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			

			KL	CO	M
	b	i) By reducing the following matrix A into Normal form find the rank of A $$A = \begin{bmatrix} -1 & 2 & -1 & -2 \\ -2 & 5 & 3 & 0 \\ 1 & 0 & 1 & 10 \end{bmatrix}.$$	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
Unit-II					
3	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
Unit-III					
4	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 $g(x) = \dfrac{1}{\sqrt{x}}$, 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
Unit-IV					
5	a	i) If $u = \dfrac{e^{x+y+z}}{e^x + e^y + e^z}$, show that $\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} + \dfrac{\partial u}{\partial z} = 2u$.	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 $\dfrac{dy}{dx}$.	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
Unit-V					
6	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 $\displaystyle\int_1^e \int_1^{\log y} \int_1^{e^x} \log z\, dx\, dy\, dz$.	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

		Unit-III			
4	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	a	**Unit-IV**			
		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	a	**Unit-V**			
		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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2

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

Sub Code: R23CC1106   **ENGINEERING PHYSICS**

Time: 3 hours   (CE, EEE, ME, ECE, CSE (AIML), DS, CS, AIML)   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	Mention the differences between spontaneous and stimulated emissions.	K1	1	2M
	b	Define acceptance cone.	K1	1	2M
	c	Define space lattice and unit cell.	K1	2	2M
	d	Draw the planes of a cubic cell (i) (111) (ii) (101).	K4	2	2M
	e	Define magnetic susceptibility and permeability.	K1	3	2M
	f	Write the properties of super conductors	K1	3	2M
	g	State Heisenberg's uncertainty principle.	K1	4	2M
	h	Write any two merits of classical free electron theory.	K1	4	2M
	i	State Hall effect.	K1	5	2M
	j	What are thermoelectric materials?	K1	5	2M

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

Q. No		Questions	KL	CO	Marks
		Unit-I			
2	a	i) With the help of suitable diagrams, explain the principle, construction and working of a Ruby laser.	K4	1	7M
		ii) Mention the applications of lasers in the different fields.	K1	1	3M
		OR			
	b	i) Explain the construction and working of a step-index fiber.	K2	1	5M
		ii) Discuss the propagation of light signal in step-index fiber.	K3	1	5M
		Unit-II			
3	a	i) Prove that FCC is more closed packed structure than the SC and BCC.	K3	2	10M
		OR			
	b	i) Derive an expression for the interplanar spacing between two adjacent planes of Miller indices (h k l) in a cubic lattice of edge a.	K3	2	7M
		ii) Calculate the interplanar spacing for (111) plane in an SC lattice, where lattice constant is 2.4×10^{-10} m.	K4	2	3M
		Unit-III			
4	a	i) Explain atomic origin of magnetism in magnetic materials.	K2	3	6M
		ii) Mention the differences between soft and hard magnetic materials.	K4	3	4M
		OR			
	b	i) What are the differences between type-1 and type -2 super conductors?	K2	3	4M
		ii) Explain AC and DC Josephson effects.	K1	3	6M
		Unit-IV			
5	a	i) Determine the energy of a particle enclosed in one-dimensional potential box of infinite height.	K5	4	7M
		ii) Find the energy of an electron for the first excited state in one dimensional potential box of width 4 A°.	K4	4	3M
		OR			
	b	i) Explain briefly the quantum free electron theory.	K2	4	3M
		ii) Explain Fermi-Dirac distribution function. Plot this function for various temperatures including 0K.	K2	4	7M
		Unit-V			
6	a	i) Distinguish conductors, semiconductors and insulators.	K3	5	6M
		ii) What are extrinsic semiconductors and explain?	K1	5	4M
		OR			
	b	i) What are the types of smart materials?	K1	5	4M
		ii) Explain the principle and properties of magneto rheological fluids-electro rheological fluids.	K2	5	6M

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

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

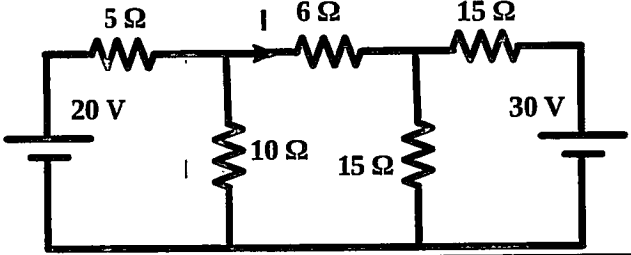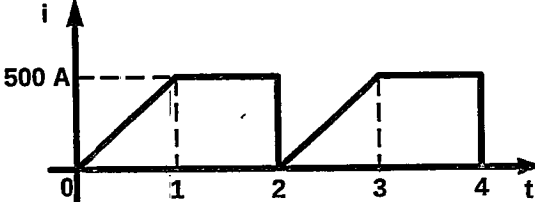Sub Code: R23CC1107   **BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

Time: 3 hours   (CE,EEE,ME,ECE,CSE(AIML),DS,CS,AIML)   Max. Marks: 70

PART-A:(EEE)

Q.No		Questions	KL	CO	M
1	a	What are the limitations of Ohms law?	K1	1	1M
	b	What is the significance of commutator of a DC generator?	K3	2	1M
	c	What are the drawbacks of non-conventional energy sources?	K3	3	1M
	d	Define phase, peak factor and form factor of an AC wave form	K1	1	1M
	e	What is meant by controlling and damping torques of an instrument?	K3	4	1M
		Unit-I			
2	a	i)Classify the electric circuit elements and explain each of them	K1	1	5M
		ii)Find the current (I) flowing through 6 Ohms resistor of the circuit shown below using superposition theorem	K2	1	5M
		OR			
	b	i) Draw the impedance and power triangles for series RL circuit.	K2	1	5M
		ii) a) Determine the form factor and amplitude factor of the waveform shown below	K2	1	5M
		Unit-II			
3	a	i)With a neat diagram explain the construction and working principle of DC motor, clearly discuss each part of the motor	K3	2	10M
		OR			
	b	i)Explain the principle of operation of Three-phase Induction motor	K3	2	5M
		ii)Explain the construction and working principle of Moving Iron instruments	K3	2	5M
		Unit-III			
4	a	i)What are the advantages and disadvantages of renewable and non-renewable energy sources	K2	3	5M
		ii) With a neat sketch, explain the hydel power generation	K3	3	5M
		OR			
	b	i) With a neat sketch explain the wind power generation	K3	3	5M
		ii)Write down any six safety precautions used in electrical system	K3	4	5M

PART-B (ECE)

Q.No		Questions	KL	CO	M
5	a	What is Zener Effect?	K1	1	1M
	b	What is the significance of amplifier?	K2	2	1M
	c	Give the truth table of XNOR gate	K1	3	1M
	d	What is the significance of FLIP-FLOP?	K1	3	1M
	e	What is the use of counter in digital electronics?	K2	4	1M
6		**Unit-IV**			
	a	i)Explain the characteristics of Zener diode	K2	1	5M
		ii)Explain the characteristics of NPN transistor	K2	1	5M
		OR			
	b	i) With a neat circuit diagram explain the working of common emitter amplifier along with its frequency response	K1	1	10M
7		**Unit-V**			
	a	i) Explain the operation of a half wave bridge rectifier with a neat circuit and also draw the relevant waveforms.	K2	2	10M
		OR			
	b	i) Explain the block diagram of an electronic instrumentation system and clearly explain each block of it.	K1	3	10M
8		**Unit-VI**			
	a	i) Explain AND, NOR, XOR and NOT gates along with their truth tables	K1	3	5M
		ii) Design & implement half adder with truth table.	K3	3	5M
		OR			
	b	i)Explain J-K flip-flop with relevant truth tables	K2	4	5M
		ii)Explain about serial input and output registers what is meant by ring counter?	K2	4	5M

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

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

Sub Code: R23CC1108   ENGINEERING GRAPHICS   R23
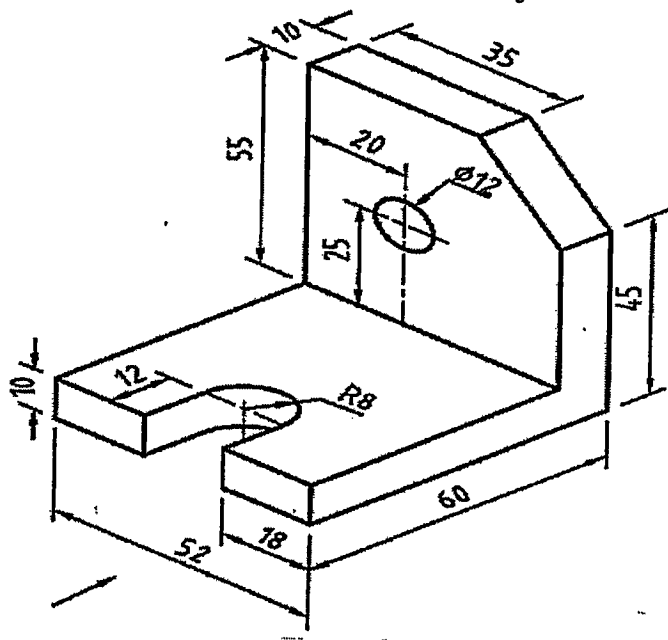
Time: 3 hours   (ECE)   Max. Marks: 70

Note: Answer All **FIVE** Questions.

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

Q.No		Questions	KL	CO	M
		Unit-I			
1	a	Draw a hyperbola when the distance of the focus from the directrix is 70 mm and the eccentricity e is 3/2. Draw the tangent and normal to the curve at a point P distance 50 mm from the directrix.	3	1	14M
		OR			
	b	Construct a Diagonal scale of 3:200 showing meters, decimeters and centimeters and to measure up to 6 meters, to show 4.56m	3	1	14M
		Unit-II			
2	a	The front view and top view of a straight line PQ measures 50mm and 65 mm respectively. The point P is in the HP and 20 mm in front of the VP and the front view of the line is inclined at 45⁰ to the reference line. Determine the true length of PQ, true angles of inclination.	3	2	14M
		OR			
	b	An isosceles triangular plane ABC with a 70 mm base and altitude 80 mm has its base in the H.P. and inclined at 45⁰ to the V.P. The corners A and C are in the V.P. Draw its projections and determine the inclination of the plane with H.P.	3	2	14M
		Unit-III			
3	a	A right circular cone of base diameter 60 mm and height 80 mm is so placed that diameter KJ of the base is inclined at 50⁰ to HP.	3	3	14M
		OR			
	b	A right pentagonal pyramid of base side 20mm and height 60mm rests on one of its edges of the base in HP, the axis is 30⁰ to the HP.	3	3	14M
		Unit-IV			
4	a	A cylinder, 65 mm diameter and 90 mm long has its axis parallel to the H.P and is inclined at 30⁰ to V.P. It is cut by a vertical section plane in such a way that the true shape of the section is an ellipse having a major axis, 75 mm long. Draw its sectional front view and true shape of the section.	3	4	14M
		OR			
	b	A pentagonal pyramid of-base edge 25 mm and height 60 mm rests vertically on its base on the HP such that one of its base edge parallel to VP. It is cut by a plane, inclined at 60° to HP and passes through a point 35 mm from the base. Draw the development of the lateral surface of the pyramid.	3	4	14M
		Unit-V			
5	a	Draw the isometric view of the cone with base 40mm diameter and height 60mm long. The axis is perpendicular to HP,the base is resting on HP	3	5	14M
		OR			

Draw the front, top and right side views of the object shown in Fig

b

3 5

14M

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