R20

I BTECH I SEM

END EXAMINATION QUESTION PAPERS

SUPPLEMENTARY

SEPT. 2025

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1102

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

Linear Algebra & Calculus

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)

1.

A) I) Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$ by reducing to Echelon form

II) Using Gauss Elimination method solve the system of linear equations
$x+3y+6z=2, 3x-y+4z=9, x-4y+2z=7$

OR

B) I) Using LU Decomposition method solve the system of linear equations
$2x-4y+4z=-2, 6x-9y+7z=-3, -x-4y+8z=0$

II) "The Echelon form of a matrix is unique" Is this statement true or false? Justify your answer.

2.

A) I)Find out Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$

II) Write the Canonical form of the Quadratic form $2x_1x_2-2x_2x_3+2x_1x_3$

OR

B) I) Verify Cayley Hamilton theorem for A = $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and find out the inverse of A.

II) Using matrix diagonalization procedure find $A^3$where $P=\begin{bmatrix} 2 & -1 \\ -1 & 1 \end{bmatrix}$ and $D=\begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$

3. A) I) Verify Rolle's theorem for $f(x)=(x-a)^m(x-b)^n$ where $m, n$are positive integers in the interval (a,b)

II) Find the maximum and minimum values of the function $f(x)=x^3-12x^2+36x+17$in the Interval [1,10].

OR

B) I) If $0<a<b<1$ Use Lagrange's Mean value theorem to show that
$\frac{(b-a)}{1+b^2}<\tan^{-1}b-\tan^{-1}a<\frac{(b-a)}{1+a^2}$. Hence, show that $\frac{\pi}{4}+\frac{3}{25}<\tan^{-1}\frac{4}{3}<\frac{\pi}{4}+\frac{1}{6}$

II) A window has the form of a rectangle surmounted by a semi circle. If the perimeter is 40ft. find its dimensions so that the greatest amount of light may be admitted.

4. A) I) If $Z=\tan(y+ax)-(y-ax)^{3/2}$ show that $\frac{\partial^2 z}{\partial x^2}=a^2\frac{\partial^2 z}{\partial y^2}$

II) If $u=e^{xyz}$ then find the value of $\frac{\partial^3 u}{\partial x\partial y\partial z}$

OR

B) I) If x = u(1-v) y = uv then prove that $JJ'=1$

II) Find the dimensions of the rectangular box, open at the top, of maximum capacity whose surface Area is 432 sq.cm.

5. A) I) Evaluate $\int_0^3\int_1^{\sqrt{4-y}}(x+y)\,dx\,dy$ by changing the order of integration.

II) Evaluate $\int_0^a\int_0^b\int_0^c x^2+y^2+z^2\,dx\,dy\,dz$

OR

B) I) Evaluate $\int_0^\infty\int_0^\infty e^{-(x^2+y^2)}dx\,dy$ by changing to polar coordinates and hence show that

$$\int_0^\infty e^{-x^2}dx=\frac{\sqrt{\pi}}{2}$$

II) Evaluate $\int_0^1\int_x^{\sqrt{x}} xy\,dy\,dx$ by changing the order of integration.

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1103

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

Engineering Chemistry

Time: 3 Hours | Max.Marks:70. | Branch: Common to CE, ME ,ECE.

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

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1. A) I) Give the procedure for remove Hardness by using Hot Lime-Soda process .
   II) Write detailed note on following (i) BOD (i) COD

   OR

   B) I) Give the procedure for remove Hardness by using Ion exchange process.
   II) Define Chlorination. Explain Break point on Chlorination.

2. A) I) Describe the Free radical mechanism of addition Polymerization.
   II) Distinguish Octane and Cetane number.

   OR

   B) I) Describe the cationic mechanism of addition Polymerization.
   II) Distinguish Thermo and Thermosetting plastics.

3. A) I) What are Composite materials? Explain Fibre reinforced plastics.
   II) Write a detailed note on Fullerenes.

   OR

   B) I) Define CNT. Give applications and any one preparation method CNT.
   II) Sol-gel method

4. A) I) Distinguish Galvanizing and Tinning.
   II) Define Fuel Cell .Explain H_2-O_2 Fuel cell.

   OR

   B) I) Distinguish Electroplating and Electroless plating.
   II) Describe working and Construction of Galvanic Cell.

5. A) I) Give the mechanism of Lubrication.
   II) Explain the following (i) Refractoriness (ii) Porosity (iii)Refractoriness Under Load (RUL)

   OR

   B) I) Write a note on preparation Portland Cement.
   II) Explain the following (i) Aniline point (ii) Iodine value (iii) Viscosity.

Narasaraopeta Engineering College (Autonomous)
Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.

Subject Code: R20CC1104

I B.Tech - I Semester Supple Examinations, September-2025
Applied physics

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

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

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1. A) I) Discuss about Interference in thin films by reflection.
   II)Write the differences between Fresnel's and Fraunhofer diffraction
   OR
   B) I) Define Polarization and what are the types of Polarization. Explain
   II) Write about Quarter wave plate.

2. A) I) Define Laser. Write about Spontaneous and Stimulated emission of radiation
   II) Write about Ruby laser
   OR
   B) I) Write about the Basic Structure and Principle of optical Fiber
   II) Write about Acceptance angle and applications of Optical Fiber.

3. A) I) What are the 7 Crystal systems. Write the Structures of SC, BCC.
   II) Define Unit Cell. Discuss about Space lattice.
   OR
   B) I) Write the Separation between successive (h k l) planes
   II) Write the Directions in crystals.

4. A) I) Derive Maxwell's Electromagnetic Equations.
   II) What are the Fundamental laws of electromagnetism
   OR
   B) I) Define Magnetic permeability. Write the Classification of Magnetic materials
   II) Write the properties of Superconductivity.

5. A) I) Deduce Schrodinger Time Independent wave equations
   II) Define wave function. Write the Physical significance of wave function
   OR
   B) I) State & Explain Hall Effect. Write the applications of Hall effect
   II)Distinguish between semiconductors and insulators.

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1105

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

Problem Solving Using C

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

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

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1. A) I) Differentiate between high-level and low-level programming languages. 6M
II) Explain in detail about the following operators: increment – decrement operators, Bitwise operators, conditional operators and logical operators. 8M

OR

B) I) Develop a flowchart to find the largest of three numbers. 7M
II) Write a pseudo-code to check whether a given number is prime. 7M

2. A) I) Develop a C program to generate prime numbers in a given range. 8M
II) Develop a C program to simulate simple calculator. 6M

OR

B) I) Write an short notes on static and external storage classes 6M
II)Write a recursive program to generate n-terms of Fibonacci series 8M

3. A) I) Develop a C Program to find minimum and maximum element in array. 7M
II) Develop a C Program to check whether a given matrix is symmetric or not. 7M

OR

B) I) Write a short note on any 6 string manipulation functions. 6M
II) Design a C program to insert a substring into main string at given position. 8M

4. A) I) Design a C program to swap two values using call by reference mechanism. 7M
II) Differentiate between structure and union. 7M

OR

B) I) Write a short notes on dynamic memory allocation function.6M
II) Define a structure named Student with members name (string), roll number (integer), and marks (float). Write a program to input details of 5 students and sort them based on their marks in descending order. Display the sorted list of students. 8M

5. A) I) Describe the purpose of the fopen and fclose functions in C. 7M
II) Design a C program which reads integer values from a file and stores all even numbers in a file named EVEN.txt and odd numbers in File named ODD.txt. 7M

OR

B) I) Discuss how fseek and ftell functions can be utilized to access records randomly in a file.
II) Explain various input and output functions on files. 7M+ 7M

NARASARAOPETA ENGINEERING COLLEGE
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Subject Code: R20ME1106

I B.Tech I Semester Supple Examinations, September-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) I) Define an algorithm and write an algorithm to find the factorial of a given number
   II) How to represent binary data in the computer and convert binary to decimal, Octal and Hex with examples.

   OR

   B) I) Explain the symbols in flowchart and raptor, and draw a raptor application to find the given number is even or odd.
   II) Draw a raptor application for generating Fibonacci series.

2. A) I) Discuss about string methods.
   II) Explain the loop statements in the python with an example.

   OR

   B) I) What are decision statements in python, explain with an example.
   II) Discuss various data types in the python, variables and different assignment statements in python.

3. A) I) Discuss user defined function and recursive functions in the python with suitable examples.
   II) Explain about the lambda function suitable example and its applications.

   OR

   B) I) Write a python code to demonstrate the mouse events.
   II) discuss about the timer events in the turtle.

4. A) I) Discuss the list methods
   II) explain the tuple functions.

   OR

   B) I) Explain about the dictionary methods.
   II) Discuss file handling methods in the python

5. A) I) Explain principles of object oriented programming language.
   II) Write a python program to demonstrate the operator overloading.

   OR

   B) I) Explain Inheritance models with an example program.
   II) what is exception and how to handle exception in python.

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Subject Code: **R20CC1107**

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

Engineering Mechanics

Time: 3 Hours | Max.Marks:70. | Branch: Common to CE,ME.

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

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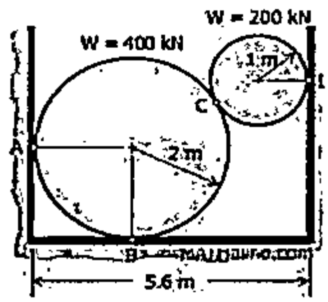
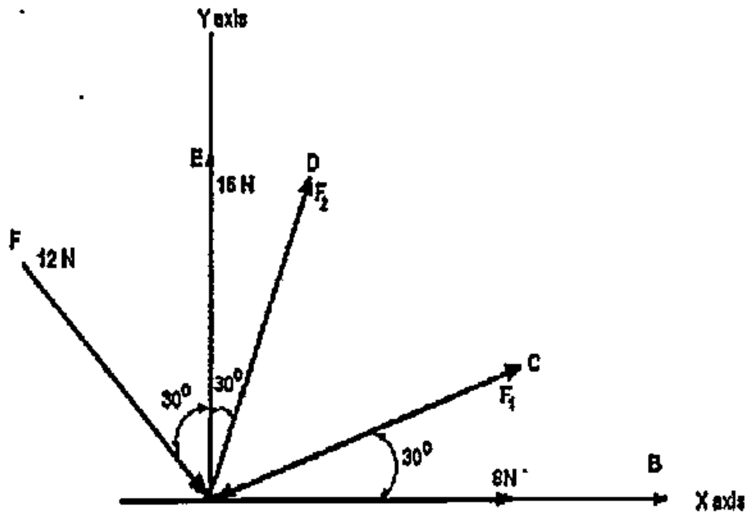
1. A) Two cylinders are in contact as shown in **Figure below.** Find the contact forces at A,B,C and D.



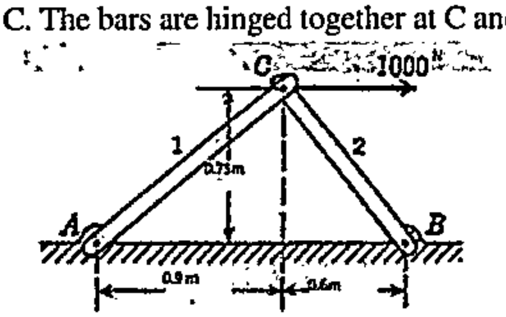
OR

B) i) State and explain Parallelogram law with relevant figures and equations

II)Determine the magnitudes of F1 and F2 for the following system of forces which are in equilibrium as shown in figure



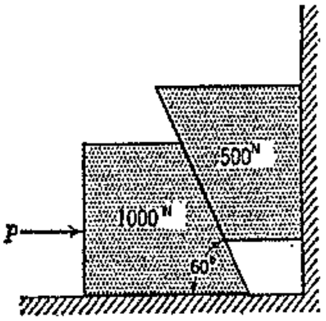
2. A) Determine the axial forces S1and S2 induced in the bars AC and BC in Fig. due to the action of the horizontal applied load at C. The bars are hinged together at C and to the foundation at A and B.



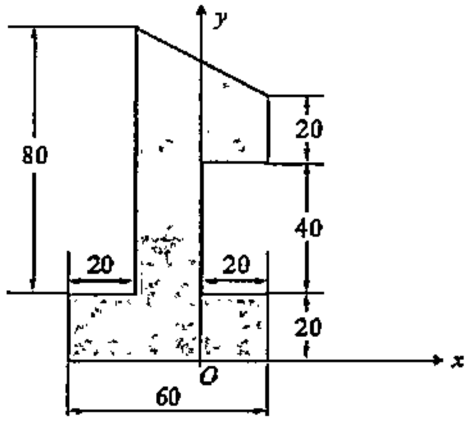
OR

B) I)Define the following: i) Friction ii) Angle of friction

II)Referring to Figure the coefficient of the friction are as follows:0.25 at the floor, 0.30 at the wall, and 0.20 between blocks. Find the minimum value of a horizontal force P applied to the lower block that will hold the system in equilibrium

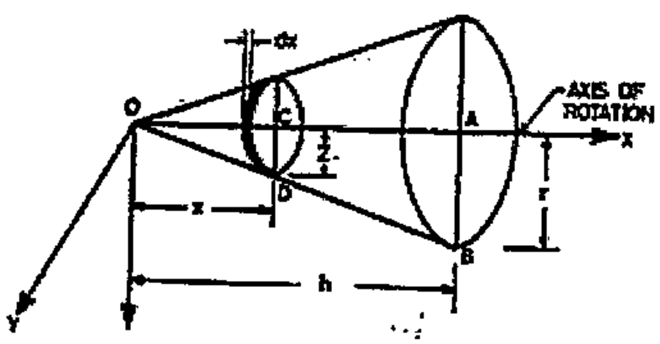


3. A) Find the centroid of the following shaded plane area as shown in fig



OR

B) Locate the Centre of gravity of the right circular cone of base radius r and height h shown in Fig.



4. A) Determine the area moment of inertia of I-section about the centroidal axis parallel to the flange, Top flange=100mmx10mm, Bottom flange=200mmx10mm and Web=100mmx10mm

OR

B) Derive an equation for mass moment o inertia of circular plate of radius 'R' and thickness 't' about its diameter.

5. A) A small steel ball is shot vertically upwards from the top of a building 25m above the ground with an initial velocity of 18 m/sec.

a) In what time; it will reach the maximum height?

b) How high above the building will the ball rise?

c) Compute the velocity with which it will strike the ground and the total time it is in motion

OR

B) Two rigid bodies of weights W1 and W2 are connected by an inextensible string and pulled by a force P. The paths of motion of the bodies are at an angle to each other. Derive the work energy equation for the system

NARASARAOPETA
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(AUTONOMOUS)

Subject Code: **R20EC1108**

I B.Tech - I Semester Supple Examinations, September-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) The major axis and minor axis of an ellipse are 70 mm and 45 mm long respectively. Construct an ellipse by Arc and circles method. (8M)

   II) Construct a regular octagon of side 30mm by using General and Arc Method. (7M)

   OR

   B) When a cricket ball was thrown, it reached a maximum height of 9m and fell on the ground at a distance of 25m from the point of projection. Draw the path of the ball.

2. A) The top view of a 75mm long line measures 55 mm. The line is in the VP, its one end being 25 mm above the HP. Draw its projections.

   OR

   B) Two points A and B are in the HP. The point A is 30mm in front of the VP; while B is behind the VP. The distance between their projectors is 75 mm and the line joining their top views makes an angle of 45^0 with xy. Find the distance of the point B from the VP.

3. A) I) A rectangle ABCD of size 30mmX20 mm is parallel to the HP and has a shorter side AB perpendicular to the VP. Draw its projections. (8M)

   II) An equilateral triangle side 60mm is perpendicular to both the HP and the VP. one of the corners of the triangle is on the HP and an edge through that corner is inclined at 45^0 to the HP. Draw the projections of the triangle. (7M)

   OR

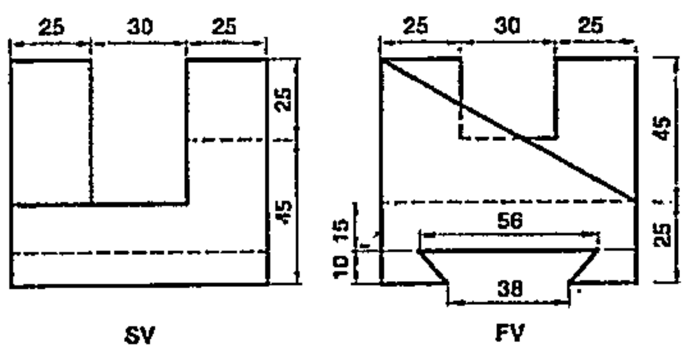
   B) I) A regular pentagon ABCDE of side 30mm has one of its edges parallel to the VP and inclined at 30^0 to the HP. The pentagon is inclined at 45^0 to the VP. Draw the projections.

4. A) I) A pentagonal pyramid with side of the base 30 mm and axis 60mm long is resting on one of its base edges on HP and the triangular face containing the resting edge is perpendicular to HP and parallel to VP. Draw the projections.

   OR

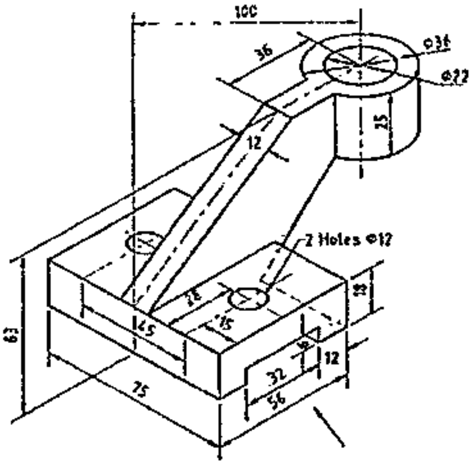
   B) A pentagonal prism is resting on corner of its base on the ground with a longer edge containing that corner inclined at 45^0 to the H.P. and the vertical plane containing that edge and the axis inclined at 30^0 to the V.P. Draw its projections. Base 40 mm side; height 65 mm.

5. A) Fig. below shows the FV and SV of an object. Draw its isometric view.



OR

B) Draw the elevation, plan and left side view of the object given below.



Subject Code: **R20EE1110**

I B.Tech - I Semester Supple Examinations, September-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) Circumscribe a regular hexagon about a circle of radius 20mm.

OR

B) Construct an ellipse when the distance between the focus and the directrix is 35mm and the eccentricity is 3/4.

2. A) A point P is 25mm below HP and lies in the third quadrant. Its shortest distance from xy is 45mm. Draw it projections.

OR

B) The front view of a line, inclined at 30^0 to the VP is 65mm long. Draw the projections of the line, when it is parallel to and 40mm above the HP; it's one end being 30mm in front of the VP.

3. A) A square plate with 35mm sides is inclined at 45° to the VP and perpendicular to the HP. Draw the projections of the plate if one of its corners is in the VP and the two sides containing that corner are equally inclined to the VP

OR

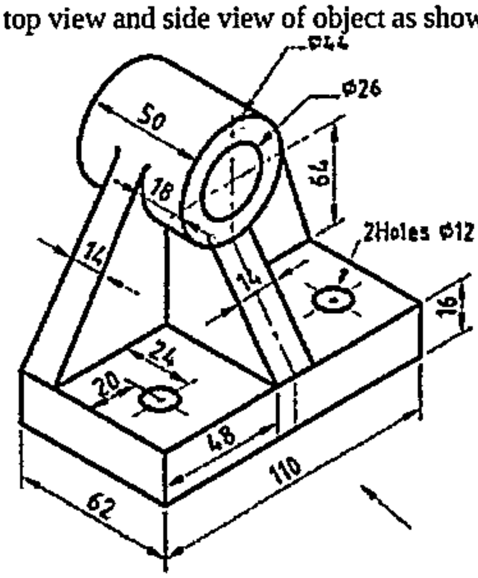
B) A hexagonal plane surface of 25mm sides has one of its corners on the HP, with the surface inclined at 45^0 to the HP and the top view of the diagonal passing through that corner is perpendicular to the VP. Draw the projections of the plate.

4. A) A cone of base diameter 55 mm and axis 70 mm long rests with one of the points on the circumference of its base on H.P. Its axis is inclined at 35^0 to H.P. and 45^0 to V.P. Draw its projections.

OR

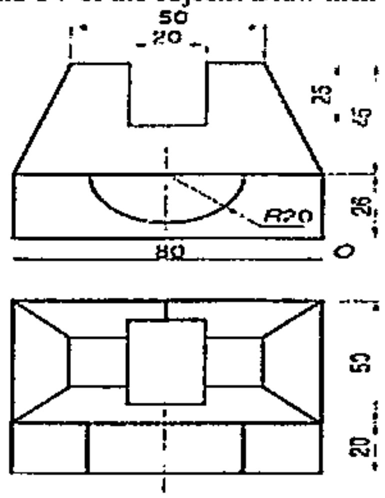
B) A cylinder of base diameter 40 mm and axis 55 mm long rests on HP on a point on the circumference of the base with its axis inclined at 35^0 to HP and parallel to VP. Draw its projections.

5. A) Draw the front view, top view and side view of object as shown in fig. below



OR

B) Fig. below shows the FV and TV of the objects. Draw their isometric projection.



NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1111

I B.Tech - I Semester Supple Examinations, September-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 forward and reverse operation of PN diode with neat schematics?	K2	1	7M
		ii) List the applications of diodes and with a neat circuit diagram explain the operation of Centre tapped Full wave rectifier	K1	1	7M
		OR			
	b	i) Explain the operation of Bridge rectifier with a neat circuit diagram and draw input and output waveforms.	K2	1	7M
		ii)A full-wave rectifier uses two diodes, the internal resistance of each diode may be assumed constant at 20Ω. The transformer r.m.s secondary voltage from centre tap to each end of secondary is 50V and load resistance is 980 Ω. Find i) the mean load current ii) the r. m. s value of load current.	K4	1	7M
2		Unit-II			
	a	i) Analyze the working of BJT in CE Configuration with neat circuit diagram and draw input and output characteristics.	K4	2	7M
		ii)Differentiate working of BJT in CE, CB and CC Configurations.	K2	2	7M
		OR			
	b	i) Analyze construction and working of n- channel Enhancement MOSFET with a neat diagram.	K3	2	7M
		ii) Compare JFET and MOSFET.	K2	2	7M
3		Unit-III			
	a	i)State and Prove Duality and DeMorgan's Laws.	K1	3	7M
		ii) Minimize the given function using K-Map. $F = \sum m(1,2,6,7,8,13,14,15)+d(0,3,5,12)$	K4	3	7M
		OR			
	b	i) Modify the following (i) $(25.25)_{10}$ to base 2 (ii)$(3DB)_{16}$ to base 8 (iii)$(111101101)_2$ to base 8	K4	3	7M
		ii) Minimize the given function using K-Map. $F = \prod (0,1,2,4,5,7,10,15)$	K4	3	7M
4		Unit-IV			
	a	i) Design a binary adder which adds given three 1-bit binary numbers.	K4	4	7M
		ii) Construct the logic diagram of SR Flip-Flop and explain it's operation with truth table?	K2	4	7M
		OR			
	b	i) Design an 1X8 De-multiplexer and explain its working with logic diagram?	K3	4	7M
		ii) Explain working of Master Slave JK FlipFlop with a neat logic diagram?	K2	4	7M

		Unit-V			
5	a	i) Construct the Control Buffer Register and explain operation with neat diagram.	K2	5	7M
		ii) Analyze the operation of 3-bit ripple counter with a neat logic diagram.	K3	5	7M
		OR			
	b	i) List out types of registers and explain the working of Universal shift register	K1	5	7M
		ii) Construct a mod-12 counter and explain operation with neat diagrams	K2	5	7M