NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

I B.Tech I Semester Regular & Supple. Examinations, December-2024 **R23**

Sub Code: R23CC1101 **LINEAR ALGEBRA & CALCULUS**

Time: 3 hours (Common to All Branches) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	If A, B and C are the angles of a non-right angled triangle ABC, then find the value of $\begin{vmatrix} \tan A & 1 & 1 \\ 1 & \tan B & 1 \\ 1 & 1 & \tan C \end{vmatrix}$.	K3	CO1	2M
	b	If $\begin{bmatrix} x^2-4x & x^2 \\ x^2 & x^3 \end{bmatrix} = \begin{bmatrix} -3 & 1 \\ -x+2 & 1 \end{bmatrix}$, then the value of x?	K2	CO1	2M
	c	Given an eigen value of a matrix A, write the eigen values of following matrices: A^T and A^n.	K1	CO2	2M
	d	Given that $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$, find the eigen values of A.	K3	CO2	2M
	e	State Lagrange's mean value theorem.	K1	CO3	2M
	f	Give an example of a function for which Rolle's theorem is not applicable.	K3	CO3	2M
	g	Find the Jacobian for the functions $x = r\cos\theta$; $y = r\sin\theta$.	K2	CO4	2M
	h	State Euler's theorem for function of three variables.	K1	CO4	2M
	i	Evaluate $\int_0^3 \int_0^1 (x^2+3y^2)\,dy\,dx$.	K4	CO5	2M
	j	Change the order of integration $\int_0^1 \int_x^{\sqrt{x}} f(x,y)\,dy\,dx$.	K3	CO5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) For what values of x, will the matrix $A = \begin{bmatrix} 3-x & 2 & 2 \\ 1 & 4-x & 0 \\ -2 & -4 & 1-x \end{bmatrix}$ be of rank less than 3.	K4	CO1	5M
		ii) Solve the following system of equations $x + 2y + 3z = 0$; $2x + 3y + z = 0$; $4x + 5y + 4z = 0$; $x + 2y - 2z = 0$.	K3	CO1	5M
		OR			

	b	i) By reducing the following matrix A into Normal form find the rank of A $= \begin{bmatrix} -1 & 2 & -1 & -2 \\ -2 & 5 & 3 & 0 \\ 1 & 0 & 1 & 10 \end{bmatrix}$.	K4	CO1	5M
		ii) Discuss the consistency of the system and if consistent, solve the equations: $x + y + z = 6; x + 2y + 3z = 14; 2x + 4y + 7z = 30$.	K3	CO1	5M
3		Unit-II			
	a	Verify Cayley-Hamilton theorem and find A^8, Where $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$.	K3	CO2	10M
		OR			
	b	Reduce the quadratic form $2x_1^2 + x_2^2 + x_3^2 + 2x_1x_2 - 2x_1x_3 - 4x_2x_3$ to canonical form by an orthogonal transformation. Also find the rank, index, signature and nature of the quadratic form.	K3	CO2	10M
4		Unit-III			
	a	i) Verify Rolle's theorem for the function $f(x) = (x - a)^m (x - b)^n$ in [a, b], where m, n are positive integers.	K3	CO3	5M
		ii) Expand $f(x) = x^5 - x^4 + x^3 - x^2 + x - 1$ in powers of (x - 1).	K3	CO3	5M
		OR			
	b	i) If $f(x) = \sqrt{x}$ and $g(x) = \frac{1}{\sqrt{x}}$, prove that c of Cauchy's mean value theorem is geometric mean between a and b, $a > 0, b > 0$.	K3	CO3	5M
		ii) Expand 5^x up to the first three non-zero terms of the series using Maclaurin's theorem.	K3	CO3	5M
5		Unit-IV			
	a	i) If $u = \frac{e^{x+y+z}}{e^x + e^y + e^z}$, show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 2u$.	K3	CO4	5M
		ii) Find the extreme values of $x^3 + y^3 - 3axy$, $a > 0$.	K3	CO4	5M
		OR			
	b	i) If $y \log(\cos x) = x \log(\sin y)$, find $\frac{dy}{dx}$.	K3	CO4	5M
		ii) Show that the rectangular solid of maximum volume that can be inscribed in a sphere is a cube.	K3	CO4	5M
6		Unit-V			
	a	Evaluate $\iint x^2 \, dx \, dy$, over the region in the first quadrant enclosed by the rectangular hyperbola $xy = 16$, the lines $y = x$, $y = 0$ and $x = 8$.	K3	CO5	10M
		OR			
	b	Evaluate $\int_1^{e \log y} \int_1^{e^x} \int_1 \log z \, dx \, dy \, dz$.	K3	CO5	10M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

I B.Tech I Semester Regular & Supple. Examinations, December-2024 **R23**

Sub Code: R23CC1102 **INTRODUCTION TO PROGRAMMING**

Time: 3 hours (Common to All Branches) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Describe type conversion with examples of implicit and explicit conversion	K3	1	2M
	b	Examine how the flowchart **tool Dia** can be used to represent an algorithm.	K4	1	2M
	c	Demonstrate the use of a for loop to print the first 10 natural numbers	K3	2	2M
	d	List the conditional statements with syntax.	K3	2	2M
	e	Differentiate **1D array** verses **2D array** with an example?	K3	3	2M
	f	How do you read and write strings in C? Provide a simple syntax.	K4	3	2M
	g	Demonstrate the difference between **ptr++** and **++ptr** using a pointer to an integer.	K3	4	2M
	h	Compare and contrast between structure and union?	K3	4	2M
	i	Write C program to demonstrate the difference between function declaration and definition	K4	5	2M
	j	Describe any 3 built-in functions to perform basic file operations in C?	K3	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Analyze the process of compilation and execution in programming languages.	K4	1	5M
		ii) Explain the role of the ALU and program counter in the basic organization of a computer.	K3	1	5M
		OR			
	b	i) How does the top-down approach help in problem-solving, and how is it different from the bottom-up approach?	K3	1	5M
		ii) Discuss the impact of time and space complexities on algorithm performance.	K3	1	5M
3		Unit-II			
	a	i) Write C program that takes an integer input from the user and prints whether the number is even or odd.	K4	2	5M
		ii) Briefly explain Switch statement with example.	K3	2	5M
		OR			
	b	i) Write C program that prints the first 10 Fibonacci numbers using a while loop.	K4	2	5M
		ii) Demonstrate **Break** and **Continue** statements with example.	K3	2	5M

4		Unit-III			
	a	i) Write a program to search for a given number in an array of integers.	K4	3	5M
		ii) Explain string manipulation functions with examples. Use **strcpy, strcat and strlen.**	K3	3	5M
		OR			
	b	i) Describe the memory model of arrays in C. How are array elements stored sequentially?	K3	3	5M
		ii) Write C program to read an array of strings and display the longest string among them.	K4	3	5M
5		Unit-IV			
	a	i) Write C program to define a structure Student with fields name, age, and marks. Input and display data for a student.	K4	4	5M
		ii) Demonstrate the memory usage of a structure and a union. Compare their sizes.	K3	4	5M
		OR			
	b	i) Create a program that swaps the values of two variables using pointers	K3	4	5M
		ii) Briefly explain the concept of pointers in C. Provide an example illustrating their use.	K3	4	5M
6		Unit-V			
	a	i) Discuss about the type of functions in C. Provide an example to illustrate it.	K3	5	5M
		ii) Examine the difference between pass by value and pass by reference in C functions	K4	5	5M
		OR			
	b	i) Write C program to count the number of characters, words, and lines in a text file.	K3	5	5M
		ii) Develop a function that appends new data to an existing file without overwriting its content	K3	5	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
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I B.Tech I Semester Regular & Supple. Examinations, December-2024

Sub Code: R23CC1103 **COMMUNICATIVE ENGLISH**

Time: 3 hours (CSE,IT,CSE(AI)) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What had Jim done to give a gift to his wife?	K2	CO1	2 M
	b	Rewrite the jumbled sentences in the correct order. i. to college walk I every day. ii. Simran and I since kindergarten each other have known.	K3	CO2	2 M
	c	What kind of landscape is described in the poem 'The Brook'?	K2	CO1	2 M
	d	Fill in the blanks with suitable prepositions. i. She is ..... leave ..... the end of the week. ii. They go ..... the office ..... train.	K3	CO2	2 M
	e	Briefly describe two of Musk's early business ventures.	K2	CO1	2 M
	f	Fill in the blanks with the correct form of the verbs. i. Suraj ..... (love) going to parties with his friends. ii. Asif ..... (teach) for six years at the computer institute by the time his father retires.	K3	CO3	2 M
	g	What instincts and tendencies did Harvey think would be difficult to change?	K2	CO1	2 M
	h	Fill in the blanks with words chosen from the options given the brackets. i. Use the ..... to guide the horse along the path. (reigns, rains, reins) ii. There has been a huge ..... in petrol prices. (rise, raise)	K3	CO3	2 M
	i	What is intrapersonal communication and how does it relate to self-awareness?	K3	CO1	2 M
	j	Rewrite the following sentences correctly. i. I have gone out yesterday. ii. I congratulated him for his promotion.	K3	CO2	2 M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Write a note on the different ways in which O.Henry tells his readers about the financial situation of the couple.	K2	CO1	7 M
		ii) Form words for the following roots and provide their meaning. 1.graph 2. bio 3. homo	K3	CO3	3 M
		OR			
	b	i) Write the Synonyms for the following words. 1. meticulous 2. hazardous 3. lucid 4. rarely 5. wreck	K3	CO3	5 M
		ii) Go through the following sentences and identify the parts of speech of the underlined words. 1.The water was very cold, but the child still jumped into the pool. 2.The sales section of the factory is on the fourth floor.	K3	CO2	5 M

		3.It has been raining heavily all night and the fields are full of water now. 4.Mr Khan will be leaving for Chennai tomorrow. 5.The apples are rotten now. They were bought yesterday, but no one ate them.				
3		Unit-II				
	a	i) How has the poet described landscape, flowers, plants and colours in the poem? How does it make you feel as a reader? Substantiate your answer with examples from the poem 'The Brook'.	K2	CO1	10 M	
		OR				
	b	i) Write a paragraph on 'The importance of sports'.	K6	CO5	5 M	
		ii) Fill in the blanks with the correct prepositions chosen from those given in the brackets. 1. We played a joke ..... Him. (on/of) 2. People often make fun .... What they do not understand. (of/to) 3. I will arrive..... six o'clock. (at/in) 4. Tom and his friend will divide the money ..... themselves. (between/among) 5. We will be gone ..... two days. (for/since)	K3	CO2	5 M	
4		Unit-III				
	a	In what way has Musk proved to be a visionary leader of cutting-edge technology? Discuss with relevant examples.	K3	CO1	10 M	
		OR				
	b	i) What is note-making and detail the three steps to make an effective note-making?	K2	CO1	5 M	
		ii) Fill in the blanks with the correct form of the verb. 1. Five miles____ long distance. (is/are) 2. Many a man ____ tried hard to climb the treacherous mountain range. (have/has) 3. The furniture of the house ____ quite impressive. (is/are) 4. Few students _____ coming to the party. (is, are) 5. Uma, my childhood friend ____ leaving for Delhi next month. (is/are)	K3	CO2	5 M	
5		Unit-IV				
	a	Describe how the children found an exciting way to play with their new non-violent toys.	K2	CO1	10M	
		OR				
	b	Write a letter to the vice chancellor of your university complaining about the poor-quality paper and print of the textbooks prescribed to you.	K3	CO4	10 M	
6		Unit-V				
	a	What are the different ways in which intrapersonal communication helps improve everyday life?	K3	CO4	10 M	
		OR				
	b	Write an essay on 'Students should be allowed to carry phones in schools'.	K4	CO5	10 M	

NARASARAOPETA ENGINEERING COLLEGE
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I B.Tech I Semester Regular & Supple. Examinations, December-2024

R23

Sub Code: R23CC1104 **BASIC CIVIL AND MECHANICAL ENGINEERING**

Time: 3 hours (CSE, IT, AI) Max. Marks: 70

PART-A: (CE)

Q.No		Questions	KL	CO	M
1	a	What are the qualities of good building stone?	K1	CO1	1M
	b	What are the two basic principles of survey?	K1	CO1	1M
	c	Sate the purpose of dam.	K1	CO2	1M
	d	What are the different modes of transportation?	K1	CO2	1M
	e	What is function of reservoir?	K1	CO3	1M
2		Unit-I			
	a	i) What are the different types of cement? Explain in briefly.	K1	CO1	5M
		ii) Discuss the role of civil engineer in the development of a country.	K2	CO1	5M
		OR			
	b	i) Explain various disciplines of civil engineering.	K1	CO1	5M
		ii) Explain with neat sketch different component of building.	K2	CO1	5M
		Unit-II			
3	a	i) Discuss about the primary classification of surveying.	K2	CO2	5M
		ii) Define surveying. Explain its importance for civil engineers.	K1	CO2	5M
		OR			
	b	i) Describe a typical chain with a neat sketch.	K2	CO2	5M
		ii) Explain the term contouring with the relevant example.	K1	CO2	5M
		Unit-III			
4	a	i) What are the factors governing selection of site for concrete Dam?	K2	CO3	5M
		ii) Explain about rainwater harvesting and its advantages.	K4	CO3	5M
		OR			
	b	i) Discuss the major role of transportation in the Development of Nation.	K2	CO3	5M
		ii) Differentiate Flexible and Rigid pavement.	K4	CO3	5M

PART-B (ME)

Q.No		Questions	KL	CO	M
5	a	Summarize the mechanical engineering role in our society	K1	CO1	1M
	b	Differentiate between 3D Printing and machining process.	K2	CO1	1M
	c	Explain the basic Refrigeration cycles?	K2	CO1	1M
	d	Outline the links and Joints used in robot?	K2	CO1	1M
	e	Lists out the major advantages of hydro power plants.	K2	CO1	1M
6		Unit-IV			
	a	i) Differentiate the ferrous and non-ferrous metals?	K4	CO2	5M
		ii) What do you mean by composites? Outline the applications of composites?	K2	CO2	5M

		OR			
	b.	Analyze the mechanical engineering technologies role in automotive sector?	K2	CO2	10M
		Unit-V			
7	a	i) Define casting and explain the working principle of casting process.	K4	CO3	5M
		ii) Explain the working principle of 4-Stroke IC engines with neat sketch.	K2	CO3	5M
		OR			
	b	i) Explain the working principle of Boilers with a neat sketch.	K2	CO3	10M
		Unit-VI			
8	a	i) Explain the working principle of steam power plant with neat sketch.	K4	CO4	10M
		OR			
	b	i) State the type of power transmission chains. Analyze about any one with its sketch?	K4	CO4	5M
		ii) Explain the Basic components of Robot?	K2	CO4	5M

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

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NARASARAOPETA ENGINEERING COLLEGE
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I B.Tech I Semester Regular & Supple. Examinations, December-2024

Sub Code: R23CC1105 **CHEMISTRY**

Time: 3 hours (CSE,IT,CSE(AI)) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Calculate the bond order of CO molecule.	2	1	2M
	b	Write the number of nodes, bonding and antibonding interactions of ψ1 and ψ2 in MO of 1, 3 butadiene.	1	1	2M
	c	Explain superconductors.	2	2	2M
	d	What are carbon nanotubes?	1	2	2M
	e	What is an electrochemical cell?	1	3	2M
	f	Mention applications of electrochemical sensors.	1	3	2M
	g	What is chain growth polymerisation?	1	4	2M
	h	Define thermosetting plastics. Give example.	1	4	2M
	i	Mention types of transitions that take place in UV spectroscopy.	2	5	2M
	j	Define electromagnetic spectrum	2	5	2M

PART-B: Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Draw MO diagram and explain homonuclear diatomic molecule taking O_2 as an example.	3	1	5M
		ii) Differentiate bonding and antibonding molecular orbitals.	3	1	5M
		OR			
	b	i) Discuss the conditions for linear combination of atomic orbitals.	2	1	5M
		ii) Discuss hydrogen bonding.	2	1	5M
3		Unit-II			
	a	i) Discuss zone refining method for preparing semiconductor. Give applications of semiconductors.	2	2	5M
		ii) Explain types of superconductors.	2	2	5M
		OR			
	b	i) Discuss laser ablation method for preparation of nanotubes.	2	2	5M
		ii) Discuss properties and applications of graphene.	2	2	5M
4		Unit-III			
	a	i) Explain the principle of potentiometric titrations.	2	3	5M
		ii) Explain construction and working of zinc-air battery. Mention its applications.	2	3	5M
		OR			
	b	i) Discuss construction of polymer electrolyte membrane fuel cell. Mention its applications.	3	3	5M
		ii) Discuss working of lithium ion battery and its applications.	2	3	5M

5		Unit-IV			
	a	i) Explain coordination polymerisation.	2	4	5M
		ii) Explain about Compression moulding	2	4	5M
		OR			
	b	i) Discuss conducting polymers.	2	4	5M
		ii) Explain preparation, properties and applications of PVC.	2	4	5M
6		Unit-V			
	a	i) Explain the principle involved in UV-Visible spectroscopy.	2	5	5M
		ii) Explain applications of IR spectroscopy.	2	5	5M
		OR			
	b	i) Discuss the instrumentation of NMR.	2	5	5M
		ii) Explain Beer- Lambert Law.	2	5	5M

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

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