NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

B.Tech I Semester Regular & Supplementary Examinations - DEC-2023

Sub Code: R20CC21MC2   **CONSTITUTION OF INDIA**

Time: 3 hours   (Common to CSE, AI, IT, DS, AIML, CS)   Max. Marks: 70

Note: Answer All **FIVE** Questions.

All Questions Carry Equal Marks   (5 X 14 = 70M)

Q.No			Questions	KL	CO	M
			Unit-I			
1	a		Explain the salient features of Constitution of India.	K2	1	14M
			OR			
	b		Analyse the Fundamental Rights as per Constitution of India.	K4	1	14M
			Unit-II			
2	a		Explain the functions of Prime Minister of India.	K2	2	14M
			OR			
	b		Examine the powers & functions of Supreme Court.	K4	2	14M
			Unit-III			
3	a		List out the functions of Chief Minister.	K4	3	14M
			OR			
	b		Explain the functions of High Court.	K2	3	14M
			Unit-IV			
4	a		Explain the functions of Municipal Corporations.	K2	4	14M
			OR			
	b		Explain the functions of Panchayats	K2	4	14M
			Unit-V			
5	a		Analyse the powers & functions of Election Commission of India.	K4	5	14M
			OR			
	b		Analyse the powers and functions of Union Public Service Commission	K4	5	14M

KL: Blooms Taxonomy Knowledge Level   CO: Course Outcome   M: Marks

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Sub Code: R20CC12MC1   Max. Marks: 5x14=70M
Time: 3 hours   Date: 12.12.2023

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks

1. A) Define the environment? Why environmental studies considered as a multi-disciplinary subject? What is the scope of environmental education?   (CO1 K2 14M)

OR

   B) What are ecological pyramids? Explain why some of these pyramids are upright while others are inverted in different ecosystems?   (CO1 K2 14M)

2. A) Write notes on Environmental effecting of extracting and using mineral resources?
                                                       (CO2 K3 14M)

OR

   B) Discuss the major uses of forests .How would you justify that ecological uses of forests surpass commercial uses?

3. A) Explain various values in biodiversity?   (CO3 K2 14 M)

OR

   B) What are the major causes of man-wildlife conflicts? Discuss the remedial steps that can curb the conflict.   (CO3 K1&K2 14 M)

4. A) List the major physiological effects of air pollution on plants, environment and human beings?
                                                       (CO4 K4 14M)

OR

   B) Discuss adverse effects and control of water pollution?
                                                       (CO4 K2 14M)

5. A) Give brief note on EMP and EIS?   (CO5 K3 14M)

OR

   B) What is EIS? Write the Impact Assessment and various stages of EIS and EIA methodology?
                                                       (CO5 K2 14M)

Subject Code: R20CC2101

II B.Tech - I Semester Regular & Supple Examinations, December-2023
NUMERICAL METHODS AND TRANSFORMATIONS
(CE,EEE,ME,ECE)

Time: 3 hours **Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks (5 X 14 =70M)

QNo		Questions	K L	CO	Marks
		Unit-I			
	a	(i) **Estimate** a real root of the equation $x^3 - 5x + 1 = 0$, using Bisection method correct to two decimal places.	L4	1	7M
		(ii) **Estimate** the root of the equation $x\log_{10}(x) = 1.2$, using False position method	L4	1	7M
1		**OR**			
	b	By Newton's forward interpolation formula find the polynomial which takes the following values table: X: 0, 2, 4, 6, 8, 10, 12 f(x): 12, 42, 144, 366, 756, 1362, 2232 Either using Newton's backward formula or by Lagrange's formula find the value of f(1). **Analyse** the answers that you get by direct substitution in the polynomial with the answer through Newton's backward formula or Lagrange formula.	L4	1	14M
		Unit-II			
2	a	**Evaluate** y(2) from $\dfrac{dy}{dx} = \dfrac{2y}{x}$, y(1) = 2, using h = 0.25 by (i) Euler's method; and (ii) Heun's method (modified Euler's method) Also compare the answers of (i) and (ii) with the analytical solution.	L5	2	14M
		OR			
	b	(i) By the fourth order Runge-Kutta method to find an **approximate** value of y when x = 1.2 in steps of 0.1, given that $y' = x^2 + y^2$; $y(1) = 1.5$.	L5	2	7M
		(ii) **Evaluate** $\int_{0}^{6} \dfrac{1}{1+x^2}\,dx$ using Simpon's (3/8)th rule.	L5	2	7M
		Unit-III			
3	a	(i) Show that $L\left[\dfrac{\sin t}{t}\right] = \tan^{-1}\left(\dfrac{1}{s}\right)$ **apply** this result to find the $L\left[\dfrac{\sin at}{t}\right]$.	L3	3	7M
		(ii) **Find** Laplace transform of $f(t) = \cosh at.\cos bt$.	L3	3	7M
		OR			
	b	(i) **Evaluate** $L\left[\int_{0}^{t} u.e^{-u}.\sin 4u\,du\right]$	L3	3	7M
		(ii) **Find** the inverse Laplace transform of $\dfrac{1}{2}\ln\left(\dfrac{s^2+b^2}{s^2+a^2}\right)$.	L3	3	7M

		Unit-IV			
4	a	(i) Find the Fourier series expansion of $f(x) = e^{ax}$ in (0. 2).	L3	4	7M
		(ii) **Construct** the Fourier series for the function $f(x) = x.\sin x$ in $(-\Pi, \Pi)$.	L3	4	7M
		OR			
	b	(i) **Find** the Fourier Series expansion of $f(x) = x^3$ in (-1,1).	L3	4	7M
		(ii) **Construct** the Fourier cosine series of $f(x) = \sin x$ in $(0, \Pi)$.	L3	4	7M
		Unit-V			
5	a	(i) **Find** the Fourier Transform of $f(x) = \begin{cases} \dfrac{1}{2a}, & if\ |x| \le a \\ 0, & otherwise \end{cases}$.	L3	5	7M
		(ii) **Find** the inverse Fourier sine transform of $\dfrac{1}{s} e^{-as}$.	L3	5	7M
		OR			
	b	(i) **Find** the Fourier Transform of $f(x) = \begin{cases} 1, & for\ |x| < 1 \\ 0, & for\ |x| > 1 \end{cases}$. Hence evaluate $\int_0^\infty \dfrac{\sin x}{x} dx$	L3	5	7M
		(ii) **Find** the Fourier cosine transform of $f(x) = \begin{cases} x, & for\ 0 < x < 1 \\ 2 - x, & for\ 1 < x < 2 \\ 0, & for\ x > 2 \end{cases}$.	L3	5	7M

KL: Blooms Taxonomy Knowledge Level   CO: Course Outcome   M:Marks

Subject Code: R20CC2102

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
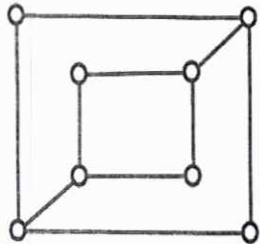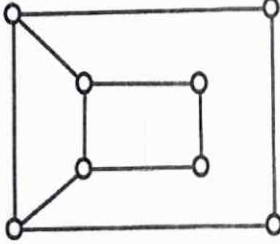### MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(CSE,IT,AI)

Time: 3 hours **Max. Marks: 70**

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks   (5 X 14 =70M)

QNo			Questions	K L	CO	Marks
			Unit-I			
1	a		**i) Verify that** the proposition is a tautology $(P \wedge Q) \vee (\sim P \wedge Q) \vee (P \wedge \sim Q) \vee (\sim P \wedge \sim Q)$.	K3	CO1	7M
			ii) Show that PCNF of the statement formula $[P \rightarrow (Q \wedge R)] \wedge [\sim P \rightarrow (\sim Q \wedge \sim R)]$ is $\Pi(2,3,4,5,7)$.	K4	CO1	7M
			OR			
	b		**i) Discuss** about the logical connectives in detail with suitable examples.	K4	CO1	7M
			ii) Show that $\sim(P \wedge Q) \rightarrow [\sim P \vee (\sim P \vee Q)] \Longleftrightarrow (\sim P \vee Q)$ without using truth tables.	K4	CO1	7M
			Unit-II			
2	a		**i) Using** mathematical induction, **show that** the following statement is true for all positive integers n, $1^2+2^2+3^2+4^2+\cdots+n^2=\dfrac{n(n+1)(2n+1)}{6}$ for $n \geq 1$.	K3	CO2	7M
			ii) Show that $(S \vee R)$ tautologically implied by $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$.	K4	CO2	7M
			OR			
	b		**i) Express** in the symbolic form and **negate** the following statements (i) Everyone who is healthy can do all kinds of work (ii) Some people are not admired by everyone (iii) Everyone should help his neighbours, or his neighbours will not help him.	K2	CO2	10M
			ii) Define Variables and Quantifiers.	K1	CO2	4M
			Unit-III			
3	a		**i) Determine** whether the following two graphs are isomorphic. 	K4	CO3	7M
			ii) Find the number of vertices require to construct a graph with 16 edges. Here each vertex if of degree 2.	K1	CO3	7M
			OR			

		i) **Apply** Kruskal's algorithm to **find** the minimal spanning tree of the following graph	K3	CO3	7M
	b	ii) **Show that** the following graph does not contain Hamiltonian circuit but it contains Hamiltonian path	K4	CO3	7M

Unit-IV

		i) **Solve** the recurrence relation $a_n - 3a_{n-1} = 5 \times 3^n$ for $n \geq 1$, given that $a_0 = 2$.	K2	CO4	7M
	a	ii) **Solve** the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 0$ for $n \geq 2$ by **using** generating function method with $a_0 = a_1 = 3$.	K2	CO4	7M
4		**OR**			
	b	i) The number of virus affected files in a system is 1000(to start with) and this increases 250% every two hours. **Use** recurrence relation to **determine** the number of virus affected files in the system after one day.	K4	CO4	7M
		ii) **By using substitution method, solve** $\sqrt{a_n} - \sqrt{a_{n-1}} - 2\sqrt{a_{n-2}} = 0$ **where** $a_0 = a_1 = 1$.	K2	CO4	7M

Unit-V

	a	i) **Obtain** the sum of products canonical form of the following Boolean expressions (i) $x_1 \oplus x_2$ (ii) $x_1 \oplus (x_2 * x_3')$.	K3	CO5	7M
5		ii) **Prove that** if any 30 people are selected, then we may choose a subset of 5 were born on the same day of the week.	K4	CO5	7M
		OR			
	b	i) In **how many** ways can 7 women and 3 men can be arranged in a row? If the 3 men must always stand next to each other.	K1	CO5	7M
		ii) **Discuss** Conjunctive and Disjunctive normal form with suitable examples.	K4	CO5	7M

KL: Blooms Taxonomy Knowledge Level   CO: Course Outcome   M:Marks

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC2103

II B.Tech. - I Semester Regular & Supple Examinations, December-2023

OOPS THROUGH JAVA

(CSE,IT,AIML,AI,DS & CY)

Time: 3 hours   Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

QNo		Questions	K L	CO	Marks
		Unit-I			
1	a	i)What do you understand by object oriented programming? What are the advantages of programming using object oriented? Explain various OOP concepts in brief.	K2	CO1	7M
		ii)Define constructor overloading and explain with an example.	K2	CO1	7M
		OR			
	b	i)What are the two control structures used in java for making decisions? Explain with an example program	K2	CO1	7M
		ii)Explain,what is an objects in object programming? How they are created from class? Give the syntax	K3	CO1	7M
		Unit-II			
2	a	i)A super class reference variable references to a sub class object. Justify this statement with example.	K6	CO2	7M
		ii)How the key word "final" can be used to prevent overriding? Explain with an example.	K2	CO2	7M
		OR			
	b	i)Define inheritance. Explain the different types of inheritance. Can a class extend more than one class? Develop a java program to implement multilevel inheritance by applying various access controls to its data members and methods.	K5	CO2	14M
		Unit-III			
3	a	i)Define Exception? Demonstrate Arithmetic exceptions with an example.	K3	CO3	7M
		ii)Illustrate the concept of string class and string buffer class with suitable example.	K3	CO3	7M
		OR			
	b	i)Develop a program that creates 3 threads by extending Thread class. First thread displays "Good Morning" every 1 sec, the second thread displays "Hello" every 2 seconds and the third displays "Welcome" every 3 seconds.	K5	CO3	7M
		ii)Create a java program that demonstrates how certain exception types are not allowed to be thrown	K5	CO3	7M
		Unit-IV			
4	a	i)How an Hashtable can change the iterator? Explain.	K2	CO4	7M
		ii)Create a Java program which stores a list of strings in an ArrayList and then displays the contents of the list	K5	CO4	7M
		OR			
	b	i)Explain the methods of StringTokenizer class.	K2	CO4	7M
		ii)Differentiate hash map and tree map	K2	CO4	7M
		Unit-V			
5	a	i)What is ...pplet? Describe the different stages of the life cycle of an applet.	K2	CO5	7M
		ii)What are listener interfaces? Illustrate mouse listener interfaces with suitable java program	K3	CO5	7M
		OR			
	b	i)Discuss about delegation event model in detail.	K2	CO5	7M
		ii)Describe the different event classes in java with the necessary description.	K2	CO5	7M

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC2104

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
DATA STRUCTURES
(CSE,IT,AI, AIML,DS & CY)
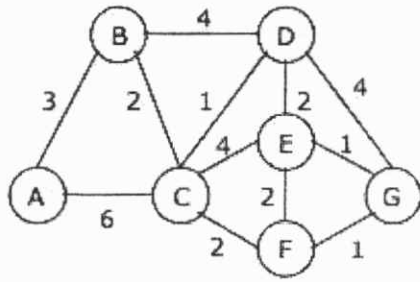
Time: 3 hours **Max. Marks: 70**

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks   (5 X 14 =70M)

QNo		Questions	K L	CO	Marks
		Unit-I			
1	a	i)Discuss different types of data structure their implementations and applications.	2	1	7M
		ii)Explain representation of array as an ADT along with their advantages and disadvantages.	2	1	7M
		OR			
	b	i)How the Algorithms play important role in Data Structure. Explain	2	1	7M
		ii) Compare and Contrast different asymptotic notations	2	1	7M
		Unit-II			
2	a	i)Explain the linear search with example	2	1	7M
		ii)Explain the recursive merge sort algorithm to sort the following elements: 10, 5, 35,19, 1, 84, 63, 7, 15, 4, 3.	3	1	7M
	b	i)Apply heap sort algorithm to sort following list of elements in ascending order: 9, 3, 5, 27, 4, 67, 18, 31, 13, 20, 39, 21	3	1	7M
		ii)Explain bubble sort with an example.	2	1	7M
		Unit-III			
3	a	i)Discuss the algorithms for push and pop operations on a stack.	2	2	7M
		ii)Explain an algorithm for evaluating from infix to postfix expression with suitable example	2	2	7M
		OR			
	b	i)Explain basic operations of queue. List the steps to implement queue using stack	2	2	7M
		ii)Compare and Contrast priority queue and circular queue	2	2	7M
		Unit-IV			
4	a	i)List various operations of linked list and explain how to insert a node anywhere in the list.	2	3	7M
		ii)Explain the operation on double linked list	2	3	7M
		OR			
	b	i)Differentiate between Single, Double and Circular Linked list?	2	3	7M
		ii)Write an algorithm to insert an element in a circular linked list.	2	3	7M
		Unit-V			
5	a	i)Draw a binary tree for the following expression and find out its pre-order traversal expressions. $E = 5 * 7 + (4 - 8 * 9) - 6 / 2$	3	4	7M
		ii)What is a BST? Construct a BST with the node values in the following order. 55, 27, 6, 14, 43, 72, 98, 9, 5, 70, 12, 77, 88, 22	3	4	7M

	OR			
b	Write and Explain the kruskal's algorithm with the following example.	3	4	14M

Subject Code: R20CC2105

II B.Tech - I Semester Regular & Supple Examinations, December-2023
FRONT END WEB TECHNOLOGIES
(CSE,IT,AI)

Time: 3 hours   **Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks   (5 X 14 =70M)

QNo		Questions	K L	CO	Marks
		Unit-I			
1	a	Discuss how tables can be created using HTML.	K3	CO2	7M
		What are interactive elements in HTML? Discuss with example.	K3	CO2	7M
		OR			
	b	Discuss how nested lists can be created using HTML.	K3	CO2	7M
		Create a HTML form to record educational details of a student from SSC to graduation by considering necessary fields.	K3	CO2	7M
		Unit-II			
2	a	Explain how to set the displaying, positioning and floating an element in CSS	K3	CO3	7M
		Discuss how to define backgrounds and color gradients in CSS?	K3	CO3	7M
		OR			
	b	Explain how to work with frames in CSS? Discuss about inline, internal and external style sheets with Example.	K3	CO3	14M
		Unit-III			
3	a	What is the use of front end validations? Explain with example.	K3	CO4	7M
		Write a JavaScript program to check whether a given number is prime or not.	K3	CO4	7M
		OR			
	b	Discuss how to work with multi dimensional arrays in JavaScript.	K3	CO4	7M
		Explain control statements in JavaScript with example.	K3	CO4	7M
		Unit-IV			
4	a	Explain how to use the jQuery API selectors with examples.	K3	C05	7M
		Discuss the procedure of slicing a selection with an example.	K3	CO5	7M
		OR			
	b	What is jQuery? State its applications.	K3	CO5	7M
		Explain Event handlers in jQuery	K3	CO5	7M
		Unit-V			
5	a	Discuss how to implement Drag and Drop using JQuery UI.	K3	CO6	7M
		What is the importance of jQuery UI? Explain Sortable in jQuery UI.	K3	CO6	7M
		OR			
	b	Discuss the procedure of changing the Accordion Event in JQuery UI.	K3	CO6	7M
		Explain how to implement auto opening of a Dialog in JQuery UI.	K3	CO6	7M

II B.Tech I Semester Regular Examinations, December-2023
Sub Code: R20CC2106 **PROBABILITY & STATISTICS** **R20**

Time: 3 hours (CS, AIML& DS) Max. Marks: 70

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No			Questions	KL	CO	M
			Unit-I			
1	a		i) Describe ways of collection of primary data also write merits and demerits associated in primary data collection.	3	1	7M
			ii) Obtain the median from the following data of weights of children in a particular locality	3	1	7M

Weights:	0-4	4-8	8-12	12-16	16-20	20-24
No. of children:	3	9	18	20	16	7

Q.No			Questions	KL	CO	M
			OR			
	b		i) Classify the secondary data also describe the various sources of getting the data for each classification. What are the limitations of secondary data.	3	1	7M
			ii) Find the skewness and kurtosis (about mean) if first four moments of the distribution about x = 2 are 1.0, 2.5, 5.5 and 16.0.	3	1	7M
			Unit-II			
2	a		i) Calculate correlation coefficient from the following data	1	2	7M

X	9	8	7	6	5	4	3	2	1
Y	15	16	14	13	11	12	10	8	9

ii) Find a straight line to the following data (3 | 2 | 7M)

X	0	1	2	3	4
Y	1	1.8	3.3	4.5	6.3

OR

b) i) Find correlation coefficient between x and y for the following data: (3 | 2 | 7M)

X	60	34	40	50	45	41	22	43
Y	75	32	34	40	45	33	12	30

ii) Find the correlation of coefficient and the means of x and y from the two regression lines: 2y-x-50=0 and 3y-2x-10=0 (3 | 2 | 7M)

Unit-III

Q.No			Questions	KL	CO	M
3	a		i)Six dice are thrown 729 times. How many times do you expect at least three dice to show a five or six?	3	3	7M
			ii) A continuous random variable X has a probability density function f(x) = $3x^2$, $0 \leq x \leq 1$. Find a and b such that (i) $P(X \leq a) = P(X > a)$; and (ii) $P(X > b) = 0.05$.	3	3	7M
			OR			
	b		i) A bag contains 5 balls and it is not known how many of them are white. Two balls are drawn at random from the bag and they are noted to be white. What is the chance that all the balls in the bag are white?	3	3	7M
			ii) A random variable X has the following probability distribution	3	3	7M

X	0	1	2	3	4	5	6	7
P(x)	0	K	2k	2k	3k	K^2	$2k^2$	$7k^2 + k$

Find (i) the value of k; (ii) P(1.5 < X < 4.5)

		Unit-IV									

4	a	i) A die is thrown 276 times and the results of these throws are given below: Test whether the die is biased or not.	5	4	7M

Number appeared on the die	1	2	3	4	5	6
Frequency	40	32	29	59	57	59

ii) Two random samples are drawn from 2 normal populations are as follows:

A	17	27	18	25	27	29	13	17
B	16	16	20	27	26	25	21	

Test whether the samples are drawn from the same normal population.   5 4 7M

OR

b i) The following table gives the number of accidents that took place in an industry during various days of the week. Test if accidents are uniformly distributed over the week   5 4 7M

Day	Mon	Tue	Wed	Thu	Fri	Sat
No. of accidents	14	18	12	11	15	14

ii) Two independent sample of sizes 7 and 6 had the following values: 5 4 7M

Sample A	28	30	32	33	31	29	34
Sample B	29	30	30	24	27	28	

Examine whether the samples have been drawn from normal populations having the same variance.

		Unit-V			

5	a	i) A bag contains defective article, the exact number of which is not known. A sample of 100 from the bag gives 10 defective articles. Find the limits for the proportion of defective articles in the bag.	3	5	7M

ii) 500 articles from a factory are examined and found to be 2% defective. 800 similar articles from a second factory are found to have only 1.5% defective. Can it reasonably be concluded that the product of the first factory are inferior to those of second?   3 5 7M

OR

b i) A machine is producing bolts of which a certain fraction is defective. A random sample of 400 is taken from a large batch and is found to contain 30 defective bolts. Does this indicate that the proportion of defectives is larger than that claimed by the manufacturer where the manufacturer claims that only 5% of his product are defective. Find 95% confidence limits of the proportion of defective bolts in batch.   3 5 7M

ii) From the data given below, compute the standard error of the difference of the two sample means and find out if the two means significantly differ at 5% level of significance.   3 5 7M

	No. of items	Mean	Standard deviation
Group I	50	181.5	3.0
Group II	75	179	3.6

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome   M:Marks

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Subject Code: R20CE2102
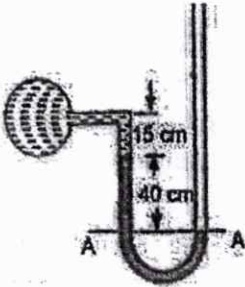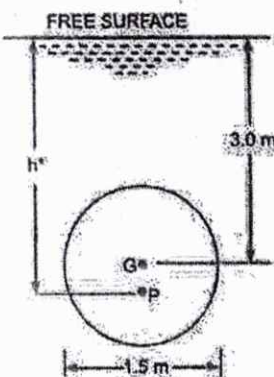
II B.Tech - I Semester Regular & Supple Examinations, December-2023
FLUID MECHANICS
(CE)

Time: 3 hours   **Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks   (5 X 14 =70M)

QNo		Questions	K L	CO	Marks
		Unit-I			
	a	i)Define any four physical properties of fluids and mention their S.I unit respectively?	K1	1	8M
1		ii)A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of sp.gr. 0.8 And having vacuum pressure is flowing. The other end is of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 40 cm and the height of the fluid in the left from the centre of pipe is 15 cm below.	K2	1	6M
		OR			
	b	i)Explain any two types of manometer with their labelled diagram?	K2	1	6M
		ii)Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the centre of the plate is 3m below the free surface of water. Find the position of centre of pressure?	K3	1	8M
		Unit-II			
2	a	i)Differentiate between following fluid flows? a) Steady and unsteady flow. b) Uniform and non-uniform flow. c) Laminar and turbulent flow.	K1	2	6M
		ii)A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also, determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s?	K4	2	8M

<div style="text-align:center">**OR**</div>
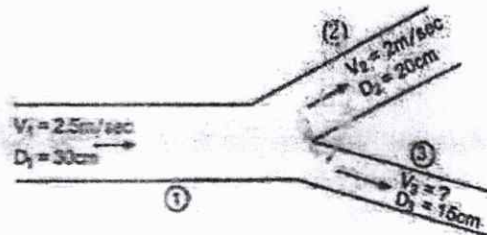
		K2	2	14M
b	i)Define the equation of continuity. Obtain the expression for continuity equation in three dimensions?			

<div style="text-align:center">**Unit-III**</div>

a	i)What are the assumptions in deriving Bernoulli's equation?	K2	3	4M
	ii)Water is flowing through a pipe of 5 cm diameter under a pressure of 29.43 N/cm² (gauge) and with mean velocity of 2.0 m/s. find the total head or total energy per unit weight of the water at a cross section, which is 5 m above the datum line. (ρ for water $=1000\,kg/m^3$)	K4	3	10M

<div style="text-align:center">**OR**</div>

3				
	i)The water is flowing through a pipe having diameters 20 cm and 10 cm at sections 1 and 2 respectively. The rate of flow through pipe is 35 liters/s. The section 1 is 6 m above the datum and section 2 is 4 m above the datum. If the pressure at section 1 is 39.24 N/cm², find the intensity of pressure at section 2?			
b		K5	3	14M

<div style="text-align:center">**Unit-IV**</div>

4				
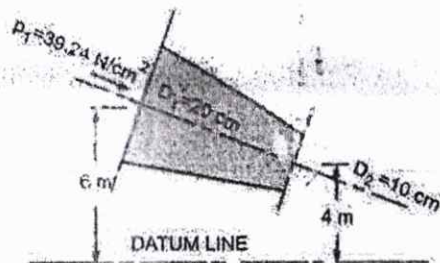
a	i)Define the following and mention the formulas?
	   a) Coefficient of velocity? b) Coefficient of contraction?
	   c) Coefficient of discharge?
		K2	4	6M

	ii)A rectangular orifice, 1.5 m wide and 1.0 m deep is discharging water from tank. If the water level in the tank is 3.0 m above the top edge of the orifice, find the discharge through the orifice. Take the coefficient of discharge for the orifice = 0.6.	K3	4	8M

<div style="text-align:center">**OR**</div>

	i)A pipe, 100 mm diameter, has a nozzle attached to it at the discharge end, the diameter of the nozzle is 50 mm. the rate of discharge of water through the nozzle is 20 litres/s and the pressure at the base of the nozzle is 5.886 N/cm². Calculate the coefficient of discharge. Assume that the base of the nozzle and outlet of the nozzle are at the same elevation.			
b		K4	4	14M

			K1	5	4M

Unit-V

5	a	i)Mention types of losses that occurs when fluid is flowing through pipes and write the reason for which losses are occurring?	K1	5	4M
		ii)Find the head lost due to friction in a pipe of diameter 300 mm and length 50m, through which water is flowing at a velocity of 3 m/s using a) Darcy formula, b) Chezy's formula for which C = 60. Take v for water = 0.01 stoke. Consider f=0.004	K3	5	10M
		OR			
	b	i)The rate of flow of water through a horizontal pipe is 0.25 m³/s. the diameter of the pipe, which is 200 mm, is suddenly enlarged to 400mm.the pressure intensity in the smaller pipe is 11.772 N/cm². Determine: 　a.　Loss due to sudden enlargement 　b.　Pressure intensity in the large pipe 　c.　Power lost due to enlargement	K3	5	14M

Subject Code: R20CE2103

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
STRENGTH OF MATERIALS-I
(CE)

Time: 3 hours   **Max. Marks: 70**

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks   (5 X 14 =70M)

QNo			Questions	K L	CO	Marks
			Unit-I			
1	a		State Hooke's law and define Poisson's Ratio	K2	CO1	7M
			A rectangular plate made of steel is 4 m long and 20 mm thick and is subjected to an axial tensile load of 60 kN. The width of the plate varies from 30 mm at one end to 80 mm at the other end. Find the elongation, if $E = 2 \times 10^5$ N/mm^2.	K3	CO1	7M
			OR			
	b		Derive the relationship between the three elastic constants?	K2	CO1	7M
			A bar of steel 25mm diameter is subjected to a tensile load of 30kN and the measured extension on a 200mm gauge length is 0.08 mm and the change in diameter is 2.32×10^{-3} mm. Calculate the Poisson's ratio and the values of three moduli.	K3	CO1	7M
2			**Unit-II**			
	a		Derive the relation between SF, BM and rate of loading.	K2	CO2	4M
			A cantilever beam of length 2m carries an uniformly distributed load of 3KN/m over a length of1.5m from its fixed end and a point load 5 KN at its free end. Draw the shear force and bending moment diagrams.	K3	CO2	10M
			OR			
	b		Write about types of beams?	K2	CO2	4M
			Draw the S. F. D & B.M.D. for the beam shown in Figure.1	K3	CO2	10M

40 KN   40 KN   40 KN   40 KN

2 m   2 m   2 m   2 m   2 m

Figure.1

QNo			Questions	K L	CO	Marks
3			**Unit-III**			
	a		State the assumptions made in deriving bending equation.	K1	CO3	4M
			A circular pipe of external diameter 80mm and thickness 10mm is used as a simply supported beam over an effective span 3.5m.Find the maximum concentrated load that can be applied at the centre of the span if permissible stress in tube is 250N/mm^2 .	K3	CO3	10M
			OR			
	b		Define section modulus. Obtain section modulus for rectangular and circular sections.	K2	CO3	7M
			Derive an expression for the distribution of shear stress across the cross section.	K2	CO3	7M

		Unit-IV			
4	a	Write the steps involved in Macaulay's method.	K2	CO4	4M
		A simply supported 6m rolled steel joist carries a U.D.L of 10 KN//m length. Determine slope and deflection at a distance of 3m from one end of the beam.	K3	CO4	10M
		OR			
	b	What are the limitations of the moment area method?	K2	CO4	4M
		A cantilever of uniform cross-section of length l carries two point loads, W at the free end and 2W at a distance a from the free end. Find the maximum deflection due to this loading.	K4	CO4	10M
5	a	Unit-V			
		Explain about longitudinal and Volumetric strains?	K2	CO5	7M
		A thin spherical shell of 1.8m diameter is 10mm thick. It is filled with a liquid so that the internal pressure is 1N/mm^2 . Find the increase in diameter and capacity of the shell. Take $E = 2 \times 10^5 \text{ N/mm2}$, $\mu = 0.3$	K3	CO5	7M
		OR			
	b	Explain about compound cylinders?	K2	CO5	4M
		A cylindrical shell with internal diameter 60mm and having a thickness equal to 3 mm is made of mild steel. Determine the permissible internal fluid pressure if the factor of safety on maximum shear stress is 4.	K3	CO5	10M

KL: Blooms Taxonomy Knowledge Level   CO: Course Outcome   M:Marks

Subject Code: R20CE2104

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
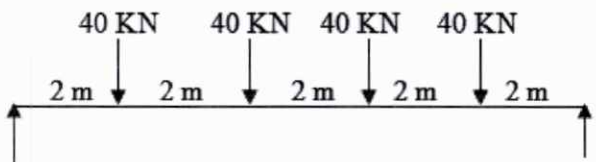### SURVEYING AND GEOMATICS
(CE)

Time: 3 hours **Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks (5 X 14 =70M)

QNo			Questions	K L	CO	Marks
			Unit-I			
1		a	Below are the bearings observed in a traverse survey conducted with a prismatic compass at a place where local attractions were suspected? At what stations do you suspect local attraction? Find the corrected bearings of the lines and also calculate the included angles. 	Line	F.B.	B.B	 PQ | 124° 30' | 304° 30' QR | 68° 15' | 246° 0' RS | 310° 30' | 135° 15' SP | 200° 15' | 17° 45'	K3	CO1	7M
			What are the basic principles of surveying? Describe in detail.	K2	CO1	7M
			OR			
		b	A line was measured with a steel tape which was exactly 30 m at 25°C and at a pull of 15 kg, the measured length being 1950 m. The temperature during the measurement was 35° C and the pull applied was 25 kg. Assuming the tape to be supported at every 30 m, calculate the true length, if the cross-sectional area of the tape was 0.020 cm^2, coefficient of thermal expansion of the material per ° C = 3 x 10^{-6}, Modulus of elasticity (E) = 2.1 x 10^6 kg/cm^2 and weight of tape material = 7.8 g/cm^3.	K3	CO1	7M
			What is plane table surveying? When it is preferred? Mention the instruments used in plane table surveying.	K2	CO1	7M
			Unit-II			
2		a	Discuss the effects of curvature and refraction in leveling.	K2	CO2	7M
			What are the different types of leveling instruments used in leveling? Bring out the essential differences between them and state which is the meet preferred why?	K2	CO2	7M
			OR			
		b	The following consecutive staff readings were taken with a level along the sloping ground line AB at regular distance of 20 m by using 4 m leveling staff 0.352, 0.787, 1.832, 2.956, 3.758, 0.953, 1.766, 2.733, 3.872, 0.812, 2.325 and 3.137. Ruled out a page of level book, enter the above readings. RL of point A is 320.288 m. Calculate the RL of all the points by rise and fall method and work out the gradient of the line AB.	K3	CO2	7M
			What do you mean by contouring? Explain its characteristics with neat sketches. Give suitable examples.	K2	CO2	7M
3			**Unit-III**			
		a	Describe the temporary adjustments of theodolite.	K2	CO3	7M
			How the horizontal angles are measured using repetition and reiteration method? Explain in detail.	K2	CO3	7M
			OR			
		b	Illustrate the following methods (systems) of plane table surveying with neat sketches. (i) Radiation (ii) Intersection (iii) Traversing	K2	CO3	14M

Table for Q1a:

Line	F.B.	B.B
PQ	124° 30'	304° 30'
QR	68° 15'	246° 0'
RS	310° 30'	135° 15'
SP	200° 15'	17° 45'

		Unit-IV			
4	a	Discuss the different between tangential and stadia tacheometry.	K2	CO4	7M
		Elaborate the principles of electronic distance measurement. How electronic distance measurement can be classified?	K2	CO4	7M
		OR			
	b	Define total station surveying? Describe its working principle with neat sketches. Mention its advantages and applications.	K2	CO4	14M
5	a	Unit-V			
		What is the concept of aerial photogrammetry? Explain in detail with neat sketches.	K2	CO5	7M
		What is the principle of stereoscopy? Elaborate in detail.	K2	CO5	7M
		OR			
	b	Discuss in detail about the practical applications of terrestrial photogrammetry.	K2	CO5	7M
		Elucidate the merits and applications of photographic mapping.	K2	CO5	7M

KL: Blooms Taxonomy Knowledge Level   CO: Course Outcome   M:Marks

Subject Code: R20CE2105

II B.Tech - I Semester Regular & Supple Examinations, December-2023
CONCRETE TECHNOLOGY
(CE)

Time: 3 hours **Max. Marks: 70**

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

QNo		Questions	K L	CO	Marks
		Unit-I			
1	a(i)	Explain the chemical composition of Portland cement.	1	1	7M
	a(ii)	Explain significance of various tests carried out on cement.	2	1	7M
		OR			
	b(i)	Explain the manufacture of Cement by dry process.	1	1	7M
	b(ii)	Explain the application of different types of cements in Civil Engineering construction industry.	2	1	7M
		Unit-II			
2	a(i)	Explain the importance of grading of aggregates and describe the various types of gradation of coarse aggregates.	3	2	7M
	a(ii)	Distinguish between the segregation and bleeding of concrete and explain the factors influencing the segregation and bleeding.	4	2	7M
		OR			
	b(i)	Define workability and explain the various factors affecting the workability of concrete.	1	2	7M
	b(ii)	Explain the various methods of mixing of concrete.	2	2	7M
		Unit-III			
3	a(i)	Explain the significance of compaction of concrete and the various methods of compaction.	2	2	7M
	a(ii)	Explain the application of different types of admixtures.	3	3	7M
		OR			
	b(i)	Explain the different types of admixtures used in the concrete preparation.	2	3	7M
	b(ii)	Explain the effect of admixtures on strength and durability of concrete.	3	3	7M
		Unit-IV			
4	a(i)	Explain the necessity Non-destructive testing of concrete and the different methods of NDT.	4	4	7M
	a(ii)	Explain the factors influencing Sulphate and Chloride attack on concrete and the methods of control.	2	4	7M
		OR			
	b(i)	Explain the various types of strength tests carried out on hardened concrete.	2	4	7M
	b(ii)	Explain the factors responsible for corrosion of steel and various methods of its control.	3	4	7M

		Unit-V			
	a	Explain the following: (i) Fibre reinforced concrete and Ferro cement (ii) High strength concrete and High performance concrete	3	5	14 M
		OR			

5	b	Design concrete of M 25 grade for RCC columns using the following data:
		      (i) Maximum size of aggregate: 20 mm
		      (ii) Degree of quality control: Good
		      (iii) Type of exposure: Moderate
		      (iv) Cement: 43 Grade
		      (v) Sand: Zone I
		Adopt IS Code method. Assume any suitable data if found necessary.
			5	5	14 M

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EE2102

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
ELECTRICAL CIRCUIT ANALYSIS-II
(EEE)

Time: 3 hours   Max. Marks: 70

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

QNo			Questions	K L	CO	Marks
			Unit-I			
1	a	i)	Describe the graphical and phasor representation of three phase system and derive the voltage and current relations?	2	1	7M
		ii)	A star connected load has an impedance of (4.8+j5.6) ohms in each phase and is connected across a balanced three phase delta connected alternator having line voltage of 128V. Determine the line currents of load and the generator?	3	1	7M
			OR			
	b	i)	Draw the circuit and analyze the three phase 3 wire supply connected to a balanced delta connected load?	3	1	7M
		ii)	A delta connected load has a parallel combination of resistance 5.9 ohms and the capacitive reactance of (-j5.6) ohms in each phase. If a balanced 3 phase 415V supply is applied between the lines, find the phase currents and line currents? Draw the phasor diagram also.	3	1	7M
			Unit-II			
2	a	i)	Obtain the equivalent delta connected impedance from un equal star connected impedances?	3	2	7M
		ii)	Draw the circuit diagram and explain in detail about the measurement of power factor by using two watt meter method?	3	2	7M
			OR			
	b	i)	Obtain the equivalent star connected impedance from un equal delta connected impedances?	3	2	7M
		ii)	Compare the 3 watt meter and two watt meter methods for the measurement of three phase power?	3	2	7M
3			**Unit-III**			
	a	i)	Analyze the transient response of RC series circuit excited by D.C source?	3	3	7M
		ii)	A coil having resistance of 12 ohms and inductance of 1.2H is switched on to a direct voltage of 110V. Find the rate of change of the current at the instant of closing the switch and when t=L/R? Also find the steady state value of the current?	3	3	7M
			OR			
	b	i)	By deriving the relevant equations analyze the transient response of RLC series circuit with DC source?	3	3	7M
		ii)	An A.C voltage v =Vsin125πt is applied to a series R-L circuit. If the L-R circuit has R=15 ohms and L=0.3 ohms, calculate the ratio of maximum value to which the current rise to steady state maximum value when the voltage is applied at an instant t=0.004s?	3	3	7M

			Unit-IV			
4	a	i)	Obtain the impedance parameters of a two port network in terms of admittance parameters?	3	4	7M
		ii)	Analyze the cascade connection of two 2 port networks and obtain the equivalent A, B, C, D parameters?	3	4	7M
			OR			
	b	i)	Derive the A, B, C, D parameters in terms of hybrid parameters of a 2 port network?	3	4	7M
		ii)	Draw the connection network and analyze the series connection of two 2 port networks?	3	4	7M
5			Unit-V			
	a	i)	Explain in detail about the properties of positive real function?	3	5	7M
		ii)	Derive and analyze the removal of a pole at infinity in the process of network synthesis?	3	5	7M
			OR			
	b	i)	Describe in detail about the basic procedure of testing of positive real function?	3	5	7M
		ii)	Check the positive realness of the function given below: $F(S) = (S2+12S+6) / (S+5)$.	3	5	7M

KL: Blooms Taxonomy Knowledge Level   CO: Course Outcome   M:Marks

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EE2103

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
ELECTRICAL MACHINES-I
(EEE)

Time: 3 hours   **Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks   (5 X 14 =70M)

QNo			Questions	K L	CO	Marks
			Unit-I			
1	a		i) Explain in detail about the process of electromagnetic energy conversion with relevant expressions?	2	1	7M
			ii) In a 120V compound generator, the armature, shunt and series winding resistances are 0.05 ohms, 28 ohms and 0.06 ohms respectively. The load consists of 198 lamps each rated 50W, 120V. Find the total e.m.f and armature current when the machine is connected for long shunt and short shunt? How will the ampere turns of the series windings be changed if in long shunt case a diverter of 0.2 ohms is connected across the series field? Neglect the armature reaction and brush drops?	3	1	7M
			OR			
	b		i) What is meant by armature reaction in DC generators? Explain the characteristics of DC series generators with armature reaction?	2	1	7M
			ii) Elaborate the process of commutation in the operation of DC generators?	2	1	7M
			Unit-II			
2	a		i) Draw and explain the power stage diagram of a D.C motor?	2	2	7M
			ii) A 55kW, 200V shunt motor takes 17A when running at 1400 r.p.m. The resistance of the armature and field are 0.4 ohms and 128 ohms respectively when hot. Find the efficiency of the motor when taking 155A? Also find the efficiency if working as generator delivering a load current of 155A at 200V?	3	2	7M
			OR			
	b		i) Derive and compare the equations of armature torque and shaft torques of DC motors?	2	2	7M
			ii) A 440V, 24kW shunt motor took 2.7A when running light. For an armature resistance to be 0.5 ohms, field resistance of 780 ohms and brush drop of 2V, find the full load efficiency?	3	2	7M
			Unit-III			
3	a		i) Derive and explain various speed control methods of DC motors?	2	3	7M
			ii) Draw the circuit diagram and explain the process of predetermining the efficiency of DC shunt motor by using swinburne's test?	2	3	7M
			OR			
	b		i) Compare the flux control method and armature control methods of speed control of DC motors?	2	3	7M
			ii) Draw neat diagram and explain the operating principle of 4 point starter?	2	3	7M
4	a		**Unit-IV**			
			i) Develop the phasor diagram of practical transformer with lagging load connected on the secondary side?	2	4	7M
			ii) Compare the two winding and single winding transformers with merits and demerits?	2	4	7M

			KL	CO	M
		OR			
	b	i) Derive the regulation of a transformer with lagging load by drawing the phasor diagram?	2	4	7M
		ii) A 120kVA, 1100/230V 50 Hz transformer has high voltage winding resistance of 0.2 ohms and a leakage reactance of 0.5 ohms. The low voltage winding has a resistance of 0.005 ohms and a leakage reactance of 0.02 ohms. Find the equivalent winding resistance, reactance and impedance referred to high voltage and low voltage sides?	3	4	7M
5		**Unit-V**			
	a	i) Draw the diagram and analyze the relations of delta-star power transformers?	4	5	7M
		ii) Explain the relations of star delta connection of three phase transformer with circuit diagram? Write its demerits?	2	5	7M
		OR			
	b	i) Describe the operation of tap changing transformer with neat sketch and write its advantages?	2	5	7M
		ii) Draw and explain the Scott connection circuit diagram of 3 phase transformer and explain its advantages?	2	5	7M

KL: Blooms Taxonomy Knowledge Level   CO: Course Outcome   M:Marks

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EE2104

II B.Tech - I Semester Regular & Supple Examinations, December-2023
ELECTROMAGNETIC FIELDS
(EEE)

Time: 3 hours   **Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks   (5 X 14 =70M)

Q.No		Questions	K L	CO	Marks
		Unit-I			
1	a	Define electric field intensity and electric flux density, Express the relation between this two quantities.	K1	1	4M
		The finite sheet $0 \le x \le 1$, $0 \le y \le 1$ on the z=0 plane has a charge density $\rho_s = xy\left(x^2 + y^2 + 25\right)^{\frac{3}{2}}$ nC/m^2. Find The electric field at (0,0,5).	K2	1	10M
		OR			
	b	Derive the expression for electric Potential and electric field intensity due to an electric dipole.	K2	1	14M
		Unit-II			
2	a	Explain the behavior of conductors and insulators in an electric field.	K2	2	7M
		Derive Laplace and Poisson's equations.	K2	2	7M
		OR			
	b	Derive the boundary conditions at the interface separated by i) conductor-dielectric and ii). Conductor –free space	K3	2	14M
		Unit-III			
3	a	State and explain Biot-Savart's law. Find magnetic field intensity(**H**) at the centre of the circular conductor of radius 'a' and carrying current 'I' by applying Biot-Savart's law.	K3	2	14M
		OR			
	b	Prove that Curl(**H**) = **J**.	K3	3	4M
		A current distribution gives rise to the vector magnetic potential $\mathbf{A} = x^2 y\, a_x + y^2 x\, a_y - 4xyz\, a_z$ Wb/m. Calculate the flux density **B** at (-1,2,5).	K2	4	10M
		Unit-IV			
4	a	Define Magnetic dipole and magnetic moment.	K2	4	4M
		A charged particle of mass 2 kg and charge 3 C starts at point (1,-2,0) with velocity $4 a_x + 3 a_z$ m/s in an electric field $12 a_x + 10 a_y$ V/m. At time t = 1 s Determine i). Acceleration ii) Velocity and iii) kinetic energy of the particle.	K3	4	10M
		OR			
	b	Derive force on a current element placed in a magnetic field.	K2	4	7M
		A charged particle moves with a uniform velocity $4 a_x$ m/s in a region where $\mathbf{E} = 20\, a_y$ V/m and $\mathbf{B} = B_0\, a_z$ Wb/m^2. Determine B_0 such that the velocity of the particle remains constant.	K3	4	7M
		Unit-V			
5	a	State Faraday's laws and derive the expressions for Transformer emf and rotational emfs.	K1	5	14M
		OR			
	b	Explain the propagation of electromagnetic waves in lossy dielectrics.	K2	5	14M

Subject Code: R20EE2105

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
ANALOG ELECTRONICS
(EEE)
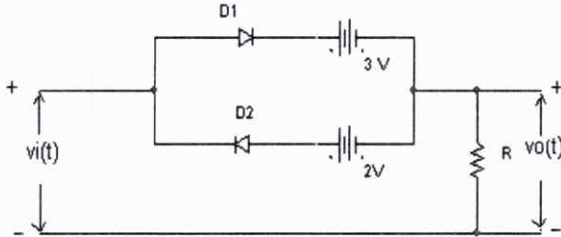
Time: 3 hours   **Max. Marks: 70**

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks   (5 X 14 =70M)

SNo		Questions	K L	CO	Marks
		Unit-I			
1	a	What are the advantages and disadvantages of introduction of negative feedback in amplifiers? Explain	K1	CO1	7M
		An amplifier circuit has a gain of 60dKB and an output impedance Zo=10 KΩ. It is required to modify its output impedance to 500 Ω by applying negative feedback. Calculate the value of the feedback factor. Also find the percentage change in the overall gain for 10 percent change in the gain of the internal amplifier.	K3	CO1	7M
		OR			
	b	Explain different types feedback amplifiers with neat sketches?	K2	CO1	7M
		Derive expression for output resistance in voltage series feedback amplifier?	K3	CO1	7M
2		**Unit-II**			
	a	Explain the response of RC low pass circuit for ramp input signal.	K2	CO2	7M
		Obtain the output waveform and plot the transfer characteristics for the clipper circuit shown below.	K3	CO2	7M
		OR			
	b	Derive the expression for percentage tilt for a square wave output of RC high pass circuit.	K3	CO2	7M
		State and prove clamping circuit theorem	K3	CO2	7M
3		**Unit-III**			
	a	Explain the basic circuit of operational amplifier.	K2	CO3	7M
		Design an inverting amplifier using op-amp. The voltage gain has to be 50 and the output voltage amplitude has to be 2.5 V. Assume necessary data	K3	CO3	7M
		OR			
	b	Design a practical integrator circuit with a dc gain of 10 to integrate a square wave of 10 kHz.	K3	CO3	7M
		Draw the schematic circuit diagram of instrumentation amplifier and derive the equation for gain of the amplifier.	K3	CO3	7M

		Unit-IV			
4	a	Draw and explain the operation of bi-stable multi vibrator using op-amp.	K2	CO4	7M
		Explain the working of 555 Timer IC in mono-stable multi-vibrator mode and give its applications	K2	CO4	7M
		OR			
	b	Draw the circuit diagram of Schmitt trigger. Explain its operation with help of necessary waveforms.	K2	CO4	7M
		Draw and explain the functional diagram of 555 Timer IC.	K2	CO4	7M
5	a	**Unit-V**			
		Design a second order high pass filter with low cut off frequency 2KHz.	K3	CO5	7M
		Explain successive approximation ADC with necessary diagrams and equations.	K2	CO5	7M
		OR			
	b	Draw the circuit diagram and explain the operation of op-amp based second order band-pass and band-reject filters.	K2	CO5	7M
		Explain op-amp D/A converter with R and 2R resistors	K2	CO5	7M

Subject Code: R20ME2102

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
FLUID MECHANICS AND HYDRAULIC MACHINERY
(ME)

Time: 3 hours **Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks (5 X 14 =70M)

QNo			Questions	K L	CO	Marks
			Unit-I			
1	a		i) Define terms, Weight density, Sp gravity, Viscosity.	K1	CO1	7M
			ii) State and Explain Newton's law of viscosity. Also briefly explain different types of fluids.	K1	CO1	7M
			OR			
	b		i)A U- tube mercury manometer is used to measure the pressure of oil flowing through a pipe whose specific gravity is 0.85. The center of the pipe is 15 cm below the level of mercury. The mercury level difference in the manometer is 25 cm, determine the absolute pressure of the oil flowing through the pipe. Atmospheric pressure is 750 mm of Hg.	K3	CO1	10M
			ii)Explain Pascal's law with suitable example.	K2	CO1	4M
			Unit-II			
2	a		i)Derive an equation of continuity of liquid flow at one dimensional	K3	CO2	7M
			ii)Water is flowing through a pipe of 100 mm diameter with an average Velocity of 10 m/s. Determine the rate of discharge of the water in liters/s. Also determine the velocity of water at the other end of the pipe, if the diameter of the pipe is 200 mm.	K3	CO2	7M
			OR			
	b		i)State and Prove Bernoulli's equation from Euler's equation of motion. Also state its assumptions.	K2	CO2	10M
			ii) Explain any three applications of Bernoulli's theorm.	K2	CO2	4M
			Unit-III			
3	a		i) Explain with a neat sketch Boundary Layer formation over a flat plate. Indicate the variation of velocity clearly.	K2	CO3	7M
			ii) Derive the expressions for displacement thickness and momentum thickness in boundary layer with necessary assumptions.	K3	CO3	7M
			OR			
	b		i)Distinguish between geometric and Kinematic similarity.	K2	CO3	7M
			ii) Explain the advantages and limitations of Dimensional Analysis.	K2	CO3	7M
			Unit-IV			
4	a		Derive an equation for force exerted on an unsymmetrical moving curved plate. a) when a jet of water is striking the plate tangentially at one end. b) Define & derive Unit Power, Unit speed, unit discharge.	K3	CO4	14M
			OR			
	b		i)What is the difference between Impulse Turbine and Reaction Turbine.	K2	CO4	7M
			ii) What is Draft Tube. Explain its function.	K2	CO4	7M

		Unit-V			
5	a	i) Define a centrifugal pump. Explain the working of a single stage centrifugal pump with neat sketches.	K2	CO5	7M
		ii)Explain the performance of a centrifugal pump using performance characteristic curves.	K2	CO5	7M
		OR			
	b	i) Define specific speed of a pump. Derive the equation for specific speed of centrifugal pump.	K3	CO5	10M
		ii) What is the difference between centrifugal and reciprocating pump.	K2	CO5	4M

NARASARAOPETA ENGINEERING COLLEGE
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Subject Code: R20ME2103

II B.Tech. - I Semester Regular& Supple Examinations, December-2023
METROLOGY AND INSTRUMENTATION
(ME)

Time: 3 hours **Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks   (5 X 14 =70M)

QNo		Questions	K L	CO	Marks
		Unit-I			
1	a	i) Distinguish between Unilateral and bilateral tolerance system with an example	K2	Co1	7M
		ii)Discuss how the selection of limits and tolerances is done for correct functioning.	K2	Co1	7M
		OR			
	b	i)Explain Hole basis and Shaft basis System with neat diagrams?	K5	Co1	7M
		ii)Tolerance for the hole is 0.002, tolerance for the shaft is 0.03 allowance is 0.02, and basic dimension is 50.00. Determine i) the limits of the shaft and ii) the limits of the hole. Use basic hole system	K4	Co1	7M
		Unit-II			
2	a	i)Discuss about the calibration of Slip gauges.	K2	Co2	7M
		ii)Explain the working of sine bar with a neat sketch.	K5	Co2	7M
		OR			
	b	i)With a neat sketch explain the constructional features and working of an optical bevel protractor.	K5	Co2	14M
		Unit-III			
3	a	i)Explain the Taylor's principle of gauge design with neat sketch.	K5	Co3	7M
		ii)Discuss about profile and position gauges.	K1	Co3	7M
		OR			
	b	i)What is Surface finish? Explain about any two methods to find surface finish of the surface.	K3	Co3	7M
		ii)What is the need of inspection? Mention any two types of inspecting techniques.	K1	Co3	7M
		Unit-IV			
4	a	i)Discuss about the common instrumental errors in linear measurement.	K3	Co4	7M
		ii)Define the terms of range, sensitivity, hysteresis.	K1	Co4	7M
		OR			
	b	i)Explain the Principle and working of LVDT with a neat sketch.	K3	Co4	7M
		ii)With a neat sketch discuss about the working principle of Piezoelectric transducer	K1	Co5	7M
		Unit-V			
5	a	i)Differentiate Thermistor and thermo couple.	K2	Co5	7M
		ii)With a neat sketch explain the working of a Thermocouple.	K3	05	7M
		OR			

	b	i)Illustrate how do Bourdon Tube Pressure Gauges Works? Explain	**K4**	**Co5**	**7M**
		ii)What are the different principles used for the measurement of pressure?	**K5**	**Co5**	**7M**

Subject Code: R20ME2104

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
THERMODYNAMICS
(ME)

Time: 3 hours **Max. Marks: 70**

Note: Answer All **FIVE** Questions.

All Questions Carry Equal Marks   (5 X 14 =70M)

QNo		Questions	K L	CO	Marks
		Unit-I			
	a	i) Explain about Quasistatic Process.	2	1	7M
		ii) Illustrate about the Gas Thermometers.	2	1	7M
		OR			
1	b	i) Define Thermodynamic Properties, Processes and Cycles, and Homogeneous & Heterogeneous systems	2	1	7M
		ii) The following data refer to a 12-cylinder, single-acting, two stroke marine diesel engine: Speed-150 rpm Cylinder diameter- 0.8 m Stroke of piston-1.2 m Area of indicator diagram- 5.5 x 10^{-4} m^2 Length of diagram-0.06 m Spring value--147 MPa per m Find the net rate of work transfer from the gas to the pistons in kW.	3	1	7M
		Unit-II			
	a	i) Explain First Law for a Closed System Undergoing a Change of State.	2	2	7M
		ii) Illustrate the application of steady flow energy equation to the Nozzle and Diffuser.	2	2	7M
		OR			
2	b	i) Explain about different forms of stored energy.	2	2	6M
		ii) Explain Steady flow process with example.	2	2	4M
		iii)) A stationary mass of gas is compressed without friction from an initial state of 0.3 m^3 and 0.105 MPa to a final state of 0.15 m^3 and 0.105 MPa, the pressure remaining constant during the process. There is a transfer of 37 .6 kJ of heat from the gas during the process. How much does the internal energy of the gas change?	3	2	4M
		Unit-III			
	a	i) Explain Equivalence of Kelvin-Planck and Clausius Statements.	2	3	7M
3		ii) Explain Carnot cycle and Carnot Theorem.	2	3	7M
		OR			
	b	i) Explain about Refrigerator and Heat Pump.	2	3	7M
		ii) Explain the Principle of increase of entropy.	2	3	7M

		Unit-IV			
4	a	i) Describe about vapour-liquid-solid phase equilibrium in a pure substance.	2	4	7M
		ii) Explain Mollier chart.	2	4	7M
		OR			
	b	i) Describe about equations of state for vapour phase of a simple compressible substance	2	4	7M
		ii) Explain about the Dalton's Law of partial pressure	2	4	7M
5		**Unit-V**			
	a	i) An engine working on the Otto cycle is supplied with air at 0.1 MPa, 35°C. The Compression ratio is 8. Heat supplied is 2100 kj/kg. Calculate the maximum pressure and temperature of the cycle, the cycle efficiency, and the mean effective pressure. (For air, c_p = 1.005, c_v = 0.718, and R = 0.287 kj/kg K).	3	5	7M
		ii) Explain about the working of Otto Cycle on P-V and T-S diagrams.	2	5	7M
		OR			
	b	i) Describe about the Diesel cycle with P-V and T-S diagrams.	2	5	7M
		ii) A refrigerator uses R-134a as the working fluid and operates on an ideal vapour compression cycle between 0.14 MPa and 0.8 MPa. If the mass flow rate of the refrigerant is 0.06 kg/s, determine (a) the rate of heat removal from the refrigerated space, (b) the power input to the compressor, (c) the COP.	3	5	7M

Subject Code: R20ME2105

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
MECHANICS OF SOLIDS
(ME)

Time: 3 hours   **Max. Marks: 70**

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks   (5 X 14 =70M)

QNo			Questions	K L	CO	Marks
			Unit-I			
	a	i)	Draw the stress – strain diagram for mild steel.	K2	1	2M
			ii) Derive the relation between three elastic constants.	K3	1	12M
1			**OR**			
	b		A bar is 3 m long and 60 mm diameter. It is subjected to a tensile load of 20 kN. Find the stress and the elongation when the load is applied gradually. What would be the maximum stress and the maximum elongation if the load had been suddenly applied? Take E = 2 X 105 N/mm2	K5	1	14M
			Unit-II			
2	a		For the simply supported beam loaded as shown in figure write equations for the shearing force and bending moment at any point along the length of the beam. Also, draw the shearing force and bending moment diagrams.	K4	2	14M
			OR			
	b		Draw the shear force and bending moment diagram for the overhang beam as shown in figure.	K4	2	14M
3			**Unit-III**			
	a	i)	Derive the expression for section modulus of rectangular and section.	K3	3	4M
			ii) An I-beam has each flange 5cm × 0.5cm and an overall depth of 7.5cm. Calculate the moment of resistance at a section where flange stress is 100N/mm². Neglecting the effect of web and assume that the stress in each flange is uniform.	K5	3	10M

		OR			
	b	A beam of triangular section having base width 20cm and height of 30cm is subjected to a shear force of 4kN. Find the value of maximum shear stress and sketch the shear stress distribution along the depth of the beam.	K4	3	14M
		Unit-IV			
4	a	A beam of length 5m and of uniform rectangular section is simply supported at its ends. It carries a uniformly distributed load of 12KN/m run over the entire span of 4m. Find the deflection at the centre if E=1.1x10⁶ N/mm².	K4	4	14M
		OR			
	b	For the loading shown in Fig a) the equation of the elastic curve for the cantilever beam b) the deflection at the free end, c) the slope at the free end 	K4	4	14M
		Unit-V			
5	a	A cylindrical thickness 2 cm has to with stand maximum internal pressure of 2N/mm². If the ultimate tensile stress in the material of the cylinder is 300 N/mm², factor of safety 4 and the joint efficiency 80% determine the diameter of the cylinder.	K5	5	7M
		Show that in thin cylinder shells subjected to the internal fluid pressure, the circumferential stress is twice the longitudinal stress.	K5	5	7M
		OR			
	b	What are the assumptions in the theory of pure torsion?	K2	5	7M
		A shaft transmits 50kW at 10Hz. Find the diameter of the shaft if the shear stress is not to exceed 75 N/mm²	K5	5	7M

Subject Code: R20EC2102

II B.Tech - I Semester Regular & Supple Examinations, December-2023
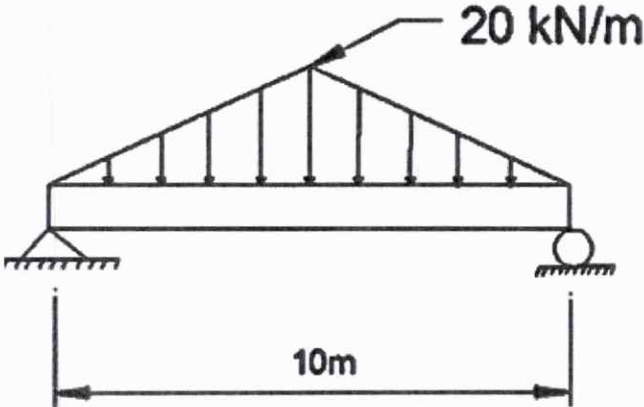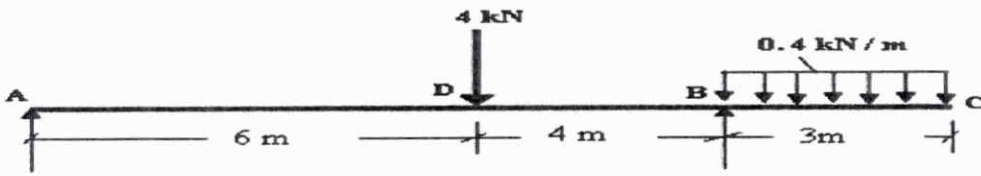### ELECTRONIC DEVICES AND CIRCUITS
(ECE)

Time: 3 hours   Max. Marks: 70

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks   (5 X 14 =70M)

QNo			Questions	KL	CO	Marks
			Unit-I			
1	a		i) Explain the Diffusion and Drift currents for a semiconductor	2	1	7M
			ii) Explain the classification of materails using energy band diagram	2	1	7M
			OR			
	b		i) Derive expression for current density of an intrinsic semiconductor	2	1	7M
			ii) Show that the Fermi energy level lies in the centre of forbidden energy band for an intrinsic semiconductor? Derive.	2	1	7M
			Unit-II			
2	a		i) With circuit and necessary waveforms explain the operation of bridge rectifier	2	2	7M
			ii) Explain the working of p-n diode in forward and reverse bias conditions	2	2	7M
			OR			
	b		i) With a neat sketch explain the working of Half-wave rectifier	2	2	14M
			ii) Determine the rating of a transformer to deliver 125 watts of dc power to a load for the following. (i) Half wave rectifier. (ii) Full wave rectifier (iii) Bridge rectifier	3	2	
			Unit-III			
3	a		i) From the transistor current components, deduce the current equation of transistor	2	3	7M
			ii) For the NPN transistor connected in CE configuration with V_{CC}=9 V, V_{BB}=4V, I_C = 5 m A, V_{CE}=5 V, β=50 and V_{BE}=0.7 V. Find β and R_B	3	3	7M
			OR			
	b		i) Explain input and output characteristics of common emitter configuration	2	3	10M
			ii) If the transistor has an α of 0.98, find the value of β and if β is 200 find α	3	3	4M
			Unit-IV			
4	a		i) What is thermal runaway? Derive relevant expressions to obtain thermal stability	2	4	7M
			ii) In a silicon transistor with a fixed bias, Vcc= 9 V, Rc= 3 kΩ, RB= 8kΩ, β = 50, V_{BE}=0.7V. Find the operating point and stability factor	3	4	7M
			OR			
	b		i) What is Biasing? Explain the need of it. List out different types of biasing methods.	2	4	7M
			ii) Differentiate bias stabilization and compensation techniques	2	4	7M
			Unit-V			
5	a		i) Explain the construction and working of Enhancement MOSFET	2	5	7M
			ii) Draw the construction diagram, operation characteristics and parameters of JFET	2	5	7M
			OR			
	b		i) Explain the following terms in detail (i)SCR (ii)UJT	2	5	14M

Subject Code: R20EC2103

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
SIGNALS AND SYSTEMS
(ECE)

Time: 3 hours　　　　　　　　　　　　　　　　　　**Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks   (5 X 14 =70M)

SNo		Questions	K L	CO	Marks
		Unit-I			
	a	i)Define energy signal and power signal. Find which of the following signals are energy signals, power signals, neither energy nor power signals i) $x_1(t)=e^{-3t}u(t)$　ii) $x_2(t)=cost$	K1,K2	CO1	7M
		ii)State and prove sampling theorem low pass band limited signal	K2	CO1	7M
		OR			
1	b	i)Define auto-correlation and cross-correlation. Prove any two properties of correlation function.	K1,K2	CO1	7M
		ii)Determine the Nyquist rate corresponding to each of the following signals i)$x_1(t)=1+\cos(2000\pi t)+\sin(4000\pi t)$ ii)　$x_2(t)=\dfrac{\sin(4000\pi t)}{\pi t}$ iii)　$x_3(t)=(\sin(4000\pi t)/\pi t)^2$	K3	CO1	7M
		Unit-II			
	a	i)Discuss the analogy between vectors and signals. Derive the condition of orthogonality between two signal f1(t) & f2(t).	K2	CO2	7M
		ii)For the signal f(t)= t, for all t; find the trigonometric Fourier series $\psi(t)$ to represent f(t) over the interval (-π,π).	K3	CO2	7M
		OR			
2		i) Obtain the relations between the coefficients of trigonometric Fourier series and Exponential Fourier series.	K2	CO2	7M
	b	ii)For the continuous time periodic signal determine the fundamental frequency ω_0 and exponential Fourier series coefficients. $x(t)=2+\cos\left(\dfrac{2\pi}{3}t\right)+4\sin\left(\dfrac{5\pi}{3}\right)t$	K3	CO2	7M
		Unit-III			
	a	i)Obtain the Fourier transform of the following functions. i) Impulse function ii) DC signal iii)　Unit step function	K2	CO3	7M
		ii)Write about Hilbert transform?	K2	CO3	7M
3		**OR**			
		i)State and prove Time shifting and Frequency shifting properties of Fourier Transform.	K2	CO3	6M
	b	ii)Compute the Fourier Transform of the following signal $y(t)=\begin{cases}1-t^2, & 0<t<1 \\ 0, & otherwise\end{cases}$	K3	CO3	8M

			KL	CO	M
		Unit-IV			
4	a	i)Find the inverse Laplace transform of $X(s) = (-5s-7) / (s+1)(s-1)(s+2)$.	K2	CO4	7M
		ii)Derive the relation between Laplace transform and Fourier transform of signal.	K2	CO4	7M
		OR			
	b	i)Compute the Laplace transform of $x(t)=e^{-b|t|}$ for the cases of $b < 0$ and $b > 0$.	K2	CO4	7M
		ii)Find the Z transform and its ROC of $x(n)=na^n$.	K2	CO4	7M
5	a	**Unit-V**			
		i)Check whether or not the following systems are i) static/ dynamic ii) linear/ non-linear iii) causal / non-causal iv) time variant/ time-invariant $$y_1(t)=10x(t)+5$$ $$y_2(t)=x(t)\cos \Omega_c(t)$$	K3	CO5	7M
		ii)Derive the relationship between bandwidth and rise time of a low pass filter when a step input is applied?	K2	CO5	7M
		OR			
	b	i)Derive the conditions for the distortion less transmission through a system	K2	CO5	7M
		ii)Explain the Classification of different LTI systems in detail	K3	CO5	7M

KL: Blooms Taxonomy Knowledge Level   CO: Course Outcome   M:Marks

Subject Code: R20EC2104

II B.Tech - I Semester Regular& Supple Examinations, December-2023
SWITCHING THEORY AND LOGIC DESIGN
(ECE)

Time: 3 hours   **Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks   (5 X 14 =70M)

QNo		Questions	K L	CO	Marks
		Unit-I			
1	a	i) Convert the following numbers: a. $(4567)_8$ to base 10. b. $(11001101.0101)_2$ to base 8 and base 4. c) $(53.1575)_{10}$ to base 2.	3	1	8M
		ii) Apply the 1's compliment and 2's compliment method for given subtraction operation $(1000110101)_2$-$(0111001001)_2$ to solve.	3	1	6M
		OR			
	b	i) Examine the given 8 bit data word 01011011, generate the 12 bit word for the hamming code that corrects and detects single bit error.	4	1	7M
		ii) Solve the following addition using excess-3 code a)386 + 756 b)1010 + 444	3	1	7M
		Unit-II			
2	a	i) Simplify the following Boolean functions to minimum number of literals. a. F = ABC + ABC' + A'B. b. F = (A+B)' (A'+B').	3	2	7M
		ii) State duality theorem. List Boolean laws and their duals.	1	2	7M
		OR			
	b	i) Implement Ex-NOR gate using only NOR gates.	4	2	7M
		ii) Find all the prime implicants for the following Boolean function using K-map and determine which are essential? $F(A,B,C,D) = \Sigma(1,3,4,5,9,10,11,12,13,14,15)$	2	2	7M
		Unit-III			
3	a	i) Design a combinational circuit of 4-bit parity encoder	4	3	7M
		ii) Implement full adder using decoder and OR gates.	3	3	7M
		OR			
	b	i) Make use of 4X1 multiplexer and external gates to implement the following Boolean function $F(A, B, C, D)=\Sigma(1, 3, 4, 11, 12, 13, 14, 15)$.	3	3	7M
		ii) Design a 2 bit comparator using gates.	4	3	7M
4		**Unit-IV**			
	a	i) Design a mod-6 asynchronous counter using T-flip flop.	4	4	7M
		ii) Design a sequential circuit with two D-Flip-Flops A and B and one input x. When x=0, the state of the circuit remains the same. When x=1, the circuit goes through the state transitions from 00 to 01 to 11 to 10 back to 00 and repeats.	4	4	7M
		OR			
	b	i) Discuss mealy and Moore machine models of sequential machines.	2	4	7M
		ii) Analyze the operation of 4-bit bidirectional shift register with neat diagram.	4	4	7M

		Unit-V			
5	a	i)Explain the general combinational PLD configuration with suitable block diagram.	2	5	7M
		ii) Give the logic implementation of a 32 x 4 bit & 8 x 4 bit ROM using suitable decoder	2	5	7M
		OR			
	b	i) Build a BCD to Excess-3 code converter and implement using suitable PLA.	2	5	7M
		ii) Minimize and implement the Boolean function F = Σ(0,1,2,3,13,14,15) using PROM.	3	5	7M

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EC2105

II B.Tech - I Semester Regular & Supple Examinations, December-2023

LINEAR CONTROL SYSTEMS

(ECE)

Time: 3 hours   Max. Marks: 70

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 14 =70M)

S No		Questions	K L	CO	Marks
		Unit-I			
1	a	i) State and explain the Mason's gain formula.	III	1	7M
		ii) Explain the difference between open loop, closed loop system and write the advantages and features of transfer function.	II	1	7M
		OR			
	b	i) Explain the various types of control systems with an example.	II	1	7M
		ii) Explain the rules of block diagram reduction techniques	II	1	7M
		Unit-II			
2	a	i) Obtain the time response of a first order system for a unit step input and plot its response.	III	2	7M
		ii) A unity feedback system is characterized by the open loop transfer function G(s) = 1/ s (1+0.3s) (1+0.4s). Determine the steady state error for unity step, unity ramp and unity acceleration inputs	III	2	7M
		OR			
	b	A system has the following transfer function C(s)/R(s)= 30/(s+15). Determine its unit impulse, step and ramp response with zero initial conditions. Sketch their responses	III	2	14M
		Unit-III			
3	a	i) Explain the Routh's criteria with an example. What are its limitations.	II	3	7M
		ii) Determine the stability of the closed loop system whose open loop transfer is 5 (2s+1)/ s (s+1) (1 + 3s) (1 + 0.5s), using Routh-Hurwitz criterion.	III	3	7M
		OR			
	b	i) Explain the procedure to draw root locus of a given transfer function.	II	3	7M
		ii) A feedback system has the open loop transfer function of $G(s)= K/s(s^2+2s+3)$ Find the limiting values of K for maintaining stability.	III	3	7M
		Unit-IV			
4	a	i) List the advantages and limitations of Frequency response methods.	II	4	7M
		ii) Sketch the polar plot and discuss the stability of the system represented by G(s) H(s) = K/s(s+1)(s+5).	III	4	7M
		OR			
	b	i) Explain the frequency domain specifications of a second order system.	II	4	7M
		ii) Given the open loop transfer function $G(s)= 5/(1+2s+s^2)(1+3s)$. Sketch the Nyquist plot and investigate the open loop and closed loop systems stability.	III	4	7M
		Unit-V			
5	a	i) Explain the design procedure of lead compensator?	II	5	7M
		ii) Derive the expression for the transfer function of a lag-lead compensator.	III	5	7M

		OR	III	5	7M	II	5	7M
	b	i) A unit feedback system has an open loop transfer function G(s) = K/s(s+2) (1+ 0.3s). Design a phase lag compensator to meet the following specifications: Velocity error constant = 10 Phase margin ≥ 40°						
		ii) Explain the properties of state transition matrix						

Subject Code: R20CI2101

II B.Tech - I Semester Regular & Supple Examinations,December-2023
COMPUTER ORGANIZATION
(CSE,IT,AIML,DS & CY)

Time: 3 hours   **Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks   (5 X 14 =70M)

QNo			Questions	K L	CO	Marks
			Unit-I			
1	a		Describe various functional units of a micro computer.	L 6	1	7M
			Explain the hardware implementation of shift micro operations.	L 2	3	7M
			OR			
	b		Distinguish between register reference instructions and memory reference instructions.	L 4	4	7M
			Describe various phases of Interrupt Cycle.	L 6	2	7M
			Unit-II			
2	a		What is stored program organization? Discuss its importance in present day applications.	L3	4	7M
			What is ISZ instruction? Write short notes on the micro operation and timing signals that are needed to execute ISZ instruction.	L1& L3	3	7M
			OR			
	b		Write brief notes on various phases of interrupt life cycle.	L2	1	7M
			Discuss the merits and limitations of using a common bus system.	L 4	3	7M
			Unit-III			
3	a		Distinguish among Direct, Indirect and Relative addressing modes.	L 4	4	7M
			Write brief note on logical shifts, arithmetic shifts and rotate type operations.	L 2	5	7M
			OR			
	b		Distinguish between RISC and CISC architectures.	L 4	6	7M
			Discuss the physical address forming in different addressing modes.	L 2	4	7M
			Unit-IV			
4	a		Illustrate the process of performing addition and subtraction using 2's compliment.	L 4	5	7M
			Highlight the differences among Associative mapping, Direct mapping and Set-Associative mapping.	L 4	4	7M
			OR			
	b		Discuss the use of signed 2's compliment data in multiplying two numbers.	L 6	5	7M
			Illustrate the Booth's multiplication algorithm with an example.	L 3	5	7M
			Unit-V			
5	a		Discuss the merits and demerits of interrupt driven data transfer.	L 6	3	7M
			Draw the block diagram of DMA controller and explain the basic functionality of DMA controller.	L 1	6	7M
			OR			
	b		What is interrupt priority and why is it necessary? Write short note on Daisy chaining priority interrupt.	L 2	3	7M
			Distinguish between Isolated I/O and Memory mapped I/O	L 2	4	7M

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20AI2101

II B.Tech. - I Semester Regular & Supple Examinations, December-2023
DATA SCIENCE
(AI)

Time: 3 hours   **Max. Marks: 70**

Note: Answer All **FIVE** Questions. All Questions Carry Equal Marks   (5 X 14 =70M)

QNo			Questions	K L	CO	Marks
			Unit-I			
1	a		Explain about Data Processing using arrays with examples	K2	CO1	7M
			Illustrate about Boolean Indexing and Fancy Indexing.	K4	CO1	7M
			OR			
	b		What is ndarray? Explain how to create ndarray with example.	K2	CO1	7M
			What are the roles and responsibilities of a data scientist?	K1	CO1	7M
			Unit-II			
2	a		Discuss about the different types of data structures in Pandas	K3	CO1	7M
			What is missing value? How to handle missing data. Explain	K2	CO1	7M
			OR			
	b		How sorting and ranking functions will work on data frames. Explain	K3	CO2	14M
			Unit-III			
3	a		Illustrate the process of reading and writing in text formats with delimiters.	K3	CO2	7M
			How do I connect HTML to web API.	K3	CO2	7M
			OR			

	b		Discuss the following functionalities with example.
			  I) Reindexing, II)Dropping entries from an axis,
			  III)Indexing, IV)selection filtering
				K3	CO3	8M

			What is format of JSON data and how do you read JSON data in PYTHON.	K3	CO3	6M
			Unit-IV			
4	a		Consider any form of data and performing the process of Data Transformation.	K3	CO3	7M
			Explain the process of creating subplots in PYTHON?	K2	CO4	7M
			OR			
	b		What are data wrangling techniques. Explain.	K3	CO3	7M
			Explain about Matplotlib with example.	K2	CO4	7M
			Unit-V			
5	a		What are GROUPBY and AGGREGATE functions in the database? Explain with example	K3	CO5	14M
			OR			
	b		Explain about group-wise operations and transformations.	K3	CO5	14M

II B.Tech I Semester Regular Examinations, December-2023

Sub Code: R20DS2105   **DATABASE MANAGEMENT SYSTEMS**   R20

Time: 3 hours   (DATA SCIENCE)   Max. Marks: 70

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks   (5 X 14 = 70M)

Q.No			Questions	KL	CO	M
1			**Unit-I**			
	a	i)	Explain database users, user interfaces, DBA and functions of a DBA	2	1	7M
		ii)	Differentiate File systems from DBMS.	2	1	7M
			OR			
	b	i)	Explain the purpose of database systems	2	1	7M
		ii)	Explain the need of query processor in DBMS	2	1	7M
2			**Unit-II**			
	a	i)	Distinguish strong entity set with weak entity set? Draw an ER diagram to illustrate Weak entity set?	3	2	7M
		ii)	Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.	3	2	7M
			OR			
	b	i)	Explain division operation in relational algebra with example	2	2	7M
		ii)	Explain all the variations of the JOIN operation in relational algebra with a suitable example.	2	2	7M
3			**Unit-III**			
	a	i)	Discuss different types of aggregate operators with examples in SQL?	2	3	7M
		ii)	Define trigger and explain its three parts? Differentiate row level and statement level triggers?	2	3	7M
			OR			
	b	i)	Explain the operators in SQL with examples. a)ANY b) IN c) EXISTS d) EXCEPT	2	3	8M
		ii)	Explain the role of active databases	2	3	6M
4			**Unit-IV**			
	a	i)	Define decomposition and how does it address redundancy? Discuss the problems that may be caused by the use of decompositions?	2	4	7M
		ii)	Given a Relation R=(X,Y,Z) and Functional Dependencies are F={ {X,Y}→{Z}, {Z}→{X} } Determine all Candidate keys of R and the normal form of R	3	4	7M
			OR			
	b	i)	What is meant by closure of F? Where F is the set of functional dependencies. Explain computing F+ with suitable examples.	2	4	7M
		iii)	Explain the BCNF with example	2	4	7M
5			**Unit-V**			
	a	i)	How do you implement Atomicity and Durability. Explain with example	2	5	7M
		ii)	Explain two phase locking for ensuring serializability	2		7M
			OR			
	b	i)	Discuss about Overflow pages and Locking considerations ofISAM?	2	5	7M
		ii)	Explain the implementation of B+ trees with example	2	5	7M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome   M:Marks

II B.Tech I Semester Regular Examinations, December-2023

Sub Code: R20AC2105   **SOFTWARE ENGINEERING**

| R20 |

Time: 3 hours   (AIML &CYBER SECURITY)   Max. Marks: 70

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks   (5 X 14 = 70M)

Q.No		Questions	KL	CO	M
		Unit-I			
1	a	i) Define Software Engineering and discuss the challenges in Software Engineering.	1,2	1	7M
		ii) Explain software development life cycle in brief.	1	1	7M
		OR			
	b	i) "Spiral process flow is suitable model for developing software products which are meant for releasing to the market" ...Justify this statement.	6	1	7M
		ii) Write brief note on the necessity of following agile process model for developing the present day software Applications.	2,3	3	7M
		Unit-II			
2	a	i) Write short note on pros and cons of structured analysis	1,2	2	7M
		ii) "Functional requirements should be specified completely and consistently" --Substantiate this statement with suitable example	6	1	7M
		OR			
	b	i) Discuss various methods of requirements gathering in brief.	2	1	7M
		ii) What is the need of requirements' validation? Explain with an example.	1	2	7M
		Unit-III			
3	a	i) Write short note on software design principles	1	1	.
		What is structured design? Explain any one of the structured design methodologies	1,2	1	7M
		OR			
	b	i) Distinguish between function oriented design and object oriented design	4	1	7M
		ii) What are the characteristics of good software design? Briefly explain	1,2	1	7M
		Unit-IV			
4	a	i) Distinguish between white box testing and black box testing.	4	4	7M
		ii) What are the limitations of traditional coding process? Explain with the help of an example.	2,3	4	7M
		OR			
	b	i) Define Test Case. Write an example test case to test the user login screen.	1,3	4	7M
		ii) Briefly discuss the connectivity between the quality of software and the testing effort with suitable examples software Applications	2	4	7M
		Unit-V			
5	a	i) What do you mean by Software Project Planning? Write short note on the various parameters that need to be considered in project effort estimation.	1	2	7M
		ii) Briefly discuss the merits and demerits of COCOMO model.	2	2	7M
		OR			
	b	i) What are the characteristics of good quality software? Mention the list of activities connected to the software quality assurance.	1	4	7M
		ii) Explain the various levels of Capability Maturity Model(CMM).	1	2	7M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome   M:Marks***