R20

I B.TECH I SEM

SUPPLEMENTARY EXAMINATIONS

MARCH 2025

Narasaraopeta Engineering College (Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: **R20CC1102**

I B.Tech - I Semester Supple Examinations, March-2025

Linear Algebra & Calculus **R20**

Time: 3 Hours Max.Marks:**70** Branch: Common to all Branches.

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

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1. A I) Find the rank of the matrix $\begin{bmatrix} 6 & -2 & -18 \\ -4 & 1 & 11 \\ -5 & 2 & 16 \end{bmatrix}$.

II) Express the matrix $\begin{bmatrix} 2 & 5 & -7 \\ -9 & 12 & 4 \\ 15 & -13 & 6 \end{bmatrix}$ as the sum of a lower triangular matrix and an upper triangular matrix with zero leading diagonal.

OR

B) I) Solve the following system of equations by Gauss Jordan method
$x+y+z=9;\quad x-2y+3z=8;\quad 2x+y-z=3$

II) Reduce the matrix $\begin{bmatrix} 1 & 2 & 0 & -1 \\ 3 & 4 & 1 & 2 \\ -2 & 3 & 2 & 5 \end{bmatrix}$ into its normal form and hence find the rank of it.

2. A) I) Find the eigen values and the eigen vectors of the matrix $\begin{bmatrix} 2 & 2 & 0 \\ 2 & 5 & 0 \\ 0 & 0 & 3 \end{bmatrix}$

II) Reduce the following quadratic form to canonical form. Also find the rank, index, signature of $2x_1^2+2x_2^2+2x_3^2+2x_1x_3$.

OR

B) I) Diagonalize the matrix $\begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix}$ by orthogonal reduction.

II) Verify Cayley-Hamilton theorem for $A=\begin{bmatrix} 1 & 2 \\ 2 & 2 \end{bmatrix}$ and evaluate $2A^4-5A^3-7A+6I$.

3. A) I) State Rolle's theorem and verify the theorem for the following function x^3-12x in $\left[0, 2\sqrt{3}\right]$

II) Prove that $e^{x\sin x}=1+x^2+\frac{x^4}{3}+\frac{x^6}{120}+\ldots$

OR

B) I) Prove using the Taylor's theorem that

$$\log(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3(1+\theta x)^3},\ 0 < \theta < 1,\ x > 0$$

. Deduce that

$$\log(1+x) < x - \frac{x^2}{2} + \frac{x^3}{3},\ x > 0$$

II) Find the maximum and minimum values of $x^3 - 6x^2 + 9x - 8$ in the interval [0.5, 3.2]

4. A) I) If $u = x^2 - y^2$, $v = 2xy$, where $x = r\cos\theta$ and $y = r\sin\theta$ find $\frac{\partial(u,v)}{\partial(r,\theta)}$.

II) Show that the rectangular solid of maximum volume that can be inscribed in a given sphere is a cube.

OR

B) I) Find the Taylor series expansion of $\log(1 + x + y)$ upto 3rd degree terms near the point (0, 0).

II) If $a^2x^2 + b^2y^2 = c^2z^2$, evaluate $\frac{1}{a^2}\frac{\partial^2 z}{\partial x^2} + \frac{1}{b^2}\frac{\partial^2 z}{\partial y^2}$.

5. A) I) Evaluate $\iint (x^2 - y^2)\,dx\,dy$ over the triangle with vertices (0, 1), (1, 1), (1, 2).

II) Evaluate the following integral by changing the order of integration $\int_0^3 \int_1^{\sqrt{4-y}} (x+y)\,dx\,dy$

OR

B) I) Evaluate the integral $\int_0^{\ln 2} \int_0^x \int_0^{x+y} e^{x+y+z}\,dz\,dy\,dx$.

II) Find the volume bounded by the cylinder $x^2 + y^2 = 4$ and the plane $y + z = 4$ and $z = 0$.

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Subject Code: **R20CC1103**

I B.Tech - I Semester Supple Examinations, March-2025

Engineering Chemistry

Time: 3 Hours

Max.Marks:**70.**

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

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1. A) I) Define alkalinity and explain how it can be determined.
   II) Discuss break point chlorination.

   OR

   B) I) Explain zeolite method for removal of hardness of water.
   II) Explain characteristics of industrial water.

2. A) I) Explain free radical method of addition polymerization.
   II) Discuss proximate analysis and its significance.

   OR

   B) I) Discuss moving bed cracking method for preparation of gasoline.
   II) Explain condensation and coordination polymerization.

3. A) I) Explain arc discharge method for preparation of carbon nanotubes.
   II) Discuss thermotropic liquid crystals.

   OR

   B) I) Explain fiber reinforced plastics.
   II) Discuss chemical reduction method for preparation of nanomaterials

4. A) I) Explain (i) methanol oxygen fuel cell (ii) dry cell
   II) Discuss the working of hydrogen electrode.

   OR

   B) I) Explain cathodic protection.
   II) Discuss electroplating and electroless plating.

5. A) I) Explain any one mechanism of lubrication.
   II) Explain the different steps involved during manufacture of Portland cement.

   OR

   B) I) Discuss refractoriness under load.
   II) Explain (i) flash and fire point (ii) effect of CO_2 on cement concrete.

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Subject Code: **R20CC1104**

I B.Tech - I Semester Supple Examinations, March-2025

Applied physics

Time: 3 Hours Max.Marks:70 Branch: CSE,IT,AI & CY

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

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1. A) I) Discuss the construction and working of Newton's ring experiment. Mention the applications of Newton's ring experiment. (10M)
   II) Differentiate interference and diffraction. (4M)

   OR

   B) I) Explain the principle of double refraction in the anisotropic crystals. Discuss the construction and working of Nicol's prism in the production of polarised light. (7M)
   II) Describe about quarter wave and half wave plate polarisers. Specify its applications. (7M)

2. A) I) Explain the prominent characteristics of laser radiation. (6M)
   II) Discuss the construction and working of He-Ne laser system. Mention its advantages over ruby laser system. (8M)

   OR

   B) I) Derive an expression for acceptance angle and numerical aperture of an optical fiber. Discuss its importance. (8M)
   II) Differentiate spontaneous and stimulated emission of radiation. (6M)

3. A) I) Derive the atomic packing factor of SC, BCC and FCC crystal systems. Prove that the FCC is densely packed with atoms than other variations of cubic systems. (10M)
   II) Define the unit cell parameters and mention its significance. (4M)

   OR

   B) I) Derive the relation between Miller indices of a plane and interplanar distance. (8M)
   II) Describe a detailed procedure to evaluate Miller indices of a plane using the intercepts of a plane and also sketch a plane using Miller indices with an example. (6M)

4. A) I) Derive the differential form of Maxwell's electromagnetic equation. (7M)
   II) Differentiate the magnetic materials based on the Hysteresis curve. (7M)

   OR

   B) I) Define the Meissner effect in superconductors and also discuss the influence of magnetic field on superconductors. (7M)+(7M)
   II) Classify type-I and type-II superconductors using magnetisation and magnetic field curve.

5. A) I) Assuming Schrodinger wave equation, derive the probability density function and energy of a particle enclosed in a potential well of infinite height for three energy levels. (8M)
   II) Discuss the dual nature of matter and derive an expression for de Broglie wavelength. (6M)

   OR

   B) I) State and explain Hall effect. Derive the relation between Hall coefficient and Hall voltage. Mention the advantages and drawbacks of this method. (8M)+(6M)
   II) Classify the solids based on band theory. Differentiate intrinsic and extrinsic semiconductors.

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1105

I B.Tech I Semester Supple Examinations, March-2025

Problem Solving Using C

Time: 3 Hours Max.Marks:70 Branch: Common to CE,EEE,ECE,CSE,IT,AI,AIML,DS & CY

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

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1. A) I) Explain Type Conversion and Type casting with an example. (7 M)
   II) Write various symbols used in drawing a flow chart and mention their purpose. Draw a flow chart for finding the second big of 3 integers. (7 M)

   OR

   B) I) Illustrate the use of Bitwise operators with an example C language code. Clearly mention the expected output for a sample input. (7 M)
   II) Define Data type. Write short note on elementary data types of C Programming. (7 M)

2. A) I) Distinguish among WHILE lop, Do-WHILE loop and FOR loop. (7 M)
   II) What are the essential characteristics of any recursive function? Write a recursive function to find the GCD of two integers. (7 M)

   OR

   B) I) What are static variables? Write the properties of static variables and show their use with an example C program. (7 M)
   II) Show with an example how *break* and *continue* statements will be replaced with *goto* statement and what are the limitations of *goto* statement? (7 M)

3. A) I) Define string. Write a C function to check whether the given string is palindrome or not without using string handling functions. (7 M)
   II) Design a C program to display the following pattern using 'Nested loops' concept. (7 M)

```
1
1   3
1   3   5
1   3   5   7
1   3   5
1   3
1
```

   OR

   B) I) Write a C program to implement addition od TWO matrices (7 M)

   II) How can you initialize the string variable? Briefly explain any 4 string handling functions with their syntax and example code. (7 M)

4. A) I) Distinguish between Structures and Union (7 M)
   II) Distinguish between 'Call by Value' and "Call by Reference with an example (7 M)

   OR

   B) I) Define Pointer. Explain *pointer expressions* and *pointer arithmetic* with suitable example lines of C language code. (7 M)
   II) What are Enumerated Data Types? What is their primary use in programming? Illustrate their use. (7 M)

5. A) I) What are command line arguments? Illustrate their use with an example C program. (7 M)

II) What is the use of storing contents into a file. Write short note on various opening modes of a text file. (7 M)

OR

B) I) Write a C program to create two text files and copy their contents into third text file one after the other i.e. third file should contain the contents of first file followed by second file. (7 M)

II) Briefly explain various kinds of possible errors that can be traced while performing file operations and suggest suitable error handling mechanisms. (7 M)

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1111

I B.Tech - I Semester Supple Examinations, March-2025
Electronic Devices and Logic Design
(AIML,CS & DS)

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)Explain the V-I characteristics of P-N junction diode with neat sketch.	2	1	7M
		ii)Explain the operation Half wave rectifier in detail.	2	1	7M
		OR			
	b	i) Compare Full wave center tapped rectifier with Bridge rectifier	4	1	7M
		ii) Justify how Zener Diode acts as Voltage Regulator	6	1	7M
2		Unit-II			
	a	i) Draw and explain Input and Output Characteristics of CE configuration	2	2	7M
		ii)Explain the construction of n channel enhancement type MOSFET	2	2	7M
		OR			
	b	i) Analyze the characteristics and working of N-channel JFET	4	2	7M
		ii)Compare BJT and MOSFET	4	2	7M
3		Unit-III			
	a	i) Modify the following (i) (86.85)10 to base 2 (ii) (FEFB)16 to base 8 (iii)(1110.1001)2 to base 10	3	3	7M
		ii) Minimize the given function using K-Map. F = Σ m (1,3,7,11,13,14,15)	3	3	7M
		OR			
	b	i) What are universal gates and why they called so? Realize AND gate with NOR gate.	2	3	7M
		ii) Minimize the given function using K-Map. F = Σ m (1,3,5,7,9,11,13,15) + d(2,4,6,8)	3	3	7M
4		Unit-IV			
	a	i)Design a Full adder circuit with gates.	5	4	7M
		ii) Define Multiplexer? Design 4X1 multiplexer and explain?	1	4	7M
		OR			
	b	i)Write short notes on i) Encoder ii) De-multiplixer	3	4	7M
		ii)Explain J-K flip flop in detail	2	4	7M
5		Unit-V			
	a	i)Explain universal shift registers with neat circuit	2	5	7M
		ii)Write short notes on i) Synchronous Counter ii)Ring Counter	2	5	7M
		OR			
	b	i)Draw and explain Bidirectional Shift Registers in detail	2	5	7M
		ii)Write short notes on i) Ripple Counter ii) Modulus Counter	2	5	7M

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Subject Code: **R20EE1110**

I B.Tech - I Semester Supple Examinations, March-2025

Engineering Drawing and Design

Time: 3 Hours | Max.Marks:**70.** | Branch:EEE.

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

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1. A) I) Construct a regular pentagon of side 30mm by using general method.
   II) Construct a parabola, when the distance of the focus from the directrix is 50mm.

   OR

   B) Construct an ellipse, when the distance of the focus from the directrix is equal to 50 mm and eccentricity is 2/3. Also draw tangent and normal to the curve at a point 40mm from the directrix.

2. A) I) Draw the projections of the following points on the same ground line, keeping the projections 25mm apart.
   i) A, in the H.P & 20mm, behind the V.P
   ii)B, 40mm above the H.P & 25mm in front of the V.P.
   iii)C, in the V.P & 40mm above the H.P.
   iv)D, 25mm below the H.P & 25mm behind the V.P.

   II) Draw the projections of 100 mm long line, in the following positions.
   a)Perpendicular to the VP 20 mm above the HP and its one end in the VP.
   b)Parallel to and 30 mm in front of the VP and in the HP.

   OR

   B) A line AB, 90 mm long, is inclined at 45^0 to the HP and its top view makes an angle of 60^0 with the VP. The end A is in the HP and 12 mm in front of the VP. Draw its front view and find its true inclination with the VP

3. A) I) Draw the projections of a circle of 50mm diameter having its plane parallel to VP. Its center is 30 mm above HP and 20mm infront of VP
   II) Draw the projections of a square ABCD of 40mm side resting on V.P and 20mm above H.P.all the sides of the square are equally inclined to the H.P.

   OR

   B) Draw the projections of a circle 50mm diameter resting in the H.P on a point 'A' on the circumference its plane inclined at 45^o to the H.P, the top view of diameter AB making 30^o angle with the V.P.

4. A) A cone having a 50mm diameter and 70mm long axis , has a point of its base circle in the V.P., such that the axis is inclined at $45^0$to the V.P. and parallel to the H.P. draw its projections.

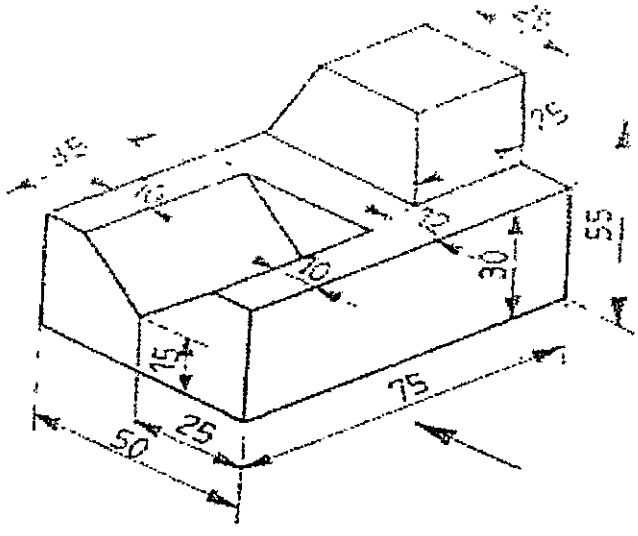
   OR

   B) A pentagonal prism having a base with a 30mm edge and a 70mm long axis, has an edge of its base in the H.P. and the axis is parallel to V.P. and inclined at 30^0 to the H.P. draw its projections.

5. A) Draw the isometric projection of a pentagonal pyramid, with side of base 25mm and axis 60mm long. The pyramid is resting on its base on HP, with an edge of the base parallel to the VP.

OR

B) Draw three views of the blocks shown pictorially in figure according to first angle projection



Narasaraopeta Engineering College (Autonomous)

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Subject Code: R20ME1106

I B.Tech - I Semester Supple Examinations, March-2025

Problem Solving using Python

Time: 3 Hours | Max.Marks:70. | Branch: ME.

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

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1. A) Construct the flowchart to
   I) Calculate the Greatest Common Divisor (GCD) of two numbers.
   II) Calculate the Fibonacci serious up to n=7.

   OR

   B) Convert the decimal number 4095 to Binary, Octal, and Hexadecimal systems. Explain the steps involved in these conversions.

2. A) I) Design a Python Script to check the whether the given number is prime or not

   OR

   B) I) Explain the string operations in python with examples.

3. A) I) Explain the recursive function in python.
   II) Write a python program to calculate factorial number using recursive function.

   OR

   B) Draw the event handling mechanism to illustrate concept

4. A) I) Explain the python List operations with examples.
   II) Explain the tuple methods in python.

   OR

   B) I) Explain file input and output operations in python
   II) Write a python program that counts the characters in a file.

5. A) I) Explain the types of inheritances with suitable examples.
   II) Write the advantages of inheritance.

   OR

   B) i) Illustrate Exception handling mechanism with example program.
   II) Explain the components of exception handling.

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Subject Code: R20EC1108

I B.Tech - I Semester Supple Examinations, March-2025

Engineering Graphics

Time: 3 Hours | Max.Marks:70. | Branch: ECE.

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

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1. A) I) Construct a parabola when the distance between the directrix and focus is 75mm. Also draw a tangent to a point on the curve located at a distance of 60mm from its directrix.
   II) Construct a regular Hexagon of side 30mm by using General and Arc Method.

   OR

   B) To construct an ellipse when the distance of the focus from the directrix is equal to 50mm and eccentricity is 2/3.

2. A) I) Draw the following Projections.
   Point A is on HP, 40mm Infront of VP.
   Point B is 30mm below HP, 40mm Behind VP.
   Point C is 25mm below HP, 50mm Infront of VP.
   II) A line PQ 60 mm length is parallel to HP and perpendicular to VP. Its end P is m above the HP and 15 mm in front of VP. Draw its projections.

   OR

   B) A line PQ is in the first quadrant. Its ends P and Q are 20 mm and 60 mm in front of the VP respectively. The distance between the end projectors is 75 mm. The line is inclined at 30^0 to the VP, with its end in HP. Draw the projections of PQ and find its true length and the inclination with the HP.

3. A) I) Draw the projections of a circle of 50 mm diameter, having its plane vertical and inclined at 30° to the V.P. Its centre is 30 mm above the H.P. and 20 mm in front of the V.P.
   II) A hexagonal lamina of a 25 mm side has its surface at 30^0 to HP. Its one side is parallel to HP and inclined at 45^0 to HP and parallel to VP. Draw the Projections.

   OR

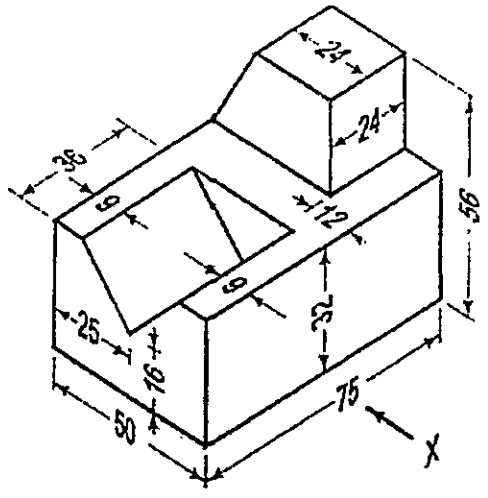
   B) Draw the projections of a pentagonal plane, side 25 mm resting on the HP on one of its edges. The plane of the pentagon is inclined at 45^0 to the HP and the perpendicular drawn from the midpoint of the resting edge makes an angle of 30^0 with the VP.

4. A) I) Draw the projections of a pentagonal prism, base 25 mm side and axis 50 mm long and one of its rectangular faces on the H.P., with the axis inclined at 450 to the V.P.
   II) A right circular cylinder of base 45mm diameter and 60mm long when it lies on one of its generator on the HP, such that its axis is parallel to the VP. Draw its projections.

   OR

   B) A cone 40mm diameter and 50 mm axis is resting on one generator on HP (lying on HP) which is parallel to VP. Draw its projections. It is cut by a horizontal section plane through its base center. Draw the development of the surface of the remaining part of cone.

5. A) Draw the (i) Front view (ii) Top view and (iii) Side view for the following figures.



OR

B) Construct an isometric view from the following orthographic projections shown in figure