R20

II B.TECH I SEM

SUPPLEMENTARY EXAMINATIONS

APRIL 2025

NARASARAOPETA ENGINEEERINGCOLLEGE::NARASARAOPET
(AUTONOMOUS)
II B.Tech I Semester Supply Examinations: April-2025
(Branches: ME)
ENVIRONMENTAL STUDIES

Sub Code: R20CC21MC2 Max. Marks: 5x14=70M
Time: 3 hours Date: 08-04-2025

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks

1. a) Define the environment? How would environmental awareness help to protect our Environment? What is the scope of environmental education? (CO1 K2 14M)

OR

b) Illustrate the process of ecological succession. (CO1 K2 14M)

2. a) Discuss the major uses of forests. How would you justify that ecological uses of forests surpass commercial uses? (CO2 K2 14M)

OR

b) Explain about the food resources. (CO2 K2 14M)

3. a) a) Comment upon Indian biodiversity with special reference as a mega diversity nation. (CO3 K2 14M)

OR

b) Explain various values in biodiversity? Explain in detail threats to biodiversity with suitable examples (CO3 K2 14 M)

4. a) Classified solid waste? What adverse effects can solid waste cause? How can the solid waste be managed? (CO4 K2 14M)

OR

b) What are the various sources, effects, & causes of water pollution? (CO4 K2 14M)

5. a) Explain environmental audit and environmental management plan? (CO5 K2 14M)

OR

b) Discuss the concept of Ecotourism, its principles and merits. (CO5 K2 14M)

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC2101

II B.Tech. - I Semester Supple Examinations, April-2025

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
1			**Unit-I**			
	a	(i)	**Estimate** a real root of the equation $x^3 - x - 1 = 0$ using Bisection method correct to two decimal places	3	1	7M
		(ii)	**Identify** the Statement of Newton's Gregory Forward Interpolation formula and Prove Newton's Gregory Forward Interpolation formula.	3	1	7M
			OR			
	b	(i)	The following data gives the melting points of an alloy of lead and zinc. Percentage of lead in the alloy(p): 50, 60, 70, 80 Temperature(QOC): 205, 225, 248, 274 **Determine** the melting point of the alloy containing 54% of lead, using appropriate interpolation formula	3	1	7M
		(ii)	**Estimate** a real root of the equation $\cos x - 3x + 1 = 0$ correct to 3 decimal places.	3	1	7M
2			**Unit-II**			
	a		By **applying** Runge - Kutta fourth order method with h=0.1 to find x(0.1) and x(0.2) where $\frac{dy}{dx} = \frac{y-x}{x+y}$.			14M
			OR			
	b		By **applying** Modified Euler's method, find y(0.1) and y(0.2) for $\frac{dy}{dx} = x^2 - y$ and y(0) = 1.	3	2	14M
3			**Unit-III**			
	a	(i)	**Estimate** $L(t^2 \sin^2 2t)$	3	3	7M
		(ii)	**Determine** $L\left(\frac{\cos 4t \cdot \sin 2t}{t}\right)$	3	3	7M
			OR			
	b	(i)	**Identify** inverse Laplace transform of $\frac{s}{(s^2+1)(s^2+4)(s^2+9)}$	3	3	7M
		(ii)	**Identify** inverse Laplace transform of $\frac{s+3}{s^2-3s+2}$	3	3	7M
4			**Unit-IV**			
	a		**Construct** the Fourier series expansion of x Cosx in $-\pi \le x \le \pi$	3	4	14M
			OR			
	b	(i)	**Construct** the Fourier cosine series of f(x) = sin x in (0,).	3	4	7M
		(ii)	**Construct** the Fourier cosine series of $f(x) = x^2$ in (-π,).	3	4	7M

5		**Unit-V**			
	a	(i) **Apply** Fourier transform technique to show $F\{f(x-a)\} = e^{ipa}$ F(p), where F(p) is the complex Fourier transform of f(x).	**3**	**5**	**7M**
		(ii) **Apply** Fourier integral representation, show that $\int_0^\infty \frac{\lambda Sin x\lambda}{\lambda^2+k^2} d\lambda = \frac{\pi}{2} e^{-kx}$, x>0, k>0.	**3**	**5**	**7M**
		OR			
	b	(i) **Estimate** the Fourier sine transform of 1/x	**3**	**5**	**7M**
		(ii) **Estimate** the Fourier cosine transform of $f(x) = \frac{1}{1+x^2}$	**3**	**5**	**7M**

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

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC2102

II B.Tech. - I Semester Supple Examinations, April-2025
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
1		**Unit-I**			
	a	i) Identify whether $(p \rightarrow q) \rightarrow r$, $p \rightarrow (q \rightarrow r)$ are logically equivalent or not.	K3	1	7M
		ii) Explain pdnf, pcnf with suitable examples	K2	1	7M
		OR			
	b	i) Show that $(P \rightarrow (Q \rightarrow R)) <=> (P \rightarrow Q) \rightarrow (P \rightarrow R)$.	K2	1	7M
		ii) Explain the tautology with example	K3	1	7M
2		**Unit-II**			
	a	i) Make use of mathematical induction prove that $1.2+2.3+3.4+.....+n(n+1)=\frac{n(n+1)(n+2)}{3}$, where n is a positive integer	K3	2	7M
		ii) Verify the validity of the following argument "every living thing is a planet or an animal. Joe's gold fish is alive and it is not a planet. All animals have hearts. Therefore Joe's gold fish has a heart".	K3	2	7M
		OR			
	b	i) Use the mathematical induction to prove that $1^3+2^3+....+n^3=[(n(n+1))/2]^2$, whenever n is a positive integer.	K3	2	14M
3		**Unit-III**			
	a	i) Write the rules for constructing Hamiltonian paths and cycles.	K3	3	7M
		ii) What is Walk, Trail, Paths and circuit? Explain with suitable graphs examples.	K2	3	7M
		OR			
	b	i) Write the difference between Hamiltonian graphs and Euler graphs	K3	3	7M
		ii) How to determine adjacency matrix for a graph. Explain properties of adjacency matrix by taking suitable graph with minimum 5 nodes and more than 5 edges	K3	3	7M
4		**Unit-IV**			
	a	i) What is solution of the recurrence relation $a_n = a_{n-1}+2\ a_{n-2}$ with $a_0 =2$ and $a_1 =7$	K2	4	7M
		ii) What is a Generating function and explain the operations on generating functions	K2	4	7M
		OR			
	b	i) Solve $a_n=a_{n-1}+n$ where $a_0=2$ by substitution	K3	4	7M
		ii) Solve the recurrence relation $2a_{n+3} = a_{n+2} +2a_{n+1}-a_n$ for $n \geq 0$,with $a_0 =0$, $a_1 =1$, $a_2 =2$.	K3	4	7M

5		**Unit-V**			
	a	i) In how many ways can the letters of the word CORRESPONDENTS can be arranged so that I) There are exactly two pairs of consecutive identical letters? II) There are at least three pairs of consecutive identical letters?	**K2**	**5**	**7M**
		ii) Test for all x, y in a Boolean algebra B, (I) $(x \wedge y)' = x' \vee y'$. (II) $(x \vee y)' = x' \wedge y'$.	**K4**	**5**	**7M**
		OR			
	b	i) Discover the disjunctive normal form of the Boolean function $f(x_1, x_2, x_3) = x_2(x_1x_3 + x_1)$	**K4**	**5**	**7M**
		ii) Find the number of positive integer less than 10,000 and are divisible by 5 or 7	**K2**	**5**	**7M**

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

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC2103

II B.Tech. - I Semester Supple Examinations, April-2025

OOPS THROUGH JAVA

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

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
1		**Unit-I**			
	a	Interpret why JAVA is so important to Internet since inception? Also outline the need of JVM.	K2	CO1	7M
		Discuss constructor overloading with an example program.	K2	CO1	7M
		OR			
	b	Outline and explain briefly the features of JAVA.	K2	CO1	7M
		Infer the use of "this" key word in JAVA with an example program.	K2	CO1	7M
2		**Unit-II**			
	a	Develop the procedure of creating customized packages in JAVA.	K3	CO2	7M
		Why JAVA does not support multiple inheritance through Classes. How this is achieved in JAVA with an example program.	K3	CO2	7M
		OR			
	b	Make the use of super keyword to call the parent class constructor (parameterized) with an example program.	K3	CO2	7M
		"A super class reference variable can refer to a sub-class object". Justify this statement with an example program.	K3	CO2	7M
3		**Unit-III**			
	a	Illustrate the use of finally block in exceptions with an example programs.	K2	CO3	7M
		Illustrate the concept of synchronization of a method in JAVA with an example program.	K2	CO3	7M
		OR			
	b	Infer the procedure of creating customized exception in JAVA with an example program.	K2	CO3	7M
		Your Professor asked you "Write a JAVA application to create a thread to print 'NEC' for every 5 seconds". How you will proceed? Explain and write the program by using appropriate methods.	K2	CO3	7M
4		**Unit-IV**			
	a	Describe the advantages of streams in JAVA. List different types of byte and character stream classes in JAVA. Explain any two classes from each category.	K2	CO4	7M
		Illustrate the use of LinkedList class with an example program.	K2	CO4	7M
		OR			
	b	Explain the HashSet with an example java program.	K2	CO4	7M
		Suppose the input is '1 2 3 4 5 6 7 8 9 10'. Construct a JAVA program to print the sum of even numbers from the given input. Use appropriate methods of StringTokenizer class to divide the input into tokens.	K3	CO4	7M

5		**Unit-V**			
	a	Explain the concept of parameter passing to Applets with an example program.	K2	CO5	7M
		Illustrate the event delegation model in AWT with any event handling mechanism as an example.	K2	CO5	7M
		OR			
	b	Illustrate the uses of the following AWT components with examples: i. Button ii. Checkbox	K2	CO5	7M
		Discuss the purpose of layout manages in JAVA. Illustrate any one manager with simple example.	K2	CO5	7M

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

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC2104

II B.Tech. - I Semester Supple Examinations, April-2025

DATA STRUCTURES

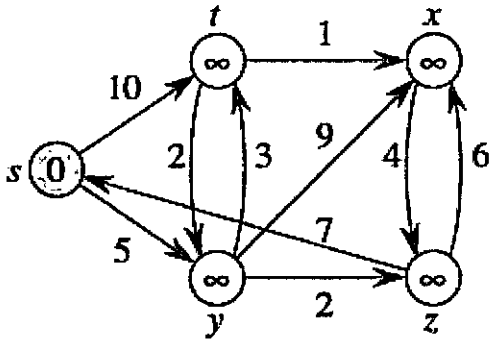
Time: 3 hours **Max. Marks: 70**

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

QNo		Questions	K L	CO	Marks
1		**Unit-I**			
	a	i) Define Algorithm and Interpret in detail how to analyze an algorithm.	K4	CO2	7M
		ii) Solve the following recurrence relation using Substitution Method T(n) = 4T(n/2) + n2 T(n) = 2T(n/2)+n	K2	CO2	7M
		OR			
	b	i) Differentiate Big-Oh, Theta, Omega notations.	K2	CO2	7M

		ii) Calculate time complexity for the given Iterative sum of n numbers algorithm
		Algorithm sum(a,n)
		{
		s:=0;
		for i:=1 to n do
		s:s+a[i];
		return s;
		}
			K4	CO2	7M

2		**Unit-II**			
	a	i) Sort the following elements using insertion sort technique a= { 2;8;7;1;3;5;6;4}	K2	CO1	7M
		ii) Analyze divide and conquer algorithms with help of merge sort technique.	K3	CO1	7M
		OR			
	b	i) Compare and contrast linear search, binary search, and Fibonacci search in terms of efficiency and complexity.	K3	CO1	7M
		ii) Sort the following elements using Quick sort technique {10; 80; 30; 90; 40; 50; 70; 60}.	K2	CO1	7M
3		**Unit-III**			
	a	Define a stack and List out various applications of stack.	K2	CO2	7M
		Compare and contrast the Queue and Circular Queue and implement insert and delete operations on queue	K4	CO2	7M
		OR			
	b	i) Illustrate the result of each operation in the sequence PUSH(S, 4), PUSH(S, 1), PUSH(S; 3), POP(S), PUSH(S, 5), and POP(S) on an initially empty stack S stored in array S[1 … 6]	K2	CO2	7M
		ii) Describe the algorithm for implementing a queue using two stacks and list out various advantages of this approach?	K4	CO2	7M

4		**Unit-IV**			
	a	i) Compare singly and circular linked list while performing insertion and deletion operations.	K2	CO2	7M
		ii) Write an algorithm to insert a new node into a Singly Linked List at the beginning, middle, and end positions.	K2	CO2	7M
		OR			
	b	i) Explain the procedure with example for specific node deletion in a doubly linked list.	K2	CO2	7M
		ii) Explain the steps for inserting a node into a circular linked list with example.	K2	CO2	7M
5		**Unit-V**			
	a	i) What is a Binary Search Tree? Write an algorithm for inserting and deleting a node in a Binary Search Tree.	K3	CO3	7M
		ii) Illustrate the step by step process of Dijkstra's algorithm to find shortest path for the give graph. 	K4	CO4	7M
		OR			
	b	i) Explain the process of finding the minimum and maximum elements of the Binary Search Tree.	K3	CO3	7M
		ii) Illustrate the process Kruskal's algorithm to find the minimum cost of spanning tree with an example.	K4	CO4	7M

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

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC2105

II B.Tech. - I Semester Supple Examinations, April-2025

FRONT END WEB TECHNOLOGIES

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	Create a webpage that displays student information as a part of online student management system. The table should present details such as the student's Roll No., name, age, grade, and marks in different subjects. Additionally, you need to ensure the table is well-structured and easy to read. Also use footer that shows some summary data like the total number of students.	**3**	**1**	**7M**
		Illustrate the process of embedding audio and video content in a web page with an example.	**2**	**1**	**7M**
		OR			
	b	Design a HTML page for your department. The page includes different sections such as "**Home** (brief description about the department)," "**Programs Offered**" and "**Department Achievements**". You make it easy for users to navigate to each section by clicking on text-based links at the top of the page. Additionally, include a link to your college official website as an external reference.	**3**	**1**	**7M**
		Create an HTML page with a canvas element that draws a colored rectangle and circle.	**2**	**1**	**7M**
		Unit-II			
2	a	Define CSS. What are the various types of CSS? Explain each with the help of an example.	**1**	**2**	**7M**
		Create a styled blog post using a combination of CSS properties such as font-family, text-transform, letter-spacing, and text-align to make the content more readable and visually appealing.	**2**	**2**	**7M**
		OR			
	b	Explain how to use the <canvas> element to create a circle. What methods are required to define and draw a circle on a canvas?	**2**	**2**	**7M**
		Explain the different types of gradients available in CSS with examples.	**1**	**2**	**7M**
		Unit-III			
3	a	List and explain the features of JavaScript.	**1**	**3**	**7M**
		Explain different types of mouse events supported by JavaScript.	**2**	**3**	**7M**
		OR			
	b	Define Regular Expression. Discuss how regular expressions can be used to validate user input, such as email addresses and phone numbers?	**2**	**3**	**7M**
		Illustrate the process of creating an object and a class in JavaScript with your own examples.	**2**	**3**	**7M**

4		**Unit-IV**			
	a	Define jQuery. Explain its significance and how it simplifies event handling in web development.	**2**	**4**	**7M**
		Explain the purpose of following methods i. addEventListener() ii. removeEventListener() iii. stopPropagation() iv. preventDefault()	**2**	**4**	**7M**
		OR			
	b	Define the Selectors API and explain its purpose in the context of DOM manipulation.	**2**	**4**	**7M**
		Discuss the concept of event delegation and provide an example demonstrating how it can simplify event management.	**2**	**4**	**7M**
5		**Unit-V**			
	a	Explain the essential functions and events required for drag-and-drop functionality, and provide an example implementation.	**2**	**5**	**7M**
		Discuss the available animation options for opening and closing dialogs with examples.	**2**	**5**	**7M**
		OR			
	b	Explain the options available for customizing the Sortable widget.	**2**	**5**	**7M**
		Illustrate the process of creating an accordion UI component using jQuery UI.	**2**	**5**	**7M**

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

NARASARAOPET'A ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech I Semester Supple. Examinations, April-2025

Sub Code: R20CC2106 PROBABILITY & STATISTICS

Time: 3 hours CSE (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
1		Unit-I			
	a	i)Find the median salary of the following distribution Salary in ($): 20-30 | 30-40 | 40-50 | 50-60 | 60-70 No. of workers: 3 | 5 | 20 | 10 | 5	3	1	7M
	a	ii) Calculate the mean and Standard deviation for the following table giving the weight (in kg) distribution of 542 members Weight (in kg): 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 No. of Members: 3 | 61 | 132 | 153 | 140 | 51 | 2	3	1	7M
		OR			
	b	i)Calculate the Karl Pearson coefficient for the following distribution. Also, calculate quartile coefficient of skewness. Group: 1-5 | 6-10 | 11-15 | 16-20 | 21-25 | 26-30 | 31-35 Frequency: 3 | 4 | 68 | 30 | 10 | 6 | 2	3	1	7M
	b	ii)Compute skewness and kurtosis if the first four moments of a frequency distribution $f(x)$ about the value $x=4$ are respectively 1,4,10, and 45.	3	1	7M
2		Unit-II			
	a	i)Calculate the correlation coefficient for the following heights in inches of the fathers (x) and their sons (y) x: 65 | 66 | 67 | 67 | 68 | 69 | 70 | 72 y: 67 | 68 | 65 | 68 | 72 | 72 | 69 | 71	3	2	7M
	a	ii) Obtain the rank correlation coefficient for the following data which give the I.Q. of a group of 6 persons who sat in an examination. I.Q(x): 110 | 100 | 140 | 120 | 80 | 90 Marks (y): 70 | 60 | 80 | 60 | 10 | 20	3	2	7M
		OR			
	b	i)A new drug was tested on mice to determine its effectiveness in reducing canceros tumors. Tests were run on 10 mice, each having a tumor of size 4 grams, by varying the amount of the drug used and then determining the resulting reduction in the weight of the tumor. The data were as follows Coded amount of drug: 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 Tumor weight reduction: 0.5 | 0.9 | 1.2 | 1.35 | 1.50 | 1.6 | 1.53 | 1.38 | 1.21 | 0.65 Estimate the maximum expected tumor reduction and the amount of the drug that attains it by fitting a quadratic regression equation.	3	2	7M
	b	ii)Fit a curve $y=ae^{bx}$ for the following data x: 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 y: 1.0 | 1.2 | 1.8 | 2.5 | 3.6 | 4.7 | 6.6 | 9.1	3	2	7M
3		Unit-III			
	a	i) A manufacturing firm employs three analytical plans for the design and development of a particular product. For cost reasons, all three are used at varying times. In fact, plans 1, 2, and 3 are used for 30%, 20% and 50% of the products, respectively. The defect rate is different for the three procedures as follows: $P(D/P_1)=0.01$, $P(D/P_2)=0.03$, $P(D/P_3)=0.02$	3	3	7M

		Where $P(D/P_j)$ is the probability of a defective product, given plan j. If a random product was observed and found to be defective, which plan was most likely used and thus responsible?			
		ii) Let X be an exponential random variable with parameter λ. **Determine** mean and variance of X.	3	3	7M
		OR			
	b	i)In 800 families with 4 children each, how many families would be expected to have 2 boys and 2 girls, at least 1 boy, no girl, at least 2 girls, Assuming that equal probabilities for girls and boys.	3	3	7M
		ii)If the probability that an individual suffers a bad reaction from injection of a given serum is 0.001. Find the probability that out of 2000 individuals exactly, more than 2 individuals, none of them suffer from bad reaction.	3	3	7M
4		Unit-IV			
	a	i) A research worker wants to determine the average time it takes a mechanic to rotate the tires of a car, and she wants to be able to assert with 95% confidence that the mean of her sample is off by at most 0.50 minute. If she can presume from past experience that $\sigma=1.6$ minutes, how large a sample will she have to take?	5	4	7M
		ii) Suppose that X is a random variable with mean μ and variance σ^2. Let $X_1, X_2, X_3,..., X_n$ be a random sample of size n from the population represented by X. **Prove** that the sample mean $\bar{x}$ and sample variance S^2 are unbiased estimators of μ and σ^2 respectively. Also find the standard error of the sample mean.	5	4	7M
		OR			
	b	i)X_1, X_2, and X_3 is a random sample of size 3 from a population with mean value μ and variance σ^2, T_1, T_2, T_3 are the estimators used to estimate mean value μ, where $T_1=X_1+X_2-X_3, T_2=2X_1+3X_3-4X_2$, and $T_3=(\lambda X/1+X_2+X_3)/3$ (i) Are T_1 and T_2 unbiased estimators? (ii) **Determine** the value of λ such that T_3 is unbiased estimator for μ. (iii) With this value of λ is T_3 a consistent estimator? (iv) Which is the best estimator?	5	4	7M
		ii) A random sample of size $n=100$ is taken from a population with $\sigma=5.1$. Given that the sample mean is $\bar{x}=21.6$, **construct** a 95% confidence interval for the population mean μ.	5	4	7M
5		Unit-V			
	a	i) Write the procedure for testing of Hypothesis.	3	5	7M
		ii) The mean height of 80 boys , who participated in the athletic competition in a college was 167 cm with a standard deviation of 9 cm. The mean height of the remaining 160 boys who did not participate in the athletic competition was 163 cm with a standard deviation of 10cm. **Test** the hypothesis at 5% level of significance, whether the students who participated in athletics are taller the other students.	3	5	7M
		OR			
	b	i)The pulsality index (P.I.) of 11 patients before and after contracting a disease are given below. **Test** at 0.05 level of significance whether there is a significant increase of the mean of P.I. values	3	5	7M

Before	0.4	0.45	0.44	0.54	0.48	0.62	0.48	0.60	0.45	0.46	0.35
After	0.5	0.60	0.57	0.65	0.63	0.78	0.63	0.80	0.69	0.62	0.68

		ii)If 57 out of 150 patients suffering with certain disease are cured by allopathy and 33 out of 100 patients with same disease are cured by homeopathy. **Test** whether there is reason to believe that allopathy is better than homeopathy at 0.05 level of significance.	3	5	7M

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

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CE2102

II B.Tech. - I Semester Supple Examinations, April-2025

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	KL	CO	Marks
1		**Unit-I**			
	a	What is capillarity? Derive an expression for the capillary rise of water in a glass tube.	K1	1	7M
		An inverted U-tube differential manometer is connected to two points of pipes A & B through which water is flowing. The vertical distance between the centres of these pipes is 30 cm with B below A. Oil (S = 0.8) is used in the manometer. The level of manometer liquid in the two limbs is 35 cm above the centres of the respective pipes. Determine the difference in pressure between the pipes.	K3	1	7M
		OR			
	b	A plate 0.05 nm distance from a fixed plate moves at 600 mm/s and requires a force of 3 N per unit area to maintain this speed. Determine the fluid viscosity between the plates. Also, find the specified weight of the above fluid if the kinetic viscosity of the fluid is 0.003×10^{-4} m^2/s.	K3	1	7M
		Derive an expression for total pressure and position of the centre of pressure on a vertically immersed plate surface. Show that the centre of pressure lies below CG.	K2	1	7M
2		**Unit-II**			
	a	Derive 3D continuity equation in differential form.	K1	2	7M
		The velocity component for a two-dimensional incompressible flow is given by u =3x – 2y and v = -3y – 2x. Show that the velocity potential exists. Determine the velocity potential function and stream function.	K3	2	7M
		OR			
	b	Differentiate between (i) Uniform and non-uniform flow (ii) Steady and unsteady flow.	K2	2	4M
		Calculate the unknown velocity components so that they satisfy the continuity equation: (a) $u = 2x^2$; v = xyz ; w = ? (b) $u = (2x^2 + 2xy)$; $w = (z^3 - 4xz - 2yz)$; v = ?	K4	2	10M
3		**Unit-III**			
	a	Derive the Euler's equation of motion and then obtain Bernoulli's equation.	K2	3	7M
		Obtain the condition for maximum efficiency in the transmission of power through a pipeline.	K2	3	7M
		OR			
	b	Prove that the equation of the free jet of liquid is given by the expression, $y = x\tan\theta - \frac{g x^2}{2U^2}\sec^2\theta$ where x,y = coordinates of a point on the jet; U = velocity of issuing jet; θ = inclination of the jet with horizontal.	K3	3	7M

		A 20 cm X 10 cm venturimeter measures the flow of water in a horizontal pipe. The pressure at the inlet of the venturimeter is 17.658 N/cm^2, and the vacuum pressure at the throat is 30cm of mercury. Find the discharge of water through the venturimeter, assuming C_d = 0.98.	K4	3	7M
4		**Unit-IV**			
	a	Water flows over a rectangular weir 1.0m wide at a depth of 150mm and afterwards passes through a triangular right angles weir, taking the coefficient of discharge for the rectangular and triangular weir as 0.62 and 0.49, respectively. Find the depth of water over the triangular weir.	K4	4	7M
		Explain the classification of orifice and mouthpiece based on their shape, size, sharpness and discharge.	K2	4	7M
		OR			
	b	Define an orifice and mouthpiece. What are hydraulic coefficients? Explain them.	K2	4	7M
		Derive an expression for discharge through a V-notch.	K2	4	7M
5		**Unit-V**			
	a	Derive the Darcy-Weisbach equation for head loss due to friction in pipes.	K2	5	7M
		Derive an expression for mean velocity for laminar flow (i) through a pipe (ii) between parallel plates.	K2	5	7M
		OR			
	b	What do you understand by hydrodynamically smooth and rough pipes?	K2	5	7M
		When a sudden contraction from 60 cm diameter to 30 cm is introduced in a horizontal pipeline, the pressure drops from 100 kPa upstream of the contraction to 80 kPa downstream. Assuming a coefficient of contraction of 0.65, (i) Estimate the flow rate in the pipe and (ii) the loss of head due to sudden contraction.	K4	5	7M

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

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CE2103

II B.Tech. - I Semester Supple Examinations, April-2025

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	KL	CO	Marks
1		**Unit-I**			
	a	Explain with a stress-strain diagram for mild steel, indicating the elastic limit, yield point, ultimate strength, and fracture point.	K1	1	7M
		A circular rod of diameter 20 mm and length 500 mm is subjected to a tensile load of 30 kN. Calculate the stress, strain, and elongation of the rod. Assume Young's modulus for the material is 200 GPa.	K2	1	7M
		OR			
	b	Prove the relationship between Young's modulus (E), Shear modulus (G), and Poisson's ratio (ν). Given E = 200 GPa and ν = 0.25, calculate G.	K1	1	7M
		A bar of length 1 m and cross-sectional area 100 mm² is subjected to a tensile load of 50 kN. Calculate the strain energy stored in the bar. Young's modulus = 200 GPa.	K2	1	7M
2		**Unit-II**			
	a	Explain the concept of shear force and bending moment in beams. Derive the relationship between shear force, bending moment, and the rate of loading.	K1	2	7M
		Draw the shear force and bending moment diagrams for a simply supported beam of length 10 m subjected to a uniformly distributed load of 4 kN/m over the left half of the span and a point load of 20 kN at midspan.	K3	2	7M
		OR			
	b	What is a point of contra flexure? Explain its significance in the analysis of bending moments in beams.	K1	2	7M
		Draw the shear force and bending moment diagrams for a simply supported beam of length 10 m subjected to a uniformly varying load of 2 kN/m at the left end increasing to 8 kN/m at the right end.	K3	2	7M
3		**Unit-III**			
	a	Calculate the shear stress at various points for a rectangular beam 200 mm wide and 400 mm deep subjected to a shear force of 20 kN.	K2	3	7M
		Derive the bending equation M/I=f/y=E/R and explain the assumptions made in the theory of simple bending.	K3	3	7M
		OR			
	b	Calculate the section modulus for a hollow circular section with an outer diameter of 200 mm and an inner diameter of 100 mm.	K1	3	7M
		A T-section beam with flange 200 mm wide and 20 mm thick, and a web 300 mm high and 15 mm thick is subjected to a bending moment of 80 kNm. Calculate the bending stresses at the top flange and at the junction of the flange and the web.	K3	3	7M
4		**Unit-IV**			
	a	A cantilever beam of length 4 m carries a point load of 20 kN at the free end. Determine the slope and deflection at the free end using the double integration method. Assume EI=50×10^6 N·m²	K3	4	7M

		A simply supported beam of span 9 m is subjected to a uniformly distributed load of 5 kN/m over the middle 3 m length. Calculate the slope at the supports and the maximum deflection using Macaulay's method. Assume EI=95×10^6 N•m^2	K3	4	7M
		OR			
	b	An overhanging beam of total length 8 m has 2 m overhangs on each end. It carries a point load of 15 kN at the free end of one overhang. Determine the slope and deflection at the free end using the double integration method. Assume EI=50×10^6 N•m^2	K3	4	7M
		A simply supported beam of span 10 m is subjected to a uniformly varying load of 5 kN/m at one end to 10 kN/m at the other end. Determine the slope and deflection at midspan using Mohr's theorems. EI=90×10^6 N•m^2	K3	4	7M
5		**Unit-V**			
	a	Derive the expressions for longitudinal and circumferential stresses in a thin cylindrical shell subjected to internal pressure. A cylindrical shell of diameter 1 m and thickness 10 mm is subjected to an internal pressure of 2 MPa. Calculate the longitudinal and circumferential stresses.	K2	5	7M
		A compound cylinder is formed by shrinking a cylinder of external diameter 150 mm and internal diameter 100 mm onto another cylinder of external diameter 200 mm and internal diameter 150 mm. If the interface pressure is 8 MPa, determine the radial and hoop stresses at the interface.	K3	5	7M
		OR			
	b	Derive Lame's equations for thick-walled cylinders subjected to internal and external pressures. Explain the assumptions made in the derivation.	K2	5	7M
		A thick-walled cylinder of internal diameter 0.3 m and external diameter 0.6 m is subjected to an internal pressure of 2 MPa and an external pressure of 1 MPa. Calculate the radial and hoop stresses at various points across the wall thickness using Lame's equations.	K3	5	7M

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

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CE2104

II B.Tech. - I Semester Supple Examinations, April-2025

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	What are the instruments used in chain surveying? How is a chain survey executed in the field?	2	1	7M
		Explain about local attraction and how to check	2	1	7M
		OR			
	b	Write the principles of surveying	2	1	7M
		Define the terms a. Bearing b. Meridian c. Types of bearing and meridian	2	1	7M
		Unit-II			
2	a	Define benchmark, line of collimation, reduced level and back sight.	2	2	7M
		Define Contours. What are the characteristics of contours?	2	2	7M
		OR			
	b	Discuss the height of instrument & rise and fall methods of computing the levels. Discuss the merits and demerits of each.	2	2	14M
		Unit-III			
3	a	How would you measure a horizontal angle by reiteration method? Explain	2	3	7M
		Describe the any two types of Theodolite	2	3	7M
		OR			
	b	How would you measure a horizontal angle by repitition method? Explain	2	3	7M
		Explain the temporary adjustments in theodolite	2	3	7M
		Unit-IV			
4	a	Write any four features of Total station	2	4	7M
		What are the advantages of EDM's when compared to other instruments?	2	4	7M
		OR			
	b	What is a tacheometer? What are the different systems of tacheometric measurement?	2	4	7M
		Write the procedure for setting out a compound curve.	2	4	7M
		Unit-V			
5	a	Explain about the principles of subsea surveying and geomatics	2	5	7M
		How do you determine the scale of an aerial photograph?	2	5	7M
		OR			
	b	What is terrestrial photogrammetry? What are the types of terrestrial photogrammetry?	2	5	7M
		Define focal length, ground nadir point and oblique photograph.	2	5	7M

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

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CE2105

II B.Tech. - I Semester Supple Examinations, April-2025
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
1		**Unit-I**			
	a	Describe the significance of different grades of cement.	**2**	**1**	**7M**
		Explain about manufacture of Portland cement by dry process	**2**	**1**	**7M**
		OR			
	b	Explain about High alumina cement	**2**	**1**	**7M**
		Discuss about Sulphate resisting cement	**2**	**1**	**7M**
2		**Unit-II**			
	a	What is Workability and discuss the factors affecting workability	**2**	**2**	**7M**
		Explain the Vee-bee method of determining workability with neat sketches	**2**	**2**	**7M**
		OR			
	b	Explain the significance of the tests on concrete at fresh state while we are interested only in concrete at hardened state?	**2**	**2**	**14M**
3		**Unit-III**			
	a	Write the Effect of mineral admixtures on strength and durability of concrete.	**2**	**3**	**7M**
		Explain about silica fume its advantages and disadvantages	**2**	**3**	**7M**
		OR			
	b	Write the Effect of mineral admixtures on fresh and hardened concrete	**2**	**3**	**7M**
		Explain any two types of chemical admixtures	**2**	**3**	**7M**
4		**Unit-IV**			
	a	What is Sulphate attack and explain any one method of controlling Sulphate attack	**2**	**4**	**7M**
		Explain about the Effect of height/diameter ratio on compressive strength	**2**	**4**	**7M**
		OR			
	b	Discuss the Factor's affecting modulus of elasticity and Poisson's ratio	**2**	**4**	**7M**
		Explain different moduli of elasticity of concrete and explain their practical significance	**2**	**4**	**7M**
5		**Unit-V**			
		Design mix proportions with the following data using IS code method. Characteristic compressive strength of concrete 30 Mpa. 20mm Maximum size of round aggregate. Moderate degree of workability. Specific gravity of concrete 3.15. specific gravity of coarse and fine aggregates 2.65. Zone III	**3**	**5**	**14M**

		sand. Good quality control.			
		OR			
	b	Write about the Proportioning of Concrete Mixes	**2**	**5**	**7M**
		Discuss in detail how high performance concrete is prepared? What are its applications and advantages?	**2**	**5**	**7M**

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EE2102

II B.Tech. - I Semester Supple Examinations, April-2025
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	KL	CO	Marks
		Unit-I			
1	a	Draw the circuit diagram and analyze the 3 phase 4 wire supply connected to balanced star connected load?	2	1	7M
		A balanced 3 phase star connected load is fed from a 212V 3 phase supply. Each leg of the load has a resistance of 32 ohms. Find the power factor, the total power, the phase currents and the line currents of the systems?	3	1	7M
		OR			
	b	Draw the circuit diagram and analyze the 3 phase 3 wire supply connected to balanced delta connected load?	2	1	7M
		Three equal star connected inductors take 7.8kW at 0.7 power factor when connected to a 440V 3 phase 3 wire supply. Calculate the line currents if one conductor is short circuited?	3	1	7M
		Unit-II			
2	a	Explain the three watt meter method for the three phase power measurement with circuit diagram?	2	2	7M
		The power input to a load was measured by two watt meter method. The readings are 780W and 390W, the next reading is obtained after reversing the potential coil connections. Determine the power and power factor of the load?	3	2	7M
		OR			
	b	Explain the power factor measurement by using two watt meter method? Also draw the circuit diagram?	4	2	14M
		Three un equal non reactive resistances are mesh connected to a 410V, symmetrical three phase system. If the line currents are 48A, 72A and 102A. Find the total load? If two watt meters are connected in the circuit to measure the power input, find the reading on each instrument. The current coils are connected in the lines carrying 48A and 102A?	3	2	
		Unit-III			
3	a	Analyze the staedy state response of R-L-C circuit excited with D.C input with necessary equations?	3	3	7M
		A 17V source is applied to a capacitive circuit has an impedance of (8-j22) ohms. Calculate the current and the power in the circuit?	4	3	7M
		OR			
	b	Analyze the transient response of R-C circuit excited with A.C input with necessary equations?	2	3	7M
		A 4600 ohms resistor and 3.4 micro farad capacitor are connected in paralle across a 215V 50Hz supply. Find the circuit impedance and the line current?	3	3	7M
		Unit-IV			
4	a	Derive and analyze the parallel connection of two port networks with equivalent circuit diagram?	4	4	7M

		Derive the inverted transmission line parameters of two port network with circuit diagram?	2	4	7M
		OR			
	b	Derive and analyze the cascade connection of two port networks with equivalent circuit diagram?	4	4	7M
		Derive the inverted h- parameters of two port network with circuit diagram?	2	4	7M
5		**Unit-V**			
	a	Discuss in detail about the basic synthesis procedure and assumptions made with relevant to electrical networks?	2	5	7M
		Compare the properties of RC impedance and RL admittance functions?	2	5	7M
		OR			
	b	Explain the role and properties of positive real function with relevant expressions?	3	5	7M
		Compare the properties of RL impedance and RC admittance functions?	2	5	7M

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

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EE2103

II B.Tech. - I Semester Supple Examinations, April-2025

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
1		**Unit-I**			
	a	i] Draw the OCC characteristics of DC shunt generator and explain how to find critical resistance of DC Generators.	K1	1	7M
		ii] The terminal voltage of a separately excited DC Generator with constant excitation is constant and is equal to 250 V. Determine the percentage reduction in speed when the load changes from 250 KW to 150 KW. The armature resistance is 0.05Ω and total contact drop at brushes = 2.2 V. Neglect armature reaction.	K3	1	7M
		OR			
	b	i] Derive an expression for the EMF generated in a DC machine?.	K2	1	7M
		ii] Explain the importance of armature, commutator and brush gear in a DC generator.	K2	1	7M
2		**Unit-II**			
	a	i] Derive the torque equation of DC motor?	K2	2	7M
		ii] A 230V DC shunt motor takes 5A when running at no-load. The armature resistance is 0.2 Ω and field resistance is 115 Ω. For an input current of 72A, calculate the shaft output and efficiency. Also calculate the armature current at which the efficiency is maximum.	K3	2	7M
		OR			
	b	i] Explain the significance of back EMF in a DC machine.	K1	2	7M
		ii] A 4 pole, 220V DC shunt generator has armature and field resistances of 0.2Ω and 220Ω respectively. The armature has 520 conductors lap wounded. The machine runs at 1600 rpm. Find the generated EMF and flux developed per pole	K3	2	7M
3		**Unit-III**			
	a	i] Explain various methods for speed control of DC motors.	K2	3	7M
		ii] The armature of a 6-pole lap wound dc shunt motor takes 400 A at a speed of 350 rpm. The flux per pole is 80 mWb's, the number of turns is 600 and 3% of torque is lost in friction and iron losses. Calculate the brake horse power, back emf and supply voltage if armature resistance is 0.1 Ω.	K3	3	7M
		OR			
	b	i] How can the efficiency of a DC shunt motor be predetermined? Explain with circuit diagram and relevant calculations. Discuss the merits and demerits of this test	K2	3	7M
		ii] Explain Hopkinson's test with its advantages and disadvantages.	K2	3	7M
4		**Unit-IV**			
	a	i] Derive an EMF equation for transformer with usual notation.	K2	4	7M

		ii] The primary winding of a 50-Hz transformer has 480 turns and is fed from a 6400V supply. Determine (a) the peak value of the flux in the core, and (b) the secondary voltage if the secondary winding has 20 turns.	K3	4	7M
		OR			
	b	i] Derive an expression for the saving of copper in an autotransformer as compared to an equivalent two winding transformer.	K1	4	7M
	b	ii] A 5KVA, 1000/200 V, 50 Hz single phase transformer gave the following test results: Open circuit test (LV side): 200 V, 1.2 A, 90 W Short circuit test (HV side): 50 V, 5 A, 110 W. Compute the parameters of approximate equivalent circuit referred to LV side.	K3	4	7M
5		**Unit-V**			
	a	i]) With the help of neat sketch, explain in detail about parallel operation of single phase transformers.	K2	5	7M
	a	ii] Explain with the help of connection diagrams the operation of off – load and on – load tap changers.	K2	5	7M
		OR			
	b	i] It is desired to transform 2400 V,500 kVA three-phase power to two-phase power 600 V by scott-connected transformers. Determine the voltage and current rating of both primary and secondary of each transformer. Neglect the transformer no load currents.	K2	5	7M
	b	ii] What is the significance of Y-Y, Y-delta and Delta-Y, Delta-Delta connections in 3-phase transformers?	K2	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 Supple Examinations, April-2025

ELECTROMAGNETIC FIELDS

(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
1		**Unit-I**			
	a	**Derive** the expression for the capacitance of a spherical capacitor. A parallel plate capacitor has a plate area $1.5m^2$ and the separation of 5mm. There are two dielectrics in between the plates. The first dielectric has a thickness of 3mm with relative permittivity of 6, second dielectric has a thickness of 2mm with relative permittivity of 4. **Find** the capacitance.	K3	1	14M
		OR			
	b	**i) Derive** relation between electric potential and field intensity.	K3	1	7M
		ii) Derive an expression for electric potential due to an electric dipole.	K3	1	7M
2		**Unit-II**			
	a	**i) Derive** Laplace and Poisson's equations.	K3	2	7M
		ii) Define polarization and **explain** the behavior of a perfect conductor in an electric field.	K3	2	7M
		OR			
	b	If $\mathbf{D}= (2y^2+z)\mathbf{a}_x + 4xy\mathbf{a}_y + x\mathbf{a}_z$ C/m^2. **Find:** i). The volume charge density at (-1, 0, 3) ii). If the flux through the cube defined by $0\le x\le 1$, $0\le y\le 4$, $0\le z\le 1$. Find the total charge enclosed by the cube.	K3	1	14M
3		**Unit-III**			
	a	**i) State** and **explain** Biot-Savart's law.	K2	3	7M
		ii) Derive H at the center of the current carrying square loop placed in xy-plane.	K3	3	7M
		OR			
	b	**i) State** and **explain** Ampere's circuital law.	K2	3	4M
		ii) Derive an expression for H of a straight current carrying conductor.	K3	3	10M
4		**Unit-IV**			
	a	**i) Derive** an expression for magnetic force between two neighbouring current carrying conductors.	K3	4	7M
		ii) An electron with velocity $(3\mathbf{a}_x + 12\mathbf{a}_y - 4\mathbf{a}_z)$ m/s experiences no net force at a point in a magnetic field $(10\mathbf{a}_x + 20\mathbf{a}_y + 30\mathbf{a}_z)$ mWb/m^2. **Find** electric field intensity at that point.	K3	4	7M
		OR			
	b	**i) Derive** an expression for torque experienced by magnetic dipole.	K3	4	7M
		ii) Derive an expression for energy stored in a magnetic field.	K3	4	7M

5		**Unit-V**			
	a	**i) Define** static and rotational induced emfs	K1	5	4M
		ii) Derive Maxwell's equations for time varying fields.	K3	5	10M
		OR			
	b	**i) Explain** the electromagnetic wave propagation in dielectrics.	K2	5	7M
		ii) State and **prove** Poynting theorem.	K2	5	7M

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

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EE2105

II B.Tech. - I Semester Supple Examinations, April-2025

ANALOG ELECTRONICS

(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	What are the advantages and disadvantages of negative amplifier in detail?	L3	CO1	7M
		Show that for a current series feedback amplifier the input and output resistances are increased by a factor if (1+Aβ) with feedback.	L3	CO1	7M
		OR			
	b	Explain with the help of mathematical expressions, how the negative feedback in amplifiers increases amplifier bandwidth and reduces distortion in amplifiers.	L2	CO1	7M
		An amplifier has a midband gain of 125 and a bandwidth of 250KHz. If 4% negative feedback is introduced, find the new bandwidth and gain.	L3	CO1	7M
		Unit-II			
2	a	Explain the response of RC Low pass circuit for a square wave input under different time constants.	L2	CO2	7M
		With the help of a circuit diagram, explain the operation of shunt clipper.	L2	CO2	7M
		OR			
	b	Prove that RC high pass circuit generates impulses at low time constants when the square wave is given as input.	L3	CO2	14M
		Explain the operation of practical clamper circuit for varying input amplitude.	L2	CO2	
		Unit-III			
3	a	Explain the dual input balanced output differential amplifier with a circuit diagram.	L2	CO3	7M
		Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1 kHz.	L4	CO3	7M
		OR			
	b	Draw a neat circuit of an integrator circuit. Explain the functioning with the input-output Waveforms.	L2	CO3	7M
		The op-amp non-inverting summing circuit has the following parameters V_{CC} = +15 V, V_{EE} = -15V, R = R_1= 1 kΩ, R_f = 2 kΩ, V_1 = +2 V, V_2 = -3 V, V_3 = +4 V. Determine the output voltage V_o.	L3	CO3	7M
		Unit-IV			
4	a	Explain the operation of Bistable Multivibrator with the help of a circuit diagram.	L2	CO4	7M
		If R_A = 6.8 KΩ, R_B = 3.3 KΩ, C = 0.1μF in 555 Astable Multivibrator. Calculate (i) thigh (ii) t_{Low} (iii) Free running frequency	L3	CO4	7M
		OR			
	b	Explain in which the 555 timer can be used as monostable multivibrator.	L2	CO4	7M
		Design a bistable multivibrator to meet the following specifications: V_{CC} = V_{BB} = 12 V, $I_{C(sat)}$ = 6 mA, $h_{FE(min)}$ = 25, maximum trigger frequency = 25 kHz.	L3	CO4	7M

5		**Unit-V**			
	a	Draw and explain the frequency response of Band pass and Band reject filters	L2	CO5	**7M**
		Illustrate the working of successive approximation type A/D converter with a diagram.	L2	CO5	**7M**
		OR			
	b	Explain the operation of first order low pass butter worth filter and derive the expression for filter gain.	L2	CO5	**7M**
		With sketch explain the working principle of Weighted resistor DAC using Op-Amp.	L2	CO5	**7M**

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

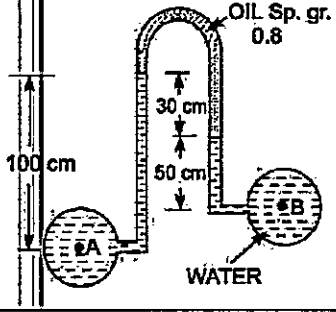
NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20ME2102

II B.Tech. - I Semester Supple Examinations, April-2025
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
1		**Unit-I**			
	a	State the following fluid properties: Mass Density, weight density, specific volume and specific gravity of a fluid and mention their SI units.	2	1	7M
		An oil film of thickness 1.6 mm is used for lubrication between a square plate of size 0.8 m × 0.8 m and an inclined plane having an angle of inclination 15^0. The weight of the square plate is 390 N and it slides down the plane with a uniform velocity of 0.25 m/s. Find the dynamic viscosity of the oil.	3	1	7M
		OR			
	b	Explain about U-tube differential manometer and inverted U-tube differential manometer with neat sketches.	2	1	7M
		In an inverted U tube differential manometer connected two pipes A and B containing water. The fluid in manometer is oil of specific gravity 0.8. For the manometer readings shown in the figure, determine the pressure difference between A and B. 	3	1	7M
2		**Unit-II**			
	a	Distinguish between a) Laminar and Turbulent b) Steady and Unsteady c) Uniform and Non-Uniform d) Compressible and incompressible flow.	2	2	7M
		A Water pipe changes in diameter from 400mm at section A to 800mm at section B which is 7 m above. The pressures at A and B are 100 kPa and 75 kPa respectively. The discharge is 400 litres/Sec. Find the direction of flow.	3	2	7M
		OR			
	b	Derive the continuity equation from fundamentals.	2	2	7M
		State assumptions and derive an expression for Bernoulli's theorem.	2	2	7M
3		**Unit-III**			
	a	Explain the Rayleigh's method and determine the time period (T) of a pendulum with length (L) and acceleration due to gravity (g) by using Rayleigh's method	3	3	7M
		Discuss the Buckingham Pi theorem and mention conditions for selecting repeating variables.	2	3	7M

		OR			
	b	Derive an expression for the momentum thickness.	**3**	**3**	**7M**
		For the given velocity profile $\frac{u}{U_{Max}} = \left(\frac{y}{\delta}\right)$, Determine 1) Displacement thickness. 2) Momentum thickness. 3) Energy thickness.		**3**	**7M**
4		**Unit-IV**			
	a	Derive the equation for impact of jet striking a moving inclined plate in the direction of jet.	**2**	**4**	**7M**
		A jet of water of diameter 40 mm moving with a velocity of 30m/sec strikes a curved fixed symmetrical plate at the center. Find the force exerted by the water on the plate, if the jet is deflected through an angle of 120 degrees at the outlet of the curved plate.	**3**	**4**	**7M**
		OR			
	b	Explain the classification of turbines.	**2**	**4**	**7M**
		A Pelton wheel is to be designed for the following specifications: Shaft power = 11,772 kW; Head = 380 meters: speed = 750 r.p.m; overall efficiency = 86%; jet diameter is not to exceed one-sixth of the wheel diameter, Determine (i) The wheel diameter. (ii) The number of jets required.	**3**	**4**	**7M**
5		**Unit-V**			
	a	Discuss the working principle of single stage centrifugal pump with neat sketch.	**2**	**5**	**7M**
		A centrifugal pump delivers water against a net head of 10 m at a designed speed of 800 rpm. The vanes are curved backwards and make an angle of 30^0 with the tangent at the outer periphery. The impeller diameter is 30cm and has a width of 5cm at the outlet. Determine the discharge of the pump, if the manometric efficiency is 85%.	**3**	**5**	**7M**
		OR			
	b	Discuss the working principle of a reciprocating pump? Explain its working with the help of an indicator diagram	**2**	**5**	**7M**
		A single acting reciprocating pump running at 50 r.p.m delivers 0.01 m^3/sec. The diameter of the piston is 20cm and stroke length is 40cm.Find the (i) coefficient of discharge (ii) slip and percentage of slip of the pump.	**3**	**5**	**7M**

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

Narasaraopeta Engineering College (Autonomous)
Kotappakonda Road, Yellamanda(P.O), Narasaraopet – 522601, Gunturn District, A.P.

Subject Code:R20ME2103

II B.Tech. - I Semester Supple Examinations, April-2025
METROLOGY & INSTRUMENTATION

Time: 3 Hours | Max.Marks:60. | Branch: ME.

Note: Answer All **FIVE** Questions.
All Questions Carry Equal Marks (5 X 12 =60M)

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1. A) I) Explain the types and systems of fits with necessary sketches.
   II) Explain the significance of the following terms with suitable examples: interchange ability and selective assembly.

   OR

   B) I) State the condition when the shaft based system is used for limits and fits
   II) Bring out the salient features of British standard and ISO systems of limits and fits.

2. A) I) Mention few applications of bevel protractors.
   II) Explain with neat sketches the variants of sine bars and their applications

   OR

   B) I) Differentiate between Line Standard and End Standard of measurement.
   II) Explain with a neat sketch the working mechanism of gear and pinion type dial indicator

3. A) State and explain the Taylor's principle of gauge design with neat sketch of Plug gauge and plug gauge.

   OR

   B) Explain the working principle of tool maker's microscope with a neat sketch.

4. A) I) How do random errors differ from systematic errors?
   II) Distinguish between static and dynamic characteristics of an instrument.

   OR

   B) Explain with the help of a diagram and characteristics the operation of LVDT

5. A) Define Thermocouple. List various types of thermocouples. With neat diagram explain the operation of Thermocouple

   OR

   B) Explain the working of McLeod pressure gauge with neat sketch?

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

6

Subject Code: R20ME2104

II B.Tech. - I Semester Supple Examinations, April-2025

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
1		**Unit-I**			
	a	i) Explain about thermodynamic path, how heat and work are different forms of energy.	K2	01	7M
		ii) Explain about Quasi-static process, how the work done during quasi static process can be treated as reversible.	K2	01	7M
		OR			
	b	i) What is a constant volume gas thermometer? Why is it preferred to a constant pressure gas thermometer?	K2	01	7M
		ii) A new scale N of temperature is divided in such a way that the freezing point of ice 1000N and the boiling point is 4000N. What is the temperature reading on this new scale when the temperature is 160^{0}C? At what temperature both the Celsius and the new temperature scale reading would be the same?	K3	01	7M
2		**Unit-II**			
	a	i) What is first law of thermodynamics and explain first law for a process and a cycle.	K2	02	7M
		ii) A piston-cylinder device operates 1 kg of fluid at 20 atm. Pressure. The initial volume is 0.04 m^3. The fluid is allowed to expand reversibly following a process $PV^{1.4}$ = constant so that the volume becomes double. The fluid is then cooled at a constant pressure until the piston comes back to the original position. Keeping the piston unaltered, heat is added reversibly to restore it to the initial pressure. Calculate the work done in the cycle	K4	02	7M
		OR			
	b	Derive the Steady flow energy equation for an open system and write its applications for turbine and compressor.	K3	02	14M
3		**Unit-III**			
	a	i) State and prove Clausius theorem; Explain Clausisus inequality from the assumptions.	K3	03	7M
		ii) One kg of ice at -0^{0}C is exposed to the atmosphere which is at 20^{0}C. Ice melts and comes into thermal equilibrium with the atmosphere. Determine the entropy increase of the universe.	K3	03	7M
		OR			
	b	A reversible heat engine operates between two reservoirs at temperatures of 600^{0}C and 40^{0}C. The engine drives a reversible refrigerator which operators between reservoirs at temperatures 40^{0}C and -20^{0}C. The heat transfer to the heat engine is 2000 kJ and the network output of the combined engine refrigerator plant is 360 kJ Evaluate the heat transfer to the refrigerator and the net heat transfer to the reservoir at 400C	K4	03	14M
4		**Unit-IV**			
	a	Explain the phase equilibrium diagram of water with ice at -10^{0}C to Steam at 250^{0}C, using P-V, T-S, H-S diagrams. Mention the importance of critical point.	K4	04	14M

		OR			
	b	Water is heated at a constant pressure of 0.7 MPa. The boiling point is 164.97^{0}C. The initial temperature of water is 0^{0}C. The latent heat of evaporation is 2066 kJ/kg. Find the increase of entropy of water if the final temperature is steam.	K3	04	14M
5		**Unit-V**			
	a	With a neat sketch explain the working of Otto cycle and derive the expression for its thermal efficiency and mean effective pressure	K3	05	14M
		OR			
	b	With a neat sketch explain the working of simple Rankine cycle and derive the expression for its thermal efficiency. Discuss the methods to improve the thermal efficiency	K3	05	14M

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20ME2105

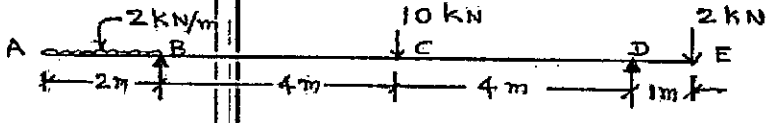
II B.Tech. - I Semester Supple Examinations, April-2025

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	KL	CO	Marks
1		**Unit-I**			
	a	i) Draw stress-strain curve for a mild steel rod subjected to tension and explain about the salient points on it.	KL2	CO1	7M
		ii) Determine the young's modulus and Possion's ratio of a metallic bar of length 25cm breadth 3cm depth 2cm when the beam is subjected to an axial compressive load 240KN. The decrease in length is given by 0.05cm and increase in breadth 0.002cm.	KL3	CO1	7M
		OR			
	b	i) Write the differences among Gradual, Sudden, Impact and Shock loadings with the help of expressions.	KL2	CO1	7M
		ii) A steel bar 320 mm long and 40 mm wide 30 mm thickness is subjected to a pull of 250KN in the direction of its length. Determine the change in volume.	KL3	CO1	7M
2		**Unit-II**			
	a	Sketch the S.F. &B.M. diagrams for an Overhanging beam ABCDE shown. Mark all the salient points with respective values. 	KL3	CO2	14M
		OR			
	b	Derive the relation between shear force, bending moment and loading for beam carrying uniformly distributed load.	KL3	CO2	14M
3		**Unit-III**			
	a	A simply supported beam having span 4 m is subjected to a UDL of 30 kN/m over whole span. The cross-section of beam is T section. The dimensions of flange are 120mmx10mm and that of web are 200mmx15mm. Draw shear stress distribution across the depth of cross-section marking the values at salient points.	KL3	CO3	14M
		OR			
	b	A steel beam of I – section 200mm deep and 160mm wide has 16 mm thick flanges and 10mm thick web. The beam is subjected to a shear force of 200 KN. Determine the shear stress distribution over the beam section if the web of the beam is kept horizontal.	KL3	CO3	14M
4		**Unit-IV**			
	a	A simply supported beam span 14m, carrying concentrated loads of 12KN and 8KN at two points 3mts and 4.5m from the two ends respectively. Moment of Inertia I for the beam is 160×10^4 mm^4 and E = 210KN/mm^2. Calculate deflection of the beam at points under the two loads by macaulay's method.	KL3	CO4	14M
		OR			
	b	A simply supported beam of 8m carries a partial uniform distributed load of intensity 5KN/m and length 2m, starting from 2m from the left end. Find slope at left support and central deflection. Take E= 200Gpa and I=8×10^8mm^4 .	KL3	CO4	14M

5		**Unit-V**			
	a	A thin cylindrical shell is 3m long and 1m in internal diameter. It is subjected to internal pressure of 1.2 MPa. If the thickness of the sheet is 12mm, find the circumferential stress, longitudinal stress, changes in diameter, length and volume. Take E=200 GPa and μ= 0.3.	KL3	CO5	14M
		OR			
	b	i) Derive torsion equation with assumptions.	KL2	CO5	10M
		ii) Find the angle of twist per metre length of a hollow circular shaft of 100 mm external and 60 mm internal diameter, if the shear stress is not to exceed 35 M Pa. Take C = 85 G Pa.	KL3	CO5	4M

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

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EC2102

II B.Tech. - I Semester Supple Examinations, April-2025

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)

Q.No		Questions	KL	CO	M
1		**Unit-I**			
	a	i) **List** the current component of PN junction diode and define diode current equation.	1	1	7M
		ii) **Explain** the semiconductors, insulators and metals classification using energy band	2	1	7M
		OR			
	b	i) **Deduce** the expression for Concentration of Hole and Electron in an intrinsic semiconductor and also prove the Fermi level position in intrinsic semiconductor	4	1	7M
		ii) **Define** transition capacitance in a diode and derive the expression for it.	3	1	7M
2		**Unit-II**			
	a	i) **Deduce** the expression for ripple factor of a full-wave rectifier with capacitor filter	4	2	7M
		ii) **Explain** the working of Zener diode and its V-I characteristics. And what is the sufficient condition for regulation.	2	2	7M
		OR			
	b	i) **Explain** the construction and working of Varactor diode with the help of V-I characteristics.	3	2	7M
		ii) **Write** short notes on the principle of LED.	2	2	7M
3		**Unit-III**			
	a	i) **Analyze** about input and output characteristics of a transistor when it is connected in common base configuration.	4	3	7M
		ii).**Show** that transistor acts as a switch and explain briefly about its switching times.	4	3	7M
		OR			
	b	i) **Compare** CE, CB and CC configurations.	3	3	7M
		ii) **Justify** why does the CE configuration provide large current amplification while the CB configuration does not	4	3	7M
4		**Unit-IV**			
	a	i)) **What** is the need for biasing what are the factors effecting the operating point in BJT?	2	4	7M
		ii) **Find** the operating point and stability factor in a silicon transistor with a fixed bias, Vcc= 9 V, Rc= 3 kΩ, RB= 8kΩ, β = 50, VBE= 0.7V.	4	4	7M

		OR			
	b	i) **Make use of** circuit diagram of Fixed bias circuit of CE amplifier and derive expression for S, S^{I} and S^{II}	3	4	7M
		ii) **How** Thermal runaway occurs, explain in detail.	2	4	7M
5		**Unit-V**			
	a	i) **Make use of** Working of UJT in electronic circuits.	2	5	7M
		ii). **Define** the pinch-off voltage Vp, sketch the depletion region before and after Pinch-off	2	5	7M
		OR			
	b	i) **Explain** the working of a depletion type MOSFET with a neat construction diagram and its characteristics.	3	5	7M
		ii)**Compare** JFET and MOSFET.	2	5	7M

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

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EC2103

II B.Tech. - I Semester Supple Examinations, April-2025
SIGNALS AND SYSTEMS
(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) Define and sketch the unit step function and Signum function? Bring out the relation between these two functions?	2	1	7M
		ii) Explain the relation between Cross and Auto Correlation?	2	1	7M
		OR			
	b	Explain the following i) Impulse Sampling ii) Natural and flat top Sampling?	2	1	7M
		Unit-II			
2	a	i) Explain the analogy of vectors and signals in terms of Orthogonally and evaluation of Constant?	2	2	7M
		ii) Discover relation between Trigonometric Fourier series and Exponential Fourier series?	3	2	7M
		OR			
	b	i) What are the properties of Fourier series?	2	2	7M
		ii) Obtain the condition under which two signals $f_1(t)$ and $f_2(t)$ are said to be orthogonal to each other. Hence prove that Sin nw_0t and Cos mw_0t are orthogonal to each other for all integer values of m, n?	3	2	7M
		Unit-III			
3	a	i) Define Hilbert Transform. What is its Significance?	2	3	7M
		ii) The Signal X(t) with Fourier transform $X(jw) = u(\omega+\omega_0) - u(\omega-\omega_0)$ can undergo impulse train sampling without aliasing, provided that the Sampling period $T < \Pi/\omega_0$. Justify	3	3	7M
		OR			
	b	i) Compute the Fourier transform of the Signal $X(t) = e^{-at}$?	3	3	7M
		ii) State and prove the time and frequency differentiation properties of Fourier transform?	3	3	7M
		Unit-IV			
4	a	i) State the properties of the ROC of LT?	3	4	7M
		ii) Find the Laplace transform of Coswt?	3	4	7M
		OR			
	b	i) Derive the relation between Laplace transform and Fourier Transform?	3	4	7M
		ii) Find the Z transform of the following sequence $X(u) = a^n u(n)$?	3	4	7M

5		**Unit-V**			
	a	i) Explain the Characteristics of an ideal LPF? Explain why can not be realised?	2	5	7M
		ii) Differentiate between signal bandwidth and system bandwidth?	3	5	7M
		OR			
	b	Explain the following i) Casual and non casual systems ii) HPF and BPF and its characteristics?	3	5	14M

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

NAKASAKRAOPETA

NEC ENGINEERING COLLEGE

(AUTONOMOUS)

Subject Code: R20EC2104

II B.Tech. - I Semester Supple Examinations, April-2025

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)

Q.No		Questions	KL	CO	M
1		**Unit-I**			
	a	i) Convert the following numbers into decimal numbers i) 10110111011011102 ii) A0CB.EE 16	3	1	7M
		ii) Represent $(199)_{10}$ in the following code: a) Binary b)BCD c) 2421	2	1	7M
		OR			
	b	i) Given the 8-bit data word 10111001, generate the 12-bit composite word for the Hamming code that corrects and detects signals error.	3	1	7M
		ii) Write the following binary numbers in signed 1's complement form and signed 2's complement form using 16 bit registers. (i) +1001010 (ii) -11110000 (iii) -11001100.1 (iv) +100000011.111	2	1	7M
2		**Unit-II**			
	a	i) Realize a 2 input EX-OR gate using minimum number of 2 input NAND gates.	3	2	7M
		ii)) Prove the following Boolean theorems (a) AB+A'C = (A+C)(A'+B) (ii) AB+A'C+BC = AB+A'C	4	2	7M
		OR			
	b	i) For the given function F(A, B, C, D, E) =Σ(0,1, 2, 3, 4, 5, 9, 10, 16, 17, 18, 19, 20, 22, 25, 26)+ Σd (7, 11, 12, 13, 15, 23, 27, 28, 29, 30). Obtain minimal SOP expression using KMap.	2	2	7M
		ii) For the given Boolean function F=x y' z + x' y' z +w' x y + w x' y + w x y a) Simplify the function to minimal literals using Boolean algebra. b) Construct the logic diagram using only NOR gates	4	2	7M
3		**Unit-III**			
	a	i). Design a 4 bit carry look ahead adder circuit.	4	3	7M
		ii) Implement the following function with multiplexer F(A,B;C,D)=(0,1,3,4,8,9,15)	3	3	7M
		OR			
	b	i) Design a 1:8 demultiplexer using two 1:4 demultiplexer	3	3	7M
		ii) Implement full adder using decoder and OR gates.	3	3	7M

4		**Unit-IV**			
	a	i)Distinguish between Mealy and Moore machines	3	4	7M
		ii) Design a 4 bit ring counter using D flip-flops and explain its operation with the help of bit pattern	3	4	7M
		OR			
	b	i) Draw the circuit diagram of positive edge triggered JK flip-flop with NAND gates and explain its operation using truth-table .How race around condition is eliminated?	3	4	7M
		ii).Draw and explain 4-bit universal shift register	4	4	7M
5		**Unit-V**			
	a	i) Design a BCD to Excess-3 code converter using PROM	4	5	7M
		ii) Develop the following four Boolean functions using PAL. F1(w,x,y,z) = ∑m(1,2,3,7,9,11) F2(w,x,y,z) = ∑m(0,1,2,3,10,12,14) F3(w,x,y,z) = ∑m(4,5,6,7,9,15) F4(w,x,y,z)=∑m(1,2,3,10,13,15)	3	5	7M
		OR			
	b	i) Compare PROM, PLA and PAL	2	5	7M
		ii) Write a brief note on Architecture of PLDs	1	5	7M

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

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EC2105

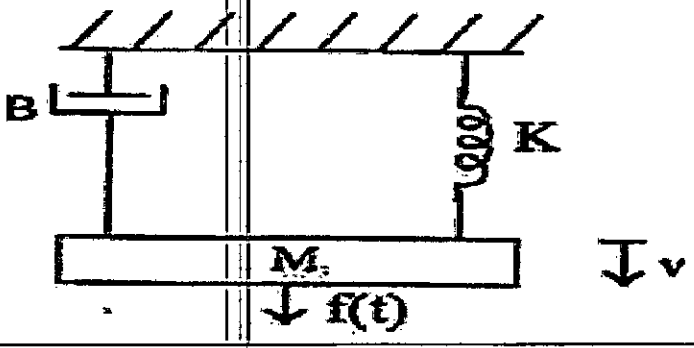
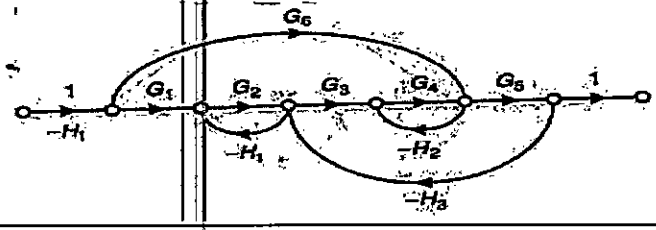
II B.Tech. - I Semester Supple Examinations,April-2025

LINEAR CONTROL SYSTEMS

(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)Determine the transfer function V(s)/F(s), for the system show in below figure 	II	1	7M
		ii) Contrast and **compare** the open loop and closed loop systems with suitable examples	IV	1	7M
		OR			
	b	i) **Develop** the transfer function of following signal flow graph of feedback system using Mason's gain formula? 	III	1	9M
		ii) **Make use of** controller device to explain the temperature controlled closed loop control system in detail	III	1	5M
		Unit-II			
2	a	A unity feedback control system has the forward transfer function, $G(s)=25/S^2+8S+25$. **Determine** the response, rise time, peak time and the maximum peak over shoot for unit step input.	IV	2	14M
		OR			
	b	**Examine** the transient response of under damped second order closed loop system for i. Unit-step input. ii) Ramp input	III	2	14M
		Unit-III			
3	a	i) **Develop** Routh array and determine the stability of the system whose characteristic equation is $s^6+2s^5+8s^4+12s^3+20s^2+16s+16=0$.	III	3	6M
		ii)A unity feedback system has an open loop function G (s) =k/s(s+1)(s+2), Build a root locus plot by **determining** the following (i) Centroid, number and angle of asymptotes,(ii) Breakaway points if any, (iii)points of intersection with jw axis and (iv) maximum value of k for stability	V	3	8M

		OR			
	b	ii) **Construct** basic Routh Hurwitz table and explain stability of the system.	**III**	**3**	**5M**
		ii)A single loop feedback system has open loop transfer function G(s)H (s) K (s 1) (s 2)/s(s+3)(s+4). **Build** the root locus as a function of K. find the range of K for which system is stable and also find the K for which purely imaginary roots if exists and their roots?	**III**	**3**	**9M**
4		**Unit-IV**			
	a	i) Explain about gain crossover frequency and phase cross over frequency.	**II**	**4**	**7M**
		ii) Sketch the polar plots of typical Type 0, 1 and 2 systems and explain the salient features of these plots	**II**	**4**	**7M**
		OR			
	b	i)By using bode plot, **Find** the value of K for which the following open loop transfer function is having gain margin 15 dB and phase margin is 600? G(s)H (s) s 101 s)(1+ s)	**I**	**4**	**7M**
		ii) **Develop** the Bode plot for a system G(s) = 15(s+5)/ (s^2+16s+100) and determine the stability of the system.	**III**	**4**	**7M**
5		**Unit-V**			
	a	i) **What** are the characteristics of Lead compensation? When lead compensation is employed?	**I**	**5**	**7M**
		ii) **Solve** the transfer function of lag compensator.	**III**	**5**	**7M**
		OR			
	b	i) **Obtain** a state model for a system characterized by the differential equation is $\frac{d^3y}{dt^3}+6\frac{d^2y}{dt^2}+11\frac{dy}{dt}+6y+u=0.$	**III**	**5**	**7M**
		ii) **Interpret** the concept of controllability and Observability with an example.	**II**	**5**	**7M**

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

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20AI2101

II B.Tech. - I Semester Supple Examinations, April-2025

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	KL	CO	Marks
1		**Unit-I**			
	a	Explain the process of creating nd arrays	K3	1	7M
		Choose various operations that can be applied on array.	K3	1	7M
		OR			
	b	Illustrate the process of Expressing Conditional Logic as Array Operations	K3	1	7M
		Examine the data scientist role in the data science?	K3	1	7M
2		**Unit-II**			
	a	Implement different data structures and convert into data frames	K3	1	7M
		Examine the panda's library architecture with neat sketch	K3	1	7M
		OR			
	b	Explain a) Reindexing, b) Dropping entries from an axis, c) Indexing, d) selection, e) filtering, f) Sorting and g) ranking	K3	1	14M
3		**Unit-III**			
	a	Write a program to write data string data into .csv file	K3	2	7M
		Illustrate the process of reading JSON data.	K3	2	7M
		OR			
	b	Examine the process of loading HDF5 data into dataframe	K3	2	7M
		Define Web API and illustrate different types of web Api's	K3	2	7M
4		**Unit-IV**			
	a	Illustrate the process of combining and merging datasets.	K3	3	7M
		Examine the process of removing duplicates and replacing values.	K3	3	7M
		OR			
	b	Explain Ticks, Labels, Legends, Annotations, Markers and Line Styles.	K2	4	7M
5		**Unit-V**			
	a	Examine various Group By operations	K3	5	7M
		Explain the process of grouping with dicts and series.	K3	5	7M
		OR			
	b	Explain Data Aggregation (Column-wise and Multiple Function Application, Returning Aggregated Data in "unindexed" Form)	K3	5	7M
		Illustrate the process of Filling Missing Values with Group-specific Values.	K3	5	7M

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

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CI2101

II B.Tech. - I Semester Supple Examinations, April-2025

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	KL	CO	Marks
1		**Unit-I**			
	a	Draw 4 bit arithmetic logic shift unit and explain same unit in detail	L3	CO1	7M
		Construct bus system for four registers with a neat diagram using multiplexers.	L2	CO1	7M
		OR			
	b	Mention the different types of Shifts. Discuss any two types with relevant examples.	L2	CO1	7M
		What is register transfer language? Explain the basic symbols used in register transfer	L2	CO1	7M
2		**Unit-II**			
	a	Draw a flowchart for interrupt cycle and explain with an example.	L3	CO2	7M
		Demonstrate the concept of input-output configuration.	L2	CO2	7M
		OR			
	b	Explain in detail about Register Reference Instructions & Memory Reference Instructions.	L2	CO2	14M
3		**Unit-III**			
	a	Illustrate the Program interrupt with suitable example.	L3	CO3	7M
		Illustrate about RISC & CISC Characteristics.	L3	CO3	7M
		OR			
	b	Interpret an arithmetic statement using three and two Addressing Instructions.with your own.	L3	CO3	7M
		Explain about data manipulation instructions.	L2	CO3	7M
4		**Unit-IV**			
	a	Apply the step-by-step multiplication process using Booth algorithm for the binary numbers (+15) X (-13).	L3	CO4	7M
		Describe in detail associative memory with a neat block diagram.	L2	CO4	7M
		OR			
	b	A block set associative cache consists of a total of 64 blocks divided into 4-block sets. The main memory contains 4096 blocks each of 128 words. i. How many bits are there in each of the TAG, SET and WORD fields? ii. How many bits are there in main memory address?	L3	CO3	7M
		Explain about Auxiliary memory and Main Memory .	L4	CO4	7M
5		**Unit-V**			
	a	Explain asynchronous data transfer with Handshaking method .	L4	CO5	7M
		Explain in detail about Direct Memory Access with neat Sketch.	L4	CO4	7M
		OR			
	b	Explain about I/O vs Memory Bus with neat sketches.	L4	CO6	7M
		Discuss about daisy chaining priority interrupt	L4	CO6	7M

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

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech I Semester Supple. Examinations, April-2025 **R20**

Sub Code: R20DS2105 **DATABASE MANAGEMENT SYSTEMS**

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 the structure of Database Management System with neat sketch	2	1	7M
			ii) Explain the levels of data abstraction?	2	1	7M
			OR			
	b	i)	Explain the applications of database system	2	1	7M
		ii)	Discuss the functionality of storage manager	2	1	7M
2			Unit-II			
	a	i)	Discuss about the Conceptual Design with the ER-Model?	2	2	7M
		ii)	Construct an Entity-Relationship diagram for a university	2	2	7M
			OR			
	b	i)	How we can convert relationship sets with key constraints into tables? Explain	2	2	7M
		ii)	Explain the Division operator of Relational algebra with a suitable example.	2	2	7M
3			Unit-III			
	a	i)	How would you use the operators IN, EXISTS, UNIQUE, ANY and ALL in writing nested queries? Explain with an example.	2	3	7M
		ii)	What is the usage of 'group by' and 'having' clauses in SQL? Explain with example	2	3	7M
			OR			
	b	i)	Discuss about Complex integrity constraints in SQL	2	3	7M
		ii)	Define null value? Describe the effect of null values in database	2	3	7M
4			Unit-IV			
	a	i)	Illustrate redundancy and the problems that it can cause	2	4	7M
		ii)	Explain the 1NF and 2 NF with example	2	4	7M
			OR			
	b	i)	Given Relation, R=(A,B,C,D,E,F,G) and Functional Dependencies F={ {A,B}→{C}, { A,C}→{B}, {A,D}→{E}, {B}→{D}, { B,C}→{A}, {E}→{F}}. Check whether the following decomposition of R into R1=(A,B,C), R2=(A,C,D,E) and R3=(A,D,F) is satisfying the lossless Decomposition property.	3	4	14M
5			Unit-V			
	a	i)	Explain ACID properties and illustrate them through examples?	2	5	7M
		ii)	Explain various anomalies that arise due to interleaved execution of transactions with suitable examples	2	5	7M
			OR			
	b	i)	How does a B tree differ from a B+ tree? Why is a B+ tree usually preferred as an access structure to a data file? Explain.	2	5	14M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech I Semester Supple. Examinations, April-2025

Sub Code: R20AC2105 **SOFTWARE ENGINEERING**

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
1		Unit-I			
	a	i) Explain Evolution of Software Engineering Methodologies.	1	2	7M
		ii) Discuss classical waterfall model?	1	2	7M
		OR			
	b	I)What is software engineering? Explain	1	2	7M
		ii) What are the elements of software process?	1	2	7M
2		Unit-II			
	a	i)Discuss functional and non-functional software requirements.	2	2	7M
		ii) Discuss the importance of SRC in software development.	2	2	7M
		OR			
	b	i) Distinguish between business requirements and user requirements in software development process.	2	2	7M
		ii) Explain Requirements Validation.	2	2	7M
3		Unit-III			
	a	i) What are the Characteristics of Good Software Design?	3	2	7M
		ii) Explain object oriented design methodology.	3	2	7M
		OR			
	b	i) Explain coupling and cohesion in software development.	3	2	7M
		ii) Give the importance of data flow diagram in software development.	3	2	7M
4		Unit-IV			
	a	i) What is structure programming? Explain	4	2	7M
		ii) What is software testing? Explain	4	2	7M
		OR			
	b	i) Explain coding principles.	4	2	7M
		Ii) Explain White Box Testing.	4	2	7M
5		Unit-V			
	a	i) Explain Software Metrics and measurements	5	2	7M
		ii) What are the Software Quality Factors? Explain	5	2	7M
		OR			
	b	i) Explain COCOMO cost models.	5	2	7M
		ii) Compare and Contrast CMM vs ISO.	5	4	7M

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