of the quadratic form $4x_1^2 + 4x_2^2 + 4x_3^2 + 4x_1x_2 + 4x_1x_3 + 4x_2x_3$.

Q14 Express each of the following transformations $x_1 = 2y_1 - 3y_2$; $x_2 = 4y_1 + y_2$ and $y_1 = z_1 - 2z_2$; $y_2 = 2y_1 + 3y_2$ in the matrix form and find the composite transformation which expresses x_1, x_2 in terms of z_1, z_2.

Q15 Find a linear transformation $Y = AX$ which carries $X_1 = (2,1)'$ and $X_2 = (4,-1)'$ to $Y_1 = (3,2)'$ and $Y_2 = (2,3)'$ respectively.

	Module 6 (Calculus of variations)	3	6

Q1 - State Euler-Lagrange equation.
- Define ~~Isoperimetric~~ Isoperimetric problem.

Q2 Find the extremals of $\int_{x_1}^{x_2} (1+x^2y')\,y'\,dx$.

Q3 Find the extremal of $\int_0^{3\pi/2} (y^2-y'^2)\,dx$
given $y(0)=0$, $y\left(\frac{3\pi}{2}\right)=1$.

Q4 Find the equation of the curve which when revolved about the x-axis between points $A(x_1,y_1)$ and $B(x_2,y_2)$ will generate a solid whose surface is minimum.

Q5 Find the extremal of the function $\int_0^{\pi/2} (y'^2-y^2+2xy)\,dy$ with $y(0)=0$, $y(\pi/2)=0$.

Q6 Find the extremal of $\int_0^1 (xy+y^2-2y^2y')\,dx$.

Q7 Find the curve $y=f(x)$ for which $\int_0^{\pi} (y'^2-y^2)\,dx$ is extremum if $\int_0^{\pi} y\,dx = 1$.

Q8 Find the plane curve of fixed perimeter and maximum area.

Q9 Find the extremal of $\int_{x_0}^{x_1} (2xy-y''^2)\,dx$

Q10 Find the extremal of $\int_{x_0}^{x_1} (y'^2-y^2+x^2)\,dx$.

Q11 Using Rayleigh-Ritz method, solve the following boundry value problems

(i) $I = \int_0^1 (2xy + y^2 - y'^2)\,dx$; $0 \le x \le 1$,

given $y(0) = y(1) = 0$.

(ii) $I = \int_0^1 (y'^2 - 2y - 2xy)\,dx$ with $y(0) = 2$, $y(1) = 1$.

(iii) $I = \int_0^1 \left(xy + \frac{1}{2}y'^2\right)dx$; $0 \le x \le 1$ given

$y(0) = 0$ and $y(1) = 0$

Q12 Find the curve on which the functional $\int_0^1 (y'^2 + 12xy)\,dx$ with $y(0) = 0$ and $y(1) = 1$ is extremal.

Q13 Using the relation that the length of the arc between two points $A(x_1, y_1)$ and $B(x_2, y_2)$ is given by $S = \int_{x_1}^{x_2} \sqrt{1 + y'^2}\,dx$, show that the shortest smooth plane curve between two points on a plane is a straight line.

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Department of Electronics and Telecommunication Engineering

Academic Year 2021-22

Semester: _IV **Year: SY**

Subject: Principles of Communication Engineering **Course Code: 1UEXC404**

Question bank

Question No.	Module: 1_Basics of Communication System	BT Level	CO
1	Describe Analog Communication System	U	CO1
2	Explain Digital Communication System	U	CO1
3	Explain Channels in communication system	U	CO1
4	Classify Noise and Explain the various types of noises affecting communication	U	CO1
5	Define SNR, F, NF, NT	U	CO1
6	Write short note on wired channel	U	CO1
7	Deduce FRIISS formula for calculation of total noise figure, if two amplifiers are connected in cascade.	Ap	CO1
8	Problem based on Noise theory	An	CO1
9	**Classify** Noise and **Explain** the internal noises affecting communication	U	CO1
10	**Explain** the external noises affecting communication	U	CO1
	MODULE: 2_Amplitude Modulation and Demodulation		
1	write short note on Amplitude Modulation and Demodulation	U	CO2
2	What is modulation? Explain the need of modulation.	R	CO2
3	Modulation index for AM should be less than one. Justify/Contradict	U	CO2

4	Derive AM voltage distribution	Ap	CO2
5	Explain low level modulation techniques with the help of diagram	U	CO2
6	Explain high level modulation techniques with the help of diagram	U	CO2
7	Compare Low level and High level AM transmitter	U	CO2
8	Describe AM envelope	U	CO2
9	Derive mathematical expression for amplitude modulation for more than one modulating signal (Multitone)	Ap	CO2
10	Explain the DSB method for suppression of unwanted carriers.	U	CO2
11	Draw the block diagram of phase cancellation SSB generator and explain how carrier and unwanted sidebands are suppressed?	U	CO2
12	Explain VSB transmission.	U	CO2
13	State advantage of SSB over DSB SC.	R	CO2
14	Problem based on Amplitude Modulation	Ap,An	CO3
	MODULE: 3_Angle Modulation and Demodulation		
1	With suitable diagram, explain the working of FM modulator	U	CO2
2	Describe frequency modulation and phase modulation	U	CO2
3	With the help of a neat block diagram explain the principle and generation of indirect methods of FM generation.	U	CO2
4	Explain the principle and working of the transistor direct FM Modulator.	U	CO2
5	Explain Ratio detector in detail with suitable diagram.	U	CO2
6	Explain the operation of Foster Seeley discriminator with the help of circuit diagram and phasor diagram.	U	CO2

7	FM noise triangle.	U	CO2
8	Explain Pre-emphasis and De-emphasis in FM.	U	CO2
9	Short note on PLL FM Demodulator.	U	CO2
10	Define frequency deviation, deviation sensitivity and modulation Index	U	CO2
11	Differentiate between narrowband and wideband FM.	U	CO2
12	Compare FM and PM.	U	CO2
13	Compare AM, FM and PM	U	CO2
14	Problem based on Angle Modulation	Ap, An	CO3
	MODULE: 4_Radio Receiver		
1	In AM why IF is selected 455 KHz?	U	CO4
2	Define Sensitivity, selectivity, fidelity and image frequency in radio receivers.	U	CO4
3	Why is AGC required in radio receivers? Explain diode detector circuit with simple AGC.	U	CO4
4	Draw a neat block diagram of a superheterodyne radio receiver and explain the function of each block with waveforms.	U	CO4
5	Explain double spotting with reference to the radio receiver.	U	CO4
6	Explain drawbacks of TRF receiver	U	CO4
7	Write short note on tracking error	U	CO4
8	Write short note on Image frequency and Image frequency rejection ratio	U	CO4
9	Explain Practical diode detector with delayed AGC in detail	U	CO4

10	Problem on Radio receiver to determine the Local Oscillator frequency, Image frequency, Image rejection ratio	U	CO3
	MODULE: 5_Pulse modulation techniques		
1	State and Prove sampling theorem for low pass band limited signals.	Ap	CO5
2	Explain Natural and flat top sampling	U	CO5
3	What is aliasing? How can it be prevented?	R	CO5
4	Compare Natural Sampling and Flat top sampling	U	CO5
5	What are the causes of fold over distortion or aliasing? How can it be prevented or removed?	R	CO5
6	Explain companding in detail. /Describe μ-law and A-law companding	U	CO5
7	Explain PAM modulation and demodulation techniques	U	CO5
8	Explain PWM modulation and demodulation techniques	U	CO5
9	Explain PPM modulation and demodulation techniques	U	CO5
10	Explain PCM techniques	U	CO5
11	Explain DM modulation and demodulation techniques	U	CO5
12	Explain ADM modulation and demodulation techniques	U	CO5
13	Compare PAM, PWM, PPM	Ap	CO5
14	Compare DM, ADM	U	CO5
	MODULE: 6_Multiplexing techniques		
1	What is signal multiplexing? Explain FDM in detail.	U	CO6
2	Explain TDM in detail.	U	CO6

3	Define crosstalk	U	CO6
4	Explain in detail FDM Hierarchy	U	CO6
5	Explain in detail TDM Hierarchy	U	CO6

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Department of Electronics and Telecommunication Engineering

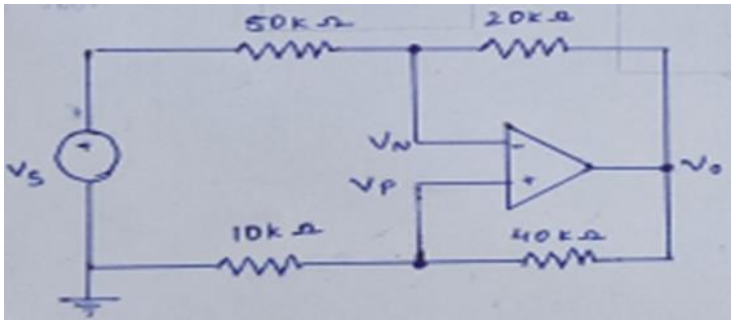
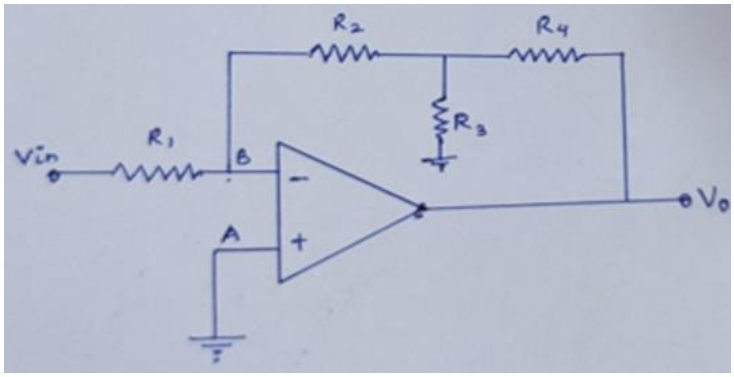
Academic Year 2021-22

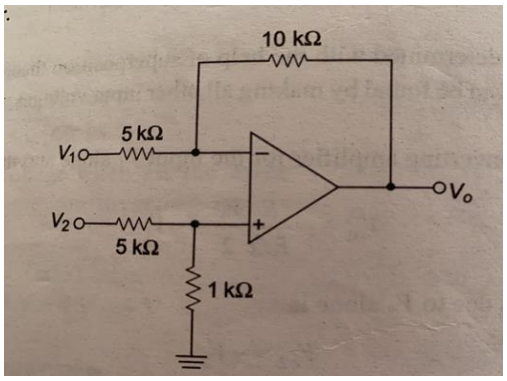
Semester: IV **Year: SY**

Subject: Linear Integrated Circuits **Course Code:** 1UEXC403

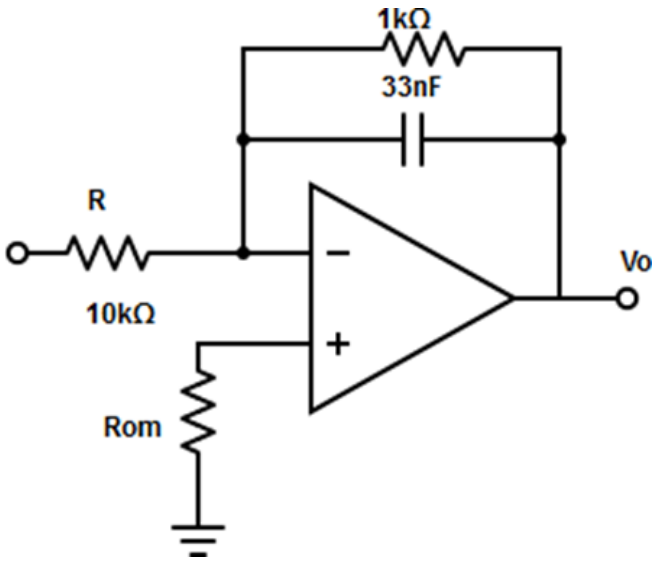
Question bank

Question No.	**Unit 1 : Introduction to Operational Amplifier**	BT Level	co
1	Draw the voltage follower using an op-amp and show that its gain is unity.	A	CO1
2	Draw the functional block diagram of the op-amp and explain each block	A	CO1
3	Define following OP AMP parameters: 1) C.M.R.R 2) Slew rate 3) Input offset voltage 4) Input bias current 5) output resistance	R	CO1
4	Sketch the implementation of an instrumentation amplifier using three op amps and explain its operation.	A	CO1
5	Compare ideal and practical op amp.	U	CO1
6	Design a circuit for $Vo = 2V_1 - 3V_2$ using a single op-amp and few resistors.	A	CO1
7	Find ideal characteristics of op-amps and give their practical values.	R	CO1
8	Design a circuit for $V_O=V_1+V2$ using single op-amp and few resistors	A	CO1

9	Find V_n, V_p, and $V_o$in the circuit if Vs is 	U	CO1
10	Determine V_o/V_{in} for the circuit shown below 	A	CO1
11	Define the following: a. slew rate b. CMRR c. Input Offset Voltage d. Output offset voltage e. PSRR	R	CO1
12	Explain the significance of virtual ground in an opamp.	U	CO1

13	Find the output voltage of the opamp circuit as shown in fig. Where v1=2V and v2=7V. 	R	CO1
14	Design a summing amplifier to produce the output Vo= -(3V1a + 12 V1b + 15 V1c+ 18 V1d). Assume the feedback resistance R2=20Kohm.	A	CO1
15	Design an opamp circuit which produces V0 = V2-3V1 with R1=R3= 100 Kohm.	A	CO1
	Unit 2: Linear Applications of Operational Amplifier		
1	What are active filters? State its advantages over passive filters.	R	CO2
2	Discuss classification of active filters and explain the frequency response of each type	R	CO2
3	Design a differentiator to differentiate input signals that varies in frequency from 10 Hz to about 1 kHz.	A	CO2
4	What are active filters? How are they classified? State its applications. Design a second order high pass filter using OP AMP at f_0= 1 KHz and with gain at 2.	R	CO2

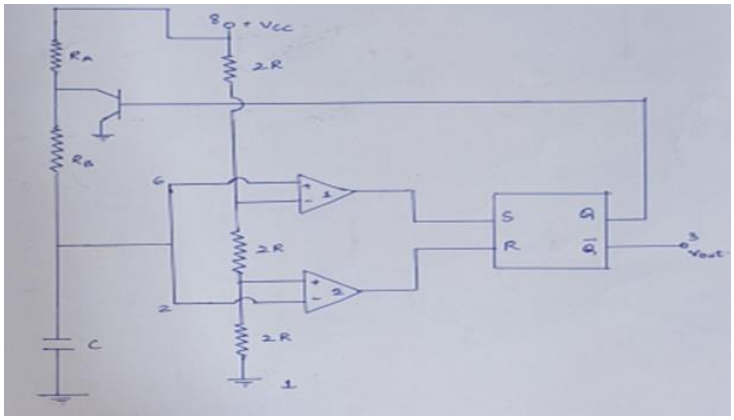
5	Write Short notes on: 1) Comparison of linear and switching regulators. 2) Active filters using op amp. 3) Voltage to Current converter.	U	CO2
6	Draw a neat circuit diagram of a RC phase shift oscillator using an op-amp. Derive its frequency of oscillation. What are the values of *R* and C for frequency of oscillation to be 1 kHz?	A	CO2
7	Design a differentiator to differentiate an input signal that varies in frequency from 10Hz to 500Hz. Draw its frequency response. If a sine wave of 2 V peaks at 500 Hz is applied to the differentiator, write an expression for its output and draw output waveform.	A	CO2
8	Draw a neat circuit diagram of a Wein Bridge oscillator using op-amp. Derive its frequency of oscillation. What are the values of R and C for frequency of oscillations to be 965 Hz?	A	CO2
9	Design a 2^{nd} order Butterworth HPF for cut off frequency of 1kHz and pass band gain of AF = 2.	A	CO2
10	Draw the circuit diagram and explain the operation of differentiator. What are limitations of ideal differentiator? How they overcome in practical circuit, state its applications.	A	CO2
11	Design a second order low pass filter using OP AMP at cut-off frequency of1KHz and with pass band gain at 2.	A	CO2

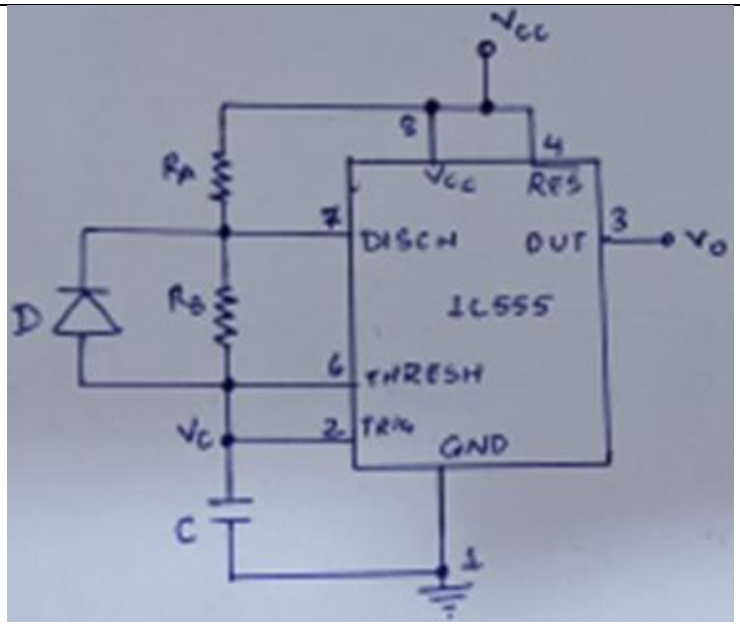
12	What is an ideal integrator? How can the disadvantages of basic integrators be overcome? Design a practical integrator circuit for the frequency of 159Hz with Cf=10nF.	U	CO2
13	Design a practical differentiator to differentiate input signals with Fmax=200Hz.	A	CO2
14	What is an ideal Differentiator? How can the disadvantages of basic differentiators be overcome?	U	CO2
15	What maximum peak to peak input signal can be applied without distorting the output?(Slew rate: 0.5v/microsecond) (Vmax= 1.99V, Vmax(peak-peak)= 3.98V, Vid= 0.398(peak-peak)An inverting amplifier using the IC 741 must have a flat response up to 40KHz. The gain of the amplifier is 10.	U	CO2
16	Determine the lower frequency limit of integration for the circuit given below. 	A	CO2
17	Describe the circuit operations of the following V-I converters,	U	CO2

	a) Floating load V-I converter b) Grounded load V-Iconcerter		
18	Analyze and obtain the gain of following circuits, i) Differentiator ii) Integrator	An	CO2
19	Design the RC phase shift oscillator for f0 = 300Hz.	A	CO2
20	Design a Wein Bridge oscillator for f0 = 2KHz.	A	CO2
21	Design second order low pass filter for the higher cut off frequency of 2KHz with a pass band gain of 2.	A	CO2
	Unit 3: Non-Linear Applications of Operational Amplifier		
1	Compare comparator and Schmitt trigger.	U	CO3
2	What is a comparator? Explain the characteristics of comparators. State applications of Comparators.	U	CO3
3	Design an inverting Schmitt trigger to achieve hysteresis of 7 Volts. Assume voltage swing = ± 12Volts.	A	CO3
4	Draw circuit diagram of temperature compensated log amplifier and explain its operation. State its application	A	CO3
5	Draw the circuit diagram and explain the operation of a triangular wave generator using OP AMP. Explain the modifications required to obtain sawtooth wave output.	A	CO3

6	With a neat circuit diagram. Explain the working of the comparator circuit.	U	CO3
7	Design a Schmitt trigger circuit to convert 5V, 1kHz square wave using IC741, VUT = 0.8 V, VLT = −0.8 V and ± = ± 11 *V*V. Draw its transfer characteristics, input and output waveforms.	A	CO3
8	Design triangular wave generator using op amp to have output voltage = 7VPP volts, frequency 2 kHz, with supply voltage +/- 14 V.	A	CO3
9	Derive the expressions for its threshold levels. Explain how these levels can be varied? With the help of a neat diagram, input and output waveforms and voltage transfer characteristics explain the working of non-inverting Schmitt triggers.	A	CO3
10	Draw the circuit diagram of a square and triangular waveform generator using op- amp. With the help of waveforms at suitable points in the circuit, explain its working. Explain how duty cycles can be varied?	A	CO3
11	With the help of a neat diagram and voltage transfer characteristics explain the working of a working of an inverting Schmitt trigger. Derive the expressions of a neat circuit. Derive the expressions for its threshold levels.	A	CO3
12	Draw the circuit diagram and explain the operation of zero crossing detector.	A	CO3

13	Draw the circuit diagram and explain the operation of precision full wave rectifier. Also, derive the expression of output voltage.	A	CO3
14	How are precision rectifiers different from simple diode rectifiers?	U	CO3
15	What is a window detector? Explain its operation	U	CO3
16	Draw a precision half wave rectifier circuit and explain its operation.	A	CO3
17	Explain the operation of a peak detector circuit.	U	CO3
	Unit 4: Timer IC 555 and its applications		
1	Explain Monostable timer circuit and design a Monostable 555 timer circuit to produce an output pulse 10 sec wide.	U	CO4
2	Analyze this circuit and draw the waveforms at output terminal V_{out} and across the capacitor C. Comment on the duty cycle of output waveform when i)$R_A < R_B$, ii) $R_A = R_B$, iii) $R_A > R_B$ The circuit given is similar to that of internal diagram of IC 555 with slight modifications in the internal resistances to	An	CO4

	value 2R. 		
3	Draw neat circuit diagram and explain the operation of monostable multivibrator using IC 555.	A	CO4
4	Design a IC 555 bases symmetrical square wave generator for 1KHz frequency of VCC = 5V, Draw waveforms for voltage across timing capacitor and output.	A	CO4
5	Design a monostable multivibrator to produce an output pulse 10 second wide. Draw the neat circuit diagram and all the waveforms.	A	CO4
6	Analyze the circuit given in Fig. below. Draw the waveforms at output terminal vo and across the capacitor C. Comment on the duty cycle of output waveform. Take diode D as an ideal diode and assume RA is equal to R*B*.	An	CO4

			
7	Write a short note on the pulse width modulator.	U	CO4
8	Explain IC 555 as a monostable multivibrator. Also design a monostable multivibrator using a 555 timer for a pulse period of 1ms.	U	CO4
9	Explain IC 555 as an astable multivibrator.	U	CO4
10	Design an Astable multivibrator using 555 timers for a frequency of 1KHz and a duty cycle of 70 %. Assume c=0.1μf	A	CO4
11	Explain Schmitt trigger using Timer IC 555.	U	CO4
12	Determine the frequency of oscillation if the duty cycle D= 20% and the ON period T1=1ms.	A	CO4
	Unit 5; Voltage Regulators		

1	Explain the functional block diagram of IC 723 and state its important features	U	CO5
2	Explain Three pin fixed voltage regulator	U	CO5
3	Draw the block diagram and explain the operation of the switching Regulator.	A	CO5
4	Explain with a circuit diagram: 1) Short circuit current protection. 2) Fold back limiting in the 723 IC voltage regulator	U	CO5
5	With the help of a functional block diagram explain the working of voltage regulator LM317 to give an output voltage variable from 6V to 12V to handle maximum load current of 500mA.	U	CO5
6	Design voltage regulator using IC 723 to have Io=50mA, Isc = 75mA, Vin = 15 V Assume Vsense = 0.6V and Vo = 5V.	A	CO5
7	For a regulated power supply the output voltage varies from 12V to 11.6V when the load current varies from 0 to 100mA which is the maximum value of I_L if the ac line voltage and temperature are constant calculate the load regulation %load regulation and output resistance of power supply.	A	CO5
8	Design a voltage regulator using IC 723 to give Vo = 4 V to 32 V and output current of 2 A.	A	CO5
9	Write Short notes on:1)Three terminal fixed voltage regulator. Monolithic switching regulator	U	CO5

10	Design an adjustable output voltage regulator circuit using IC 317 to give 5 to 12 volts at I1=1 Amp. Given; IAD) =100 uA and let Ri=240	A	CO5
11	Compare linear and switching voltage regulator.	U	CO5
12	Design 1 amp. Current source using a 7805 regulator IC.	A	CO5
13	Design a voltage regulator using IC 723 for Vo=5v,Io=50mA,Isc=75mA,Vin=15V,assume Vsense=0.6v	A	CO5
14	Draw and explain the functional diagram of the IC723 voltage regulator.	A	CO5
	Unit 6 : Special Purpose Integrated Circuits		
1	Draw block diagram and explain the operation of PLL (phase locked loop). State its applications.	A	CO6
2	Draw a neat diagram of PLL IC 565 & explain the terms i) Free running frequency ii) Capture range iii) Lock Range	A	CO6
3	Explain the use of PLL as a frequency Multiplier	U	CO6
4	Write short not on VCO and explain their applications.	U	CO6

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Department of Electronics and Telecommunication Engineering

Academic Year 2021-22

Semester: IV **Year: SY**

Subject: Signal and Systems **Course Code:** 1UEXC405

Question bank

Question No.	Module1. Introduction to signals and systems	BT Level	CO
1	Sketch δ(t), δ(t-2), δ(t+2) and –δ(t+4)	CO1	2
2	If x(t) = 2, 0 ≤ t ≤ T, and zero elsewhere. Sketch 0.5x(t), 2x(t), x(t/2) and x(2t)	CO1	2
3	Explain any two elementary signals with mathematical equation and graphical plot	CO1	2
4	Sketch the signal x(-t), x(t+6), x(3t) and x(t/2) 	CO1	2
5	A discrete time signal given by x[n] = {1,1,1,1,2}. x[n] = {1,1,1,1,2}. ↑ Sketch the following signals: x[n], x[n-2], x[n] u[n-1], x[3-n]	CO1	2
6	State whether the following signal is periodic or not, giving reasons. If it is periodic, find the corresponding period: x(t) = 2 cos 100 πt + 5 sin 50 t.	CO1	2
7	A discrete time periodic sequence is given by $x_p[n]$ = A cos [nπ/2]. Determine period of the sequence. Sketch the sequence x[n] for the variable n for one period.	CO1	2
8	Distinguish between deterministic and stochastic signals. Give an	CO1	2

	example of each.		
9	Explain Energy and Power of signal	CO1	2
10	Periodic Signals are always power signals. Justify	CO1	2
11	Find the average power of $A\cos\omega_o t$	CO1	3
12	Find Energy and Power of Signal: (i) $x[n] = \cos(\pi n)$ $-4 \leq n \leq 4$ otherwise $x[n] = 0$ (ii) $x(t) = \cos wt$	CO1	3
13	Find and Sketch Even and Odd parts of $f(t) = t$, $0 \leq t \leq 1$ $= 2-t$, $0 \leq t \leq 1$	CO1	3
14	Find and Sketch Even and Odd parts of $x[n] = u[n] - u[n-5]$	CO1	3
15	Explain classification of signals with example	CO1	3
16	If x[n] = [1, 2, 3, 4], sketch x[n], x[n+2], x[n-3], x[-n], x[-n+2], x[-n-3], x[2n] and x[n/2]	CO1	3
17	Determine x[n] = u[n], signal is a. Continuous or discrete b. periodic or aperiodic c. Even or Odd d. Energy or Power	CO1	3
18	Determine x(t) = r(t), signal is e. Continuous or discrete f. periodic or aperiodic g. Even or Odd h. Energy or Power	CO1	3

19	Explain any five elementary signals with mathematical equation and graphical plot	CO1	3
20	For the given system, determine whether it is : 1. Memoryless 2. Causal 3. Linear 4. Time-invarient y[n] = nx[n]	CO1	3
	Module 2. Time domain analysis of Continuous Time and Discrete Time systems		
1	Find the relationship between impulse response and step response for a continuous time LTI system	CO2	2
2	Find output of LTI system with impulse response h(t) = **δ** (t-3) for input x(t) = cos 4t + sin 7t.	CO2	2
3	Explain Auto correlation and Cross correlation	CO2	2
4	State relation of ESD and PSD with Autocorrelation	CO2	2
5	State relation of ESD and PSD with Cross-correlation	CO2	2
6	Find the cross correlation between x[n] and y[n] where x[n] = [1, 2, 3, 4] and y[n] = [5, 6, 7]	CO2	3
7	Obtain the system output if x(t) = u(t) and h(t) = 1; $-1 \leq t \leq 1$	CO2	3
8	Compute Linear convolution of the following sequence: x[n] = {1,2,3,1}, h[n] = {1,2,2,-1}	CO2	3
9	Compute Linear convolution using tabular method of the following sequence: x[n] = {1,2,3,1}, h[n] = {1,2,2,-1}	CO2	3
10	Find Auto-correlation function of a sine wave	CO2	3

11	x(t) = A from 0 to 3 and zero elsewhere & h(t) = B from 0 to 2 and zero elsewhere. From the given input and impulse response determine the output of the system using convolution	CO2	3
12	Find the autocorrelation function of $A\cos\omega_o t$ and determine the average power from the result	CO2	3
13	Find Convolution of x(t) and h(t) where x(t) = u(t) - u(t-2) and h(t) = u(t) - u(t-3)	CO2	3
14	Compute Linear convolution using direct computation method and tabular method of the following sequence: x[n] = {1,2,4}, h[n] = {1,1,1}	CO2	3
15	Find auto-correlation, power spectral density and power of the following signal: x(t) = 5+ 4 sin (10πt + 30 °)	CO2	3
16	Find the auto-correlation of the signal X(t) = (cosπt) [u(t+2) - u(t-2)] and sketch the autocorrelation.	CO2	3
17	Compute Cross correlation using direct computation method and tabular method of the following sequence: x[n] = {2,3,4}, h[n] = {1,2,3}	CO2	3
18	Obtain autocorrelation, power and power spectral density of the signal x(t) = 3 cos t + 4 cos 3t.	CO2	3
19	What is convolution, autocorrelation and Cross correlation, explain with formula and example.	CO2	2
20	Distinguish between autocorrelation and Cross correlation.	CO2	2
	Module 3. Review of Fourier series		
1	Write expressions for trigonometric and exponential Fourier series representation of a signal	CO3	2
2	What is Gibb's phenomenon?	CO3	2

3	Explain types of Fourier series with example	CO3	2
4	Write short note on time domain and frequency domain (spectrum) representation with suitable example	CO3	2
5	Explain relation between Z transform and DTFT	CO3	2
6	Compare CTFS and DTFS	CO3	2
7	Find the fourier series of a periodic signal $f(t) = V, \quad 0 < t < T/2$ $= 0, \quad T/2 < t < T$	CO3	3
8	Obtain fourier series for given signal $f(t) = V/2\ t, \quad 0 < t < 2$ $T = 2$ sec, $\quad w_o = 2\pi/t = \pi$ rad/sec	CO3	3
	Module 4. Fourier Analysis of Continuous and Discrete Time Signals and Systems		
1	Explain the Dirichlet conditions for the existence of Fourier transform	CO4	2
2	State Merits and limitations of Fourier transform	CO4	2
3	Define Fourier transform and Inverse Fourier transform.	CO4	2
4	Find out Fourier transform of $f(t) = 10\delta(t-2)$. Sketch its amplitude and phase spectrum.	CO4	2
5	Find the Fourier transform of $A\cos\omega_o t$ and sketch the amplitude spectrum.	CO4	2
6	Obtain Fourier transform of delta function	CO4	2
7	Obtain Fourier transform of a dc signal	CO4	2
8	State and prove Parseval's power theorem	CO4	2

9	State and prove Rayleigh's Energy theorem	CO4	2
10	A system has an impulse response h[n] = - 0.25 δ[n+1] + 0.5 δ[n] – 0.25 δ[n-1] 1. Sketch the impulse response 2. Is the system BIBO stable? 3. Is the system causal? 4. Find the transfer function of the system	CO4	3
11	State any eight properties of Fourier transform. Give proof of any one property	CO4	3
12	Find Fourier transform of x(t) is given by x(t) = u(t) and using properties of Fourier transform find Fourier transform of y(t) = u(2t) + u(t-1)	CO4	3
13	Obtain transfer function and the impulse response of the given differential equation $d^2y(t)/dt^2 + 3dy(t)/dt + 2y(t) = dx(t)/dt + 3x(t)$	CO4	3
	Module 5. Laplace Transform and Continuous time LTI systems		
1	Sketch poles and zeros, $X(s) = s^2 - s - 2/ s^2 - s – 6$	CO5	2
2	List out applications of Laplace Transform.	CO5	2
3	What is the 'S' domain?	CO5	2
4	Find Laplace Transform of x(t) = u(t) -	CO5	2
5	Find initial value and final value of 1/s+1	CO5	2
6	Find the Laplace transform of $x(t) = e^{at} u(t)$ where a > 0 and sketch the RoC	CO5	2
7	Obtain Laplace Transform of A sin wtu(t).	CO5	3
8	Find impulse response and step response of continuous time system	CO5	3

	governed by following transfer function $H(s) = (s+3) / (s^2 + 6s + 8)$		
9	Find Laplace transform of d/dt sin t u(t).	CO5	3
10	Determine the stability of the following systems using Laplace transform, RoC and pole. 1. Impulse response $h(t) = A\, e^{-at}\, u(t)$, $a > 0$ 2. Impulse response $h(t) = A\, e^{at}\, u(-t)$, $a > 0$	CO5	3
11	Find function x(t) if its laplace transform is given by, $X(s) = [10s/ (s+1)(s+3)]e^{-s}$	CO5	3
12	Find the Inverse Laplace transform of : $X(s) = (s2+2s+6)/(s2+3s)$ using the long division method.	CO5	3
13	Using Laplace transform determines the complete response of the system. The differential equation of the system is given by $d^2y(t)/dt^2 + 6dy(t)/dt + 8y(t) = dx(t)/dt + x(t)$ with $y(0) = 1$. $dy(0)/dt = 3$ for input $x(t) = u(t)$.	CO5	3
14	Find transfer function, impulse response of a continuous time LTI system, also sketch impulse and step response $dy(t)/dt = 2y(t) = 3x(t)$.	CO5	3
	Module 6. Z-Transform and Discrete time LTI systems		
1	Find the relationship between DTFT and ZT	CO6	2
2	What is the Z- domain and how to denote z-transform.	CO6	2
3	What is the need of the Z- transform and advantages of the z-transform.	CO6	2
4	Find initial value x(0) and final value $x(\infty)$ of the given z-transform $X(z) = 2z^{-2}/ (1-1.8z^{-1} + 0.8z^{-2})$	CO6	3
5	Determine z-Transform of following discrete time signals and also specify and draw ROC.	CO6	3

	1. x(n) = {1,2,3,4} 2. y(n) = {1,3,5,7}		
6	Determine the z-transform of the following signal: x(n) = coswn u(n).	CO6	3
7	Perform convolution of $x_1(n)$ and $x_2(n)$ using the property of z-transform. $x_1(n)$ = {1,-2,1} $x_2(n)$ = {1,1,1,1,1,1}	CO6	3
8	The impulse response of DT system is given by h(n) = {1,2,3} and output response is given by y(n) = {1,1,2,-1,3}. Using z-transform determine x(n) by long division method.	CO6	3
9	Find the z-transform of z[n] = [1, 2, 3, 4, 5] and inverse z-transform of $X[z] = 3z^{-2} + 4z^{-3} + 5 + 6z + 7z^3$	CO6	3
10	Determine inverse z-transform of $X(z) = 1/(1-1.5z^{-1} + 0.5z^{-2})$ using division method. when 1. ROC $Z > 1$ 2. ROC $Z < 0.5$	CO6	3
11	Compute the inverse z-transform using partial fraction method: $X(z) = 1/(1-1.5z^{-1} + 0.5z^{-2})$ if 1. ROC $\|Z\| > 1$ 2. ROC $\|Z\| < 0.5$ 3. ROC $0.5 < \|Z\| < 1$	CO6	3
12	Find the response of the time invariant system with impulse response h[n] = {1,2,1,-1} to an input signal x[n] = {1,2,3,1} using convolution as well as using z-transform. Verify your answers.	CO6	3
13	Find the inverse z-transform using the partial fraction method and sketch x[n]. $X[z] = 3z^2 + 2z + 1 / z^2 + 3z + 2$	CO6	3

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Department of Electronics and Telecommunication Engineering

Academic Year 2021-22

Semester: IV **Year: SY**

Subject: Microcontrollers **Course Code: 1UEXC402**

Question bank

Question No.	Module 1: Overview of Microcomputer based System)	BT Level	CO
1	Distinguish between Microprocessors and Microcontrollers	R	CO1
2	Explain concept of timers and counters in 8051	R	CO1
3	Distinguish between RISC AND CISC CPU ARCHITECTURES	R	CO1
4	Distinguish between VON- NEUMANN & HARVARD CPU ARCHITECTURE	R	CO1
5	Outline the Features of 8051 microcontrollers.	R	CO1
6	Explain concept of Interrupts in 8051	R	CO1
7	Explain serial data input and output concept in 8051	R	CO1
	Module 2: The Memory Systems		
8	Classify Memory : Primary and Secondary	Ap	CO2
9	Explain different types of Semiconductor memories	R	CO2
10	Explain Cache Memory	R	CO2
11	Explain Virtual Memory Concept with Memory Management Unit with Segmentation and Paging.	R	CO2

	Module 3: 8051 Microcontroller		

12	Draw and Explain Architecture of 8051	R	CO3
13	*Discuss Pin diagram of 8051*	R	CO3
14	Discuss Memory organization of 8051	R	CO3
15	Explain Internal RAM organization of 8051	R	CO3
16	What is stack? How is it implemented in 8051	R	CO3
17	Discuss Instruction Syntax	R	CO3
18	Comparison of 8051 family members	R	CO3
19	Explain The Stack and Stack pointer	R	CO3
20	Discuss the Special Function Registers (SFRs) of 8051	Ap	CO3
21	Discuss CPU timing and machine cycle	Ap	CO3
22	Outline the Features of 8051 microcontrollers.	R	CO3
23	Explain concept of Interrupts in 8051	R	CO3
24	Explain serial data input and output concept in 8051	R	CO3
25	Explain Serial Communication in 8051	R	CO3
26	Explain Serial Interface in 8051	R	CO3
27	Explain Data Transmission in microcontrollers	R	CO3
	Module 4: 8051 Assembly Language Programming and Interfacing		
28	Explain Addressing modes in 8051	R	CO4
29	Explain IO Port Usage in 8051	R	CO4

30	Explain the Need of Assembler & Cross Assemble, Assembler Directives	R	CO4
31	List 8051 Data types and directives	R	CO3
32	Explain 8051 Interrupt	R	CO4
33	Programs related to: arithmetic, logical	AP	CO4
34	Programs related to: delay subroutine	AP	CO4
35	Programs related to: output, timer, counters	AP	CO4
36	Programs related to: port, serial communication	AP	CO4
37	Programs related to: interrupts	AP	CO4
38	Interfacing of 8051 with LEDs	AP	CO4
39	Interfacing of 8051 with Seven Segment Display	AP	CO4
40	Interfacing of 8051 with Relay and Keys, LCD	AP	CO4
41	Compare between SJMP , LJMP and AJMP	R	CO4
42	Compare Jump and call instructions in 8051	R	CO4
43	Block Transfer in 8051	AP	CO4
44	What is stack? How is it implemented in 8051.	R	CO4
45	WAP to find EVEN nos.	AP	CO4
46	WAP to find smallest and Largest number in series	AP	CO4
47	WAP to sort numbers using 8051	AP	CO4
	Module 5 : ARM7		
48	Explain ARM 7 Programmers Model	R	CO5

49	Explain ARM 7 Features	R	CO5
50	Explain ARM 7 CPSR and SPSR	R	CO5
51	Explain ARM 7 operating modes	R	CO5
52	Explain ARM 7 Interrupts and Exception	R	CO5
53	Distinguish between RISC and CISC	R	CO5
54	Explain ARM 7 Load Store Model	R	CO5
55	Distinguish between Thumb state and ARM state	AN	CO5
	Module 6 : ARM Programming with Embedded C		
56	Explain CORTEX A, CORTEX R and CORTEX M	R	CO6
57	WAP to ADD and multiply in ARM 7	R	CO6
58	WAP to find smallest in series using ARM 7	AP	CO6
59	WAP to find Largest in series using ARM 7	AP	CO6
60	WAP in ARM to implement following equation : R0=3R1+17R2	AP	CO6
61	Write Short Note on LPC2148	R	CO6
62	Write note on GIPO for ARM	R	CO6
63	Explain Pulse–Width Modulator Configuration	R	CO6
64	Explain Timer Mode in ARM	R	CO6