R19

I BTECH TO IV BTECH

END EXAMINATION QUESTION PAPERS

SUPPLEMENTARY

SEPT/OCT. 2025

NEC NARASARAOPETA
ENGINEERING COLLEGE
(AUTONOMOUS)

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

Sub Code: 19BCC1TH02 **ENGINEERING PHYSICS**
Time: 3 hours (Common to CE, ME, ECE) Max. Marks: 60

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

Q.No.		Questions	Marks
1		Unit-I	
	a	i) Derive an expression for wavelength of light by using Newton ring experiment	[12M]
		OR	
	b	i) In a diffraction grating, how does the following affect the diffraction pattern: (a) Changing the total number of lines, (b) Varying the number of lines per cm, and (c) Modifying the width of the grating? Explain briefly.	[6M]
		ii) Calculate the thickness of (a) Quarter wave plate and (b) Half wave plate. Given that $\mu_e=1.553$, $\mu_o=1.544$, $\lambda=5000$ Å	[6M]
2		Unit-II	
	a	i) Describe the working of solid state Ruby Laser with the help of neat energy level diagram.	[12M]
		OR	
	b	i) Explain the mechanism of light propagation in optical fiber. Discuss the different types of optical fibers with suitable diagrams.	[4M]
		ii) An optical fiber has a numerical aperture of 0.20 and a cladding refractive index of 1.59. Find the acceptance angle for the fiber in water, which has a refractive index of 1.33.	[4M]
		iii) What is meant by the critical angle of an optical fiber? Obtain an expression for the critical angle.	[4M]
3		Unit-III	
	a	i) What is atomic packing fraction? Work out atomic packing fraction for simple cubic (SC) and Face-Centered Cubic (FCC) structures.	[8M]
		ii) Draw separately the principal planes (100), (110), and (111) in a simple cubic crystal.	[4M]
		OR	
	b	i) State and derive Braggs' law for diffraction in crystals.	[6M]
		ii) Calculate the interplanar spacing for a (321) plane in a simple cubic lattice whose lattice constant is 4.2 Å.	[6M]
4		Unit-IV	
	a	i) State and explain Biot-Savart law and Ampere's circuital law.	[4M]
		ii) Write the four Maxwell equations and explain their physical significance separately.	[8M]
		OR	
	b	i) Write the Curie-Weiss law in the case of Ferromagnetic material and explain the significance of Curie temperature.	[4M]
		ii) Write 4 major differences between hard and soft ferromagnetic materials	[4M]
		iii) What is the magnetic hysteresis loop? What is its physical significance?	[4M]
5		Unit-V	
	a	i) Show that the energy of a microparticle confined in an infinite one-dimensional	[12M]

			potential well of length 'L' is given by $E=\frac{n^2h^2}{8mL^2}$,where the symbols have their usual meaning. In the above situation, the particle cannot have zero energy. Explain why.	
	OR			
	b	i)	Explain the term Hall effect. What is the relation between Hall voltage and Hall coefficient	[6M]
		ii)	How does the Fermi level change with temperature in extrinsic semiconductors? Discuss the effect of increasing amounts of dopants in extrinsic semiconductors. Explain with neat diagrams.	[6M]

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NARASARAOPETA ENGINEERING COLLEGE
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I B.Tech I Semester Supple. Examinations, September-2025

Sub Code: 19BCC1TH03 **LINEAR ALGEBRA AND CALCULUS**
Time: 3 hours (Common to CE, EEE, ME, ECE, CSE, IT) Max. Marks: 60

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

Q.No.		Questions	Marks
		Unit-I	
1	a	i) Find the rank of the matrix $\begin{bmatrix}1 & -1 & 2 & 4\\1 & 0 & 1 & 6\\2 & -3 & 5 & 4\\3 & 2 & -1 & 1\end{bmatrix}$.	[6M]
		ii) Determine the general solution for the following homogeneous system $x+2y+z+2w=0,$ $2x+4y+z+3w=0,$ $3x+6y+z+4w=0.$	[6M]
		OR	
	b	Solve the system of linear equations using Gauss-Seidel method (Perform five iterations). $13x+5y-3z+w=18,$ $2x+12y+z-4w=13,$ $3x-4y+10z-w=29,$ $2x+y-3z+9w=31.$	[12M]
		Unit-II	
2	a	Find the eigen values and eigen vectors $A=\begin{bmatrix}1 & 3 & 0\\3 & 1 & 0\\0 & 0 & -2\end{bmatrix}$	[6M]
	b	Verify Cayley-Hamilton theorem for the matrix $A=\begin{bmatrix}1 & 4\\2 & 3\end{bmatrix}$. Find A^{-1}. Find $B=A^5-4A^4-7A^3+11A^2-A-10I$.	[6M]
		OR	
	b	Define rank, index, signature of a quadratic form. Find the nature, index, and signature of quadratic form $7x_1^2+6x_2^2+5x_3^2-4x_1x_2-4x_2x_3$ by reducing it canonical form.	[12M]
		Unit-III	
3	a	i) Verify Rolle's theorem for $f(x)=x(x+3)e^{-x/2}$ in $[-3,0]$.	[6M]
		ii) Prove that $x-\frac{x^2}{2}<\log(1+x)<x-\frac{x^2}{2(1+x)}$ for $x>0$.	[6M]

		OR	
	b	i) Obtain by Maclaurin's theorem the first five terms in the expansion of $\log(1+sinx)$.	[6M]
		ii) Find the points of maxima and minima of the function $f(x)=\sin 2x+2cosx,\ x\in[0,2\pi]$.	[6M]
4		Unit-IV	
	a	i) Transform the equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$ into polar coordinates.	[6M]
		ii) If $u^3+v^3+w^3=x+y+z, u^2+v^2+w^2=x^3+y^3+z^3$,and $u+v+w=x^2+y^2+z^2$, find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.	[6M]
		OR	
	b	i) Determine maxima and minima of the function $f(x,y)=x^3+y^3-63(x+y)+12xy$	[6M]
		ii) Expand $f(x,y)=x^2+y^2+xy$ about the point (2,3) using Taylor's theorem up to second degree terms.	[6M]
5		Unit-V	
	a	i) Find the perimeter of the loop of the curve $3ay^2=x(x-a)^2$.	[6M]
		ii) Find the volume formed by the revolution of loop of the curve $y^2(a+x)=x^2(3a-x)$, about the x-axis.	[6M]
		OR	
	b	i) Change the order of integration in $\int_0^1\int_x^{\sqrt{2-x^2}}\frac{x}{\sqrt{x^2+y^2}}dydx$ and hence evaluate it.	[6M]
		ii)Evaluate $\int_0^\infty\int_0^\infty e^{-(x^2+y^2)}dydx$ by changing to polar coordinates.	[6M]

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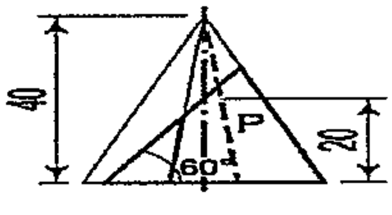
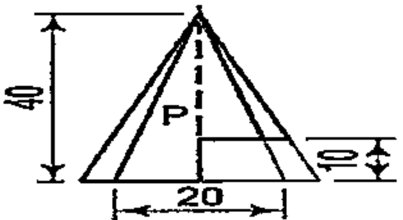
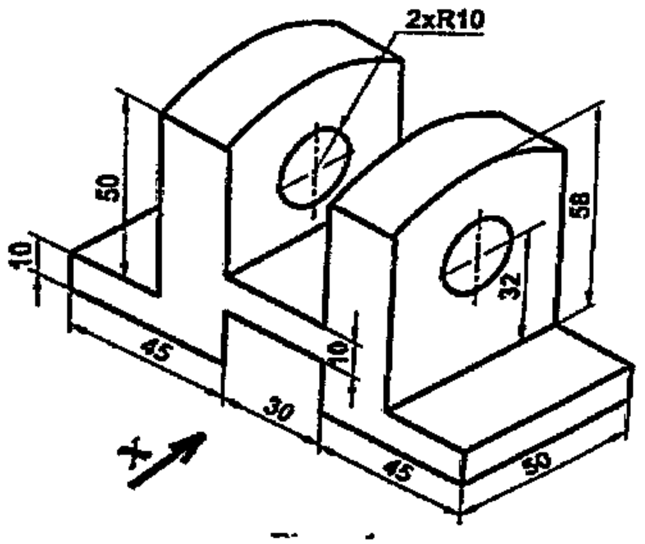
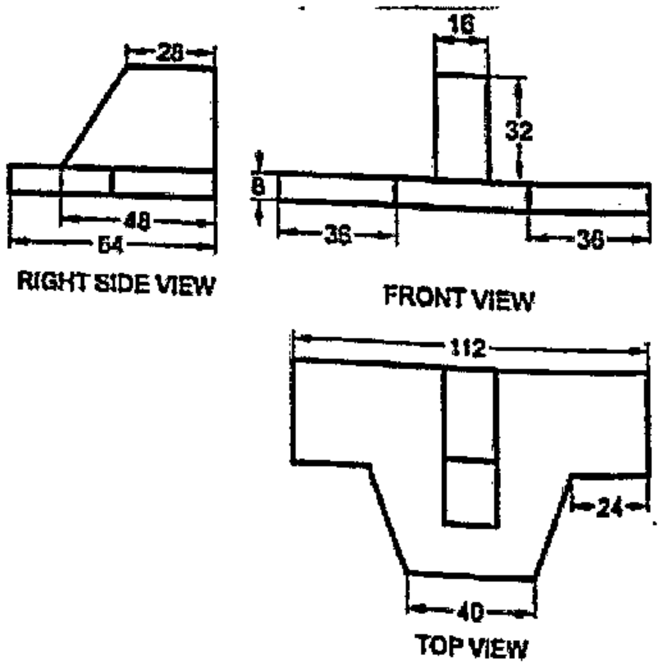
I B.Tech I Semester Supple. Examinations, September-2025

Sub Code: 19BCC1TH04 **ENGINEERING DRAWING**
Time: 3 hours **(Common to CE & ME)** Max. Marks: 60

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

Q.No.		Questions	Marks
		Unit-I	
1	a	i) Draw a hyperbola with the distance between its focus and directrix equal to 75mm and eccentricity equal to 1.5	[6M]
		ii) Construct a scale of 1:5 to show decimeters and centimeters and to read up to 1 metre. Show the length of 7.6 dm on it.	[6M]
		OR	
	b	i) Draw a cycloid generated by a point P on the circumference of a circle of diameter 60 mm when the circle rolls along a straight line. Draw a normal and a tangent to the curve at any convenient point.	[6M]
		ii) Construct a regular pentagon with a 30mm side using the general method.	[6M]
		Unit-II	
2	a	Draw the projections of the following points on the same ground line, keeping the distance between projectors equal to 30mm. (i) Point A, 25 mm above the HP, 30mm behind the VP (ii) Point B, 20 mm below the HP, 25 mm behind the VP (iii) Point C, 30 mm below the HP, 25 mm in front of the VP (iv) Point D, 25 mm above the HP, 30 mm in front of the VP (v) Point E, in the HP, 25 mm behind the VP	[12M]
		OR	
	b	i) Write the difference between the first-angle and third-angle projections.	[4M]
		ii) A line AB, 75 mm long, is inclined at 45^0 to the H.P. and 30^0 to the V.P. Its end B is in the H.P., and 30 mm in front of the V.P. Draw its projections and determine its traces.	[8M]
		Unit-III	
3	a	Draw the projections of a regular hexagon with a 35 mm side, having one of its sides in the H.P. and inclined at 60^0 to the V.P., and its surface making an angle of 45^0 with the H.P.	[12M]
		OR	
	b	Draw the projections of a regular pentagon of 40 mm side, with its surface inclined at 30^0 to the H.P. and a side parallel to the H.P. and inclined at 60^0 to the V.P.	[12M]
		Unit-IV	
4	a	i) A Square pyramid of 50 mm side of the base and 60 mm length of the axis rests on one of its triangular faces on the H.P. having a slanted edge containing that face parallel to the V.P. Draw the pyramid projections.	[6M]
		ii) A cone of diameter of base 40 mm and axis length equal to 80 mm rests on one of its slant generators on H.P. such that its axis is inclined at an angle of 45^0 with the V.P. Keep its apex near the V.P. and draw the projections.	[6M]

		OR	
	b	Draw the development of the lateral surface of part P of each of the pyramids, the front views of which are shown in Fig A and Fig B.  **(a)**  **(b)** a) A square pyramid, side of the base 20 mm long and one side of the base inclined at 30⁰ to the V.P. b) A pentagonal pyramid, one side of the base parallel to the V.P.	[12M]
		Unit-V	
	a	Draw the (i) Front view (ii) Top view and (iii) Side view for the following figure.  	[12M]
		OR	
5	b	Draw an isometric view for the given orthographic projections.  	[12M]

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

Sub Code: 19BCC1TH05 **PROBLEM SOLVING WITH PYTHON**
Time: 3 hours (Common to CE, ECE)
Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No		Questions	Marks
		Unit - I	
1	a	i) Define an **algorithm** and explain its characteristics with examples.	[6M]
		ii) Compare and contrast **system software and application software** with examples.	[6M]
		OR	
	b	i) Justify the importance of **data representation techniques** in ensuring efficient computation and processing.	[6M]
		ii) Design a **simple algorithm** for a real-life problem (e.g., ATM transaction process) and explain its logic	[6M]
		Unit - II	
2	a	i) List and explain different **flowchart symbols** used in RAPTOR with their meanings.	[6M]
		ii) Write a **RAPTOR flowchart program** to **convert units** (e.g., Celsius to Fahrenheit).	[6M]
		OR	
	b	i) Analyze the **time complexity of linear search and binary search algorithms.**	[12M]
		ii) Create a **RAPTOR flowchart** to generate the **Fibonacci series** up to 'n' terms.	
		Unit – III	
3	a	i) List different **data types in Python** and explain their usage with examples.	[6M]
		ii) Describe the **role of mathematical functions** in Python and demonstrate their usage with code.	[6M]
		OR	
	b	i) Write a Python program to check whether a given number is **even or odd** using conditional statements.	[6M]
		ii) Justify the need for **functions in Python programming** and how they improve code reusability.	[6M]
		Unit – IV	
4	a	i) Define **lists, tuples, and dictionaries** in Python with examples.	[6M]
		ii) Describe **dictionary operations** such as adding, removing, and updating key-value pairs with examples.	[6M]
		OR	
	b	Implement a Python program to **sort a list using the Bubble Sort algorithm.**	[12M]
		Unit - V	
5	a	i) Define **event-driven programming** and explain its importance in Python.	[6M]
		ii) Describe **Inheritance and polymorphism** in Python with an example	[6M]
		OR	
	b	i) Implement a Python program to **handle key press events** using the turtle module	[6M]
		ii) Design a **Python class for a banking system** that includes attributes like account number, balance, and methods like deposit and withdraw	[6M]

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

Sub Code: 19BCI1TH06 **ELECTRONIC DEVICES AND LOGIC DESIGN**

Time: 3 hours (Common to CSE & IT) Max. Marks: 60

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

Q.No.		Questions	Marks
		Unit-I	
1	a	i) Explain the equilibrium condition of an open-circuited PN junction using the energy band diagram and depletion width variation.	[8M]
		ii) Write short notes on Zener diode as a voltage regulator	[4M]
		OR	
	b	i) Illustrate the working of a Half-wave Rectifier with and without a filter with neat diagrams and derive expressions for ripple factor and efficiency.	[8M]
		ii) Differentiate between L-section and π-section filters	[4M]
		Unit-II	
2	a	i) Elaborate the construction and operation of NPN transistor with sketch. Also comment on the characteristics of NPN transistor	[8M]
		ii) Compare and contrast between CE, CB and CC configurations.	[4M]
		OR	
	b	i) Describe the construction, operation, and characteristics of an enhancement-mode MOSFET	[8M]
		ii) Differentiate between JFET and MOSFET	[4M]
		Unit-III	
3	a	i) What are universal logic gates? Write their truth tables and explain why NAND and NOR are called universal gates	[6M]
		ii) Prove De Morgan's laws algebraically and verify them using truth tables.	[6M]
		OR	
	b	i) convert the following (a) $(45.625)_{10}$ to base 2 (b) $(4567)_8$ to base 16 (c) $(1110.101)_2$ to base 10	[6M]
		ii) Reduce the following function using K-Map. $F(A, B, C, D) = \sum m(0,1,2,5,8,9,10,13)$	[6M]
		Unit-IV	
4	a	i) Design Full adder using 4x1 MUX	[6M]
		ii) Illustrate the derivation of the excitation table of a **JK flip-flop** with the help of its truth table?	[6M]
		OR	
	b	i) Construct a 4×2 encoder circuit. Write its truth table and explain the logic.	[6M]
		ii) Draw the logic diagram of D Flip-Flop and explain it's operation?	[6M]
		Unit-V	
5	a	i) Explain the working of a **Synchronous Counter** with neat logic diagram and truth table.	[8M]
		ii) Write short notes on **applications of Modulus Counters.**	[4M]
		OR	
	b	i) List out types registers and explain the working of bidirectional shift register	[6M]
		ii) Design a **4-bit Ring Counter** using D flip-flops	[6M]

NEC **NARASARAOPETA**
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I B.Tech I Semester Supple. Examinations, September-2025

Sub Code: 19BCC1TH10 **C PROGRAMMING**
Time: 3 hours (Common to EEE, ME, CSE, IT) Max. Marks: 60

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

Q.No		Questions	Marks
1		Unit-I	
	a	i) Identify the key features of an Algorithm.	[6M]
		ii) Demonstrate structure of C program with an example.	[6M]
		OR	
	b	i) Illustrate various data types in C language	[6M]
		ii) Explain about Type conversion and Type casting	[6M]
2		Unit-II	
	a	Explain about *for* loop with an example	[12M]
		OR	
	b	i) Explain about *Do-While* loop	[4M]
		ii) Explain about actual parameters and formal parameters of a typical function.	[4M]
		iii) Compare recursion vs iteration.	[4M]
3		Unit-III	
	a	i) Explain about an Array, its definition and declaration with an example.	[6M]
		ii) Develop a C program to addition Two MxN Matrices.	[6M]
		OR	
	b	i)Demonstrate about accessing elements of the Array of size N=56. Assume suitable data to array and named as *Inputdata*.	[6M]
		ii)Explain about String Manipulation functions.	[6M]
4		Unit-IV	
	a	i) Explain about structures with an example.	[6M]
		ii) Compare malloc vs Calloc.	[6M]
		OR	
	b	i) Explain about Passing Arguments to Functions using Pointer.	[6M]
		ii) Develop a C program to create an Union named as *StudentUnion* for the attributes such as *StudentName*, *RegNumber*, *Course*. Assume suitable data if necessary.	[6M]
5		Unit-V	
	a	i) Explain about Reading Data from Files with an example.	[6M]
		ii) Illustrate about Creating a Temporary File with an example.	[6M]
		OR	
	b	i) Explain about Error Handling during File Operations.	[6M]
		ii) Demonstrate Command Line arguments with an example.	[6M]

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NEC NARASARAOPETA ENGINEERING COLLEGE
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I B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BCC2TH02 DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Time: 3 hours (Common to CE, EEE, ME, ECE) Max. Marks: 60

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

Q.No.		Questions	Marks
		Unit-I	
1	a	i) Solve $2x\frac{dy}{dx}-y=10x^3y^5$.	[12M]
		OR	
	b	i) A body originally at 80^0C cools down 60^0C in 30 minutes, the temperature of air being 40^0C.What will be the temperature of the body after 50 minutes from the original?	[12M]
		Unit-II	
2	a	Solve $\frac{d^2y}{dx^2}+a^2y=Tan\ ax$ using the method of variation of parameters.	[12M]
		OR	
	b	Solve $\frac{dx}{dt}=7x-y,\ \frac{dy}{dt}=2x+5y$.	[12M]
		Unit-III	
3	a	i) Solve the equation $zpq=p+q$.	[6M]
		ii) Form P.D.E by eliminating the arbitrary function from lx + my + nz = $(x^2+y^2+z^2)$.	[6M]
		OR	
	b	i) Solve $z^2(p^2+q^2)=x^2+y^2$	[6M]
		ii) Solve the equation $p-q=\log(x+y)$	[6M]
		Unit-IV	
4	a	i) Find the constants a and b so that the surface $ax^2 - byz - (a+2)x$ is orthogonal to the surface $4x^2y + z^3 = 4$ at the point (1, -1, 2).	[12M]
		OR	
	b	i) Find the directional derivative of f = xy + yz + zx in the direction of vectors i + 2j + 2k at the point (1, 2, 0).	[12M]
		Unit-V	
5	a	i) Verify Stokes theorem for $\vec{F}=(x^2+y^2)\hat{i}-2xy\hat{j}$ taken round the rectangle bounded by the lines $x=\pm a, y=0, y=b$.	[6M]
		ii) Show that vector $3y^4z^2\bar{i}+4x^3z^2\bar{j}+3x^2y^2\bar{k}$ is solenoidal.	[6M]
		OR	
	b	i) Verify Green`s theorem for $\oint(3x^2-8y^2)dx+(4y-6xy)dy$, where c is boundary of the region defined by $y=\sqrt{x}$ and $y = x^2$	[6M]
		ii) If $\overline{F}=(x+y+1)\bar{i}+\bar{j}-(x+y)\bar{k}$, then find the value of $\overline{F}.Curl\overline{F}$.	[6M]

NEC NARASARAOPETA ENGINEERING COLLEGE
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I B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BCC2TH03 **ENGINEERING CHEMISTRY**
Time: 3 hours (Common to CE, ME, ECE) Max. Marks: 60

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

Q.No.		Questions	Marks
		Unit-I	
1	a	i) Discuss estimation of dissolved oxygen in water.	[6M]
		ii) Explain zeolite process for softening hard water.	[6M]
		OR	
	b	i) Explain reverse osmosis method for desalination of brackish water.	[6M]
		ii) What are types of hardness? How can they be removed? Explain the units of hardness and mention their interconversion.	[6M]
		Unit-II	
2	a	Discuss refining of petroleum. Discuss fixed bed catalytic cracking method.	[12M]
		OR	
	b	i) Explain compression moulding technique.	[4M]
		ii) Discuss processing of natural rubber.	[4M]
		iii) Explain step growth polymerization with examples.	[4M]
		Unit-III	
3	a	i) Discuss sol-gel method for preparation of nanomaterials.	[6M]
		ii) Discuss applications of liquid crystals.	[6M]
		OR	
	b	i) Explain chemical vapour deposition method for preparation of nanotubes.	[6M]
		ii) Discuss fiber reinforced plastics.	[6M]
		Unit-IV	
4	a	i) Discuss working of a fuel cell and mention its applications.	[6M]
		ii) Explain dry theory of corrosion.	[6M]
		OR	
	b	i) Explain construction of calomel electrode.	[6M]
		ii) Discuss constituents of paints and their functions.	[6M]
		Unit-V	
5	a	i) Discuss boundary lubrication mechanism.	[6M]
		ii) Discuss setting and hardening of cement.	[6M]
		OR	
	b	i) Discuss refractoriness under load.	[6M]
		ii) Explain the following properties of lubricating oils: (i) oiliness (ii) Aniline point (iii) Saponification value	[6M]

NARASARAOPETA
ENGINEERING COLLEGE
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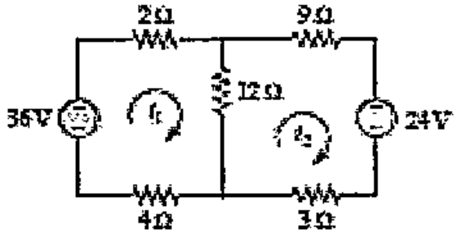
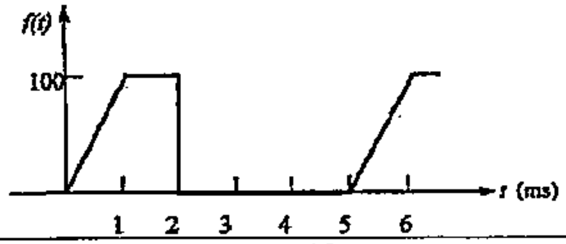
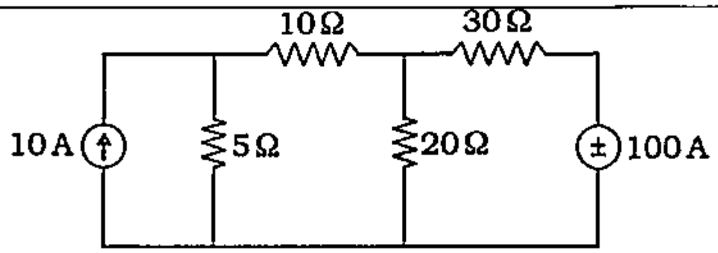
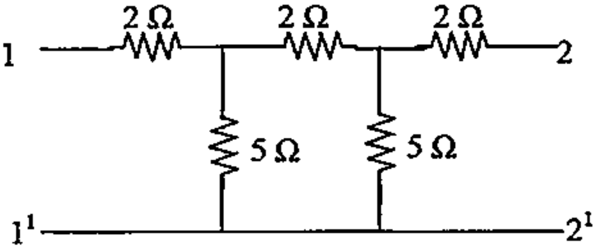
I B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BEC2TH04 **NETWORK ANALYSIS**

Time: 3 hours (ECE) Max. Marks: 60

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

Q.No		Questions	Marks
		Unit-I	
1	a	i) Differentiate between dependent and independent sources	[4M]
		ii) Explain various source transformation techniques.	[4M]
		iii) Find the equivalent star-connected resistance of a given delta-connected load with $R_{AB} = 10$, $R_{BC} = 20$, $R_{CA} = 30$.	[4M]
		OR	
	b	i) Explain in detail volt-ampere relationship of R and C elements with neat diagram	[6M]
		ii) Calculate the mesh currents of the circuit of Fig 	[6M]
		Unit-II	
2	a	Calculate the form factor and peak factor of the following periodic waveform shown in fig 	[12M]
		OR	
	b	i) Explain the dot convention in coupled circuits.	[6M]
		ii) Derive an expression for coefficient of coupling between two magnetically coupled circuits.	[6M]
		Unit-III	
3	a	i) Explain steady state analysis of RC series circuit	[6M]
		ii) An inductive circuit has a resistance of 5 in series with an inductance of 0.03 H. Calculate the current and power factor when connected across 230 V, 50 HZ supply.	[6M]
		OR	
	b	i) State and explain Norton's theorem	[6M]
		ii) Find the current through 20 resistance of the network shown in the figure by using super-position theorem.	[6M]

			
4		Unit-IV	
	a	i) Compare between Series (RLC) resonant circuit and Parallel (RL and C) resonant circuit	[6M]
		ii) Given a series RLC circuit with R = 100 ohms, L = 0.5 H and C = 40 µF, Calculate the resonant, lower and upper half – power frequencies	[6M]
		OR	
	b	i) Derive the symmetry and reciprocity conditions for ABCD parameters and h-parameters	[6M]
		ii) Determine the Y- parameters of the network shown in figure 	[6M]
5		Unit-V	
	a	i) Derive the expression for voltage across the capacitor in a RC series circuit with dc excitation.	[12M]
		OR	
	b	i) A series RLC circuit has R = 50 Ω, L = 0.2H and C = 50 µF constant voltage of 100 V is impressed upon the circuit at t = 0. Find the expression for the transient cuurent assuming initially relaxed conditions.	[12M]

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NARASARAOPETA
ENGINEERING COLLEGE
(AUTONOMOUS)

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

Sub Code: 19BEC2TH06 **C PROGRAMMING**
Time: 3 hours (ECE) Max. Marks: 60

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

Q.No.		Questions	Marks
I		Unit-I	
	a	i) Discuss different data types in C with examples.	[4M]
		ii) Explain the use of keywords and identifiers in C with proper syntax and examples	[4M]
		iii) Differentiate between type casting and type conversion in C. Give suitable examples	[4M]
		OR	
	b	i) Explain the use of constants and variables in C with proper syntax and examples.	[4M]
		ii) Define an algorithm. Write pseudo code to check whether a given number is prime	[4M]
		Iii) Write a C program to find the largest of three numbers using decision control statements.	[4M]
2		Unit-II	
	a	i) Explain the working of if–else and switch statements with examples. Highlight the use of break and continue statements.	[7M]
		ii) Explain different storage classes in C with suitable examples. Discuss their scope and lifetime	[5M]
		OR	
	b	i) Differentiate between recursion and iteration with examples.	[6M]
		ii) Explain entry controlled and exit controlled loops with example programs	[6M]
3		Unit-III	
	a	i) Explain the declaration and initialization of two-dimensional arrays with examples	[6M]
		ii) Write a C program to find the transpose of a matrix using two-dimensional arrays.	[6M]
		OR	
	b	i) Discuss any four string manipulation functions in C with examples.	[6M]
		ii) Define and explain an array of strings. Write a C program to arrange a list of names in alphabetical order.	[6M]
4		Unit-IV	
	a	i) Define a pointer. Explain pointer arithmetic with suitable examples. Write a program to add two numbers using pointers.	[6M]
		ii) Write a C program using dynamic memory allocation to store marks of n students and compute the average	[6M]
		OR	
	b	i) Demonstrate different ways of defining a structure and declaring variables, and accessing members using a student structure example	[6M]
		ii)Write an appropriate structure definition and variable declarations to store info for 100 students: Name, USN, Gender, Date of Birth and marks in 3 subjects	[6M]
5		Unit-V	
	a	i) Write a C program to copy contents from one file into another file.	[6M]
		ii) Explain the use of command line arguments in C. Write a C program that accepts two file names and compares their contents.	[6M]
		OR	
	b	i) Explain different file handling operations with example code snippets	[6M]
		ii) Write a C program to count the number of characters, words, and lines in a given text file.	[6M]

NARASARAOPETA ENGINEERING COLLEGE
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I B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BCI2TH08 **PROBABILITY AND STATISTICS**

Time: 3 hours (Common to CSE, IT) Max. Marks: 60

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

Q.No		Questions	Marks
		Unit-I	
1	a	i) A pair of dice is tossed twice. Find the probability of scoring 7 points i) One (ii) at least once (iii) twice.	[6M]
		ii) A car hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson variate with a mean of 1.5. Calculate the proportion of days on which (i) neither car is used, (ii) some demand is refused.	[6M]
		OR	
	b	i) The average number of phone calls/ minute coming into a switchboard between 2 p.m. and 4 p.m. is 2.5. Determine the probability that during one particular minute, there will be i) 4 or fewer and ii) more than six calls.	[6M]
		ii) Let X denote the sum of the two numbers that appear when a pair of fair dice is tossed. Determined i) distribution function, ii) mean, iii) variance.	[6M]
		Unit-II	
2	a	i) For normally distributed variate with mean one and standard deviation 3, find the probability that i)$3.43 \le X \le 6.19$ ii))$-1.43 \le X \le 6.19$	[6M]
		ii) A continuous random variable has the probability density function $f(x)=K.x.e^{-\lambda x}$,for $x \ge 0, \lambda > 0$and $f(x)=0$,otherwise. i) Determine K (ii) Mean (iii) Variance.	[6M]
		OR	
	b	i) Given that the mean height of students in a class is 158 cm with a standard deviation of 20 cm. Find how many students' heights lie between 150 cm and 170 cm if there are 100 students in the class.	[6M]
		ii) If X is a normal variate with mean 30 and standard deviation 5, find the probabilities that i) $26 \le X \le 40$(ii) $X \ge 45$(iii) $\|X-30\|>5$.	[6M]
		Unit-III	
3	a	i) If a population is 2, 3, 4, 5. (i) List all possible sample sizes of 2 that can be taken without replacement from the finite population. (ii) Calculate the mean of each of the sampling distributions of means. (iii) Find the standard deviation of the sampling distribution of the mean.	[12M]

	OR		
	b	i) For a population of 3, 7, 11, and 15, consider all possible distinct samples of size 2 with replacement. Find (i) Calculate the mean of each of the sampling distributions of means. (ii) Find the standard deviation of the sampling distribution of the mean.	[12M]
4	Unit-IV		
	a	i) An ambulance service company claims that, on average, it takes 20 minutes between a call for an ambulance and the patient's arrival at the hospital. If in 6 calls, the time taken (between a call and arrival at the hospital) is 27, 18, 26, 15, 20, 32. Can the company's claim be accepted?	[6M]
		ii) Evaluate the importance of the Chi-square test in hypothesis testing. Discuss its applications and limitations.	[6M]
	OR		
	b	i) Find the probability that the variance of the first sample will be at least 3 times as large as that of the second sample if two independent random samples of size $n_1=7$ and $n_2=13$ are taken from the normal population.	[6M]
		ii) Determine the probability that the variance of the first sample of size $n_1=9$ will be at least 4 times as large as the variance of the second sample of size $n_2=16$ if the two samples are independent random samples from a normal population.	[6M]
5	Unit-V		
	a	i) A manufacturing process produces rods with a target length of 50 cm. The process standard deviation is 0.5 cm. Construct a control chart for measurements (X-bar and R-chart) using the following sample data: Sample 1: 49.8, 50.1, 50.2, 49.9 Sample 2: 50.0, 50.3, 49.7, 50.1 Sample 3: 50.2, 49.9, 50.0, 50.3 (a) Calculate the mean and range for each sample. (b) Plot the control charts and determine if the process is in control.	[12M]
	OR		
	b	i) A company produces light bulbs and wants to monitor the number of defective bulbs in each batch. The following data represents the number of defects in 10 batches: Batch 1: 5, Batch 2: 3, Batch 3: 7, Batch 4: 4, Batch 5: 6, Batch 6: 2, Batch 7: 5, Batch 8: 3, Batch 9: 6, Batch 10: 4 (a) Construct a control chart for attributes (p-chart). (b) Analyze the chart and determine if the process is in control.	[12M]

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NARASARAOPETA ENGINEERING COLLEGE
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I B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BCI2TH10 NUMERICAL METHODS AND VECTOR CALCULUS

Time: 3 hours Max. Marks: 60

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

<table>
<tr><th>Q.No.</th><th></th><th>Questions</th><th>Marks</th></tr>
<tr><td rowspan="4">1</td><td colspan="3">Unit-I</td></tr>
<tr><td>a</td><td>i) Find the root of the equation $x^3 - x - 4 = 0$ by using bisection method upto 4th iteration.</td><td>[12M]</td></tr>
<tr><td colspan="3">OR</td></tr>
<tr><td>b</td><td>i) Using Newton-Raphson method, compute the root of the equation $xe^x = 2$ correct to 3 decimal places</td><td>[12M]</td></tr>
<tr><td rowspan="4">2</td><td colspan="3">Unit-II</td></tr>
<tr><td>a</td><td>Construct Newton's forward interpolation polynomial for the following data. Hence evaluate y(5).
<table>
<tr><td>X:</td><td>4</td><td>6</td><td>8</td><td>10</td></tr>
<tr><td>Y:</td><td>1</td><td>3</td><td>8</td><td>16</td></tr>
</table></td><td>[12M]</td></tr>
<tr><td colspan="3">OR</td></tr>
<tr><td>b</td><td>Given that y(3)=6, y(5)=24, y(7)=58, y(9)=108, y(11)=174 find y(x) using Lagrange's formula.</td><td>[12M]</td></tr>
<tr><td rowspan="6">3</td><td colspan="3">Unit-III</td></tr>
<tr><td rowspan="2">a</td><td>(i) Find $y(0.1), y(0.2)$ using Taylor's series method given that $y' = y^2 + x$ and $y(0) = 1$</td><td>[6M]</td></tr>
<tr><td>(ii) Solve numerically by applying Euler's method find $y(0.4)$ for the equation $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$ with $h = 0.2$</td><td>[6M]</td></tr>
<tr><td colspan="3">OR</td></tr>
<tr><td rowspan="2">b</td><td>(i) Evaluate $\int_0^1 \frac{dx}{(1+x)}$ by (i) Trapezoidal rule (ii) Simpson's one –third rule</td><td>[6M]</td></tr>
<tr><td>(ii) Use Runge – kutta method of 4th order, evaluate $y(0.1)$ and $y(0.2)$ given that $y' = x + y$, $y(0) = 1$</td><td>[6M]</td></tr>
<tr><td rowspan="6">4</td><td colspan="3">Unit-IV</td></tr>
<tr><td>a</td><td>(i) Find the Directional derivative of the function f = $x^2 - y^2 + 2z^2$ at the point P(1,2,3) in the direction of the line PQ where Q(5,0,4)</td><td>[6M]</td></tr>
<tr><td></td><td>(ii) Prove that Div $(Curl\bar{F}) = 0$</td><td>[6M]</td></tr>
<tr><td colspan="3">OR</td></tr>
<tr><td>b</td><td>(a) Show that $\frac{\bar{r}}{r^3}$ is solenoidal. Where $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$</td><td>[6M]</td></tr>
<tr><td></td><td>(b) Find the constants a and b so that the surface</td><td>[6M]</td></tr>
</table>

		$ax^4 - byz = (a+2)x$ *will be orthogonal to the surface* $4x^2y + z^3 = 4$ *at* $(-1,1,2)$	
5		**Unit-V**	
	a	Evaluate by greens theorem $\oint_c (y - sinx)dx + cosxy\,dy$ where C is the triangle enclosed by the lines y=0, x=$\frac{\pi}{2}$,$\pi y = 2x$.	[12M]
		OR	
	b	i)Apply Stokes theorem to Evaluate $\oint_c ydx + zdy + xdz$ where c is the curve of the intersection of the sphere $x^2+y^2+z^2=a^2$ and x+z=a	[12M]

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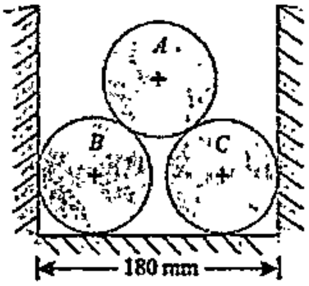
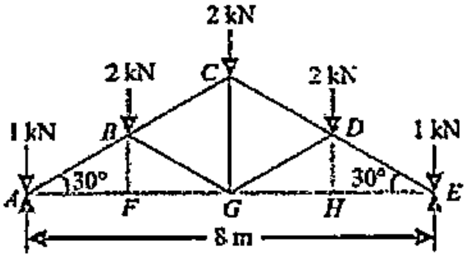
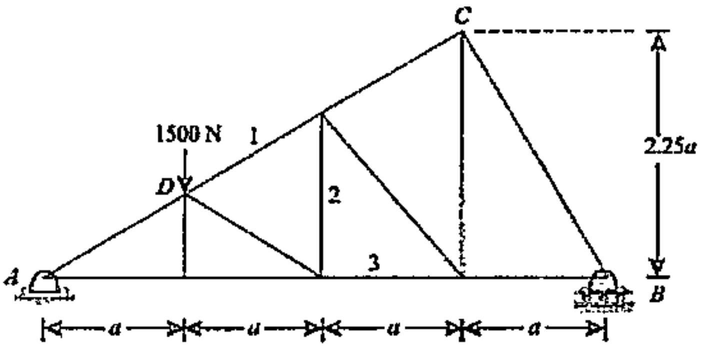
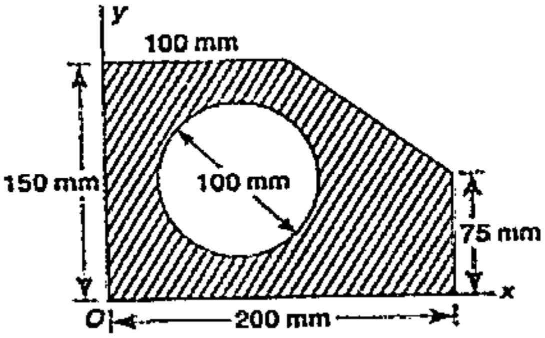
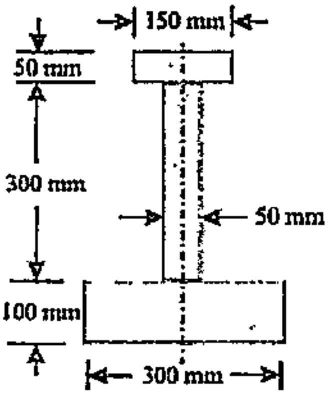
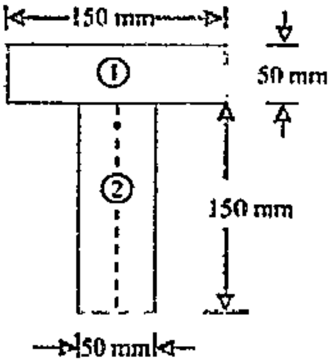
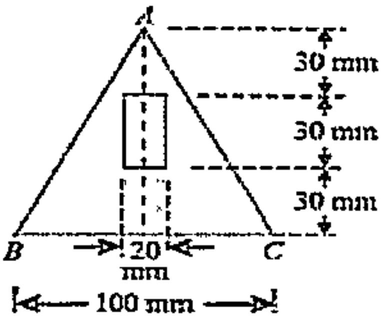
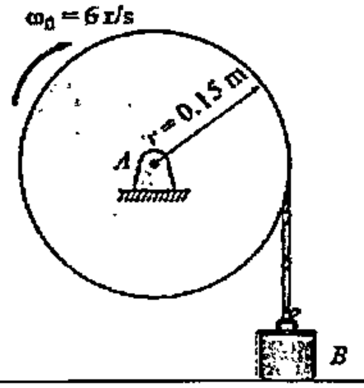
I B.Tech II Semester Supple. Examinations, September-2025

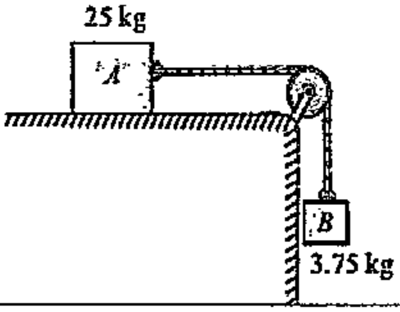
Sub Code: 19BCC2TH11 **ENGINEERING MECHANICS**
Time: 3 hours (Common to CE, ME) Max. Marks: 60

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

Q.No.		Questions	Marks
1		**Unit-I**	
	a	i) State and prove the Lami's Theorem	[4M]
		ii) The following forces act at a point : (i) 20 N inclined at 30° towards North of East, (ii) 25 N towards North, (iii) 30 N towards North West, and (iv) 35 N inclined at 40° towards South of West. Draw Free body diagram and Find the magnitude and direction of the resultant force.	[8M]
		OR	
	b	i) State and prove Varignon's theorem	[4M]
		ii) Three cylinders weighting 100 N each and of 80 mm diameter are placed in a channel of 180 mm width as shown in Fig. Determine the pressure exerted by (i) the cylinder A on B at the point of contact (ii) the cylinder B on the base and (iii) the cylinder B on the wall. 	[8M]
2		**Unit-II**	
	a	i) A king post truss of 8 m span is loaded as shown in Fig. Find the forces in each member of the truss and tabulate the results 	[12M]
		OR	
	b	A plane is loaded and supported as shown in Fig Determine the nature and magnitude of the forces in the members 1,2 and 3.	[12M]

			
	Unit-III		
3	a	Reference to Fig, determine the coordinates xc and yc of the center of a 100 mm diameter, circular hole cut in a thin plate so that this point will be the centroid of the remaining shaded area. 	[12M]
	OR		
	b	An I-section has the following dimensions in mm units : Bottom flange = 300 × 100 Top flange = 150 × 50 Web = 300 × 50 Determine mathematically the position of centre of gravity of the section. 	[12M]
	Unit-IV		
4	a	i) State and prove parallel axis Theorem	[6M]
		ii) . Find the moment of inertia of a T-section with flange as 150 mm × 50	[6M]

<table>
<tr><td></td><td></td><td> mm and web as 150 mm × 50 mm about X-X axes</td><td></td></tr>
<tr><td></td><td colspan="3">OR</td></tr>
<tr><td></td><td>b</td><td>i) A rectangular hole is made in a triangular section as shown in Fig Determine the moment of inertia of the section about X-X axis passing through its centre of gravity and the base BC. </td><td>[12M]</td></tr>
<tr><td rowspan="5">5</td><td colspan="3">Unit-V</td></tr>
<tr><td rowspan="2">a</td><td>i) State D'Alembert's principle.</td><td>[4M]</td></tr>
<tr><td>ii) A motor gives disk A an angular acceleration of a = (0.6t + 0.75) rad/s , where t is in A seconds. If the initial angular velocity of the disk is = 6 rad/s, determine the magnitude of the velocity and acceleration of block B when t = 2 sec. </td><td>[8M]</td></tr>
<tr><td colspan="3">OR</td></tr>
<tr><td>b</td><td>i) Derive work energy equation
ii) A body of mass 25 kg resting on a horizontal table is connected by string passing over a smooth pulley at the edge of the table to another body of mass 3.75 kg and hanging vertically, as shown in Fig. 14.8(a). Initially, the friction between 25 kg mass and the table is just sufficient to prevent the motion. If an additional 1.25 kg is added to the 3.75 kg mass, find the acceleration of the masses.</td><td>[6M]
[6M]</td></tr>
</table>

		25 kg A B 3.75 kg	

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NEC NARASARAOPETA ENGINEERING COLLEGE
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I B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BCC2TH14 ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Time: 3 hours (Common to CE, ME) Max. Marks: 60

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

Q.No.		Questions	Marks
		Unit-I	
1	a	i) State and derive Ohm's Law. Explain its applications and limitations.	[6M]
		ii) What are active and passive elements in a circuit? Discuss their characteristics with examples.	[6M]
		OR	
	b	i) Discuss the methods of solving series and parallel circuits. Illustrate with an example of a resistive network.	[6M]
		ii) What is Delta-Wye (Δ-Y) conversion? Explain how it is used in transforming complex circuits.	[6M]
		Unit-II	
2	a	Explain the working of a DC motor. Derive the torque equation and explain the factors affecting the torque.	[12M]
		OR	
	b	i) Describe the function and working of a 3-point starter in DC motors.	[6M]
		ii) Discuss losses in DC machines and explain the efficiency calculation using direct loading method.	[6M]
		Unit-III	
3	a	i) Explain the construction and working principle of a transformer with their diagrams.	[6M]
		ii) Derive the EMF equation of a transformer ?	[6M]
		OR	
	b	i) Describe the construction and working of a 3-phase induction motor with a neat diagram.	[6M]
		ii) What are the advantages of slip ring induction motor over squirrel cage motor?	[6M]
		Unit-IV	
4	a	i) Explain intrinsic and extrinsic semiconductors with their energy band diagrams.	[6M]
		ii) With neat sketch explain the construction, operation and its characteristics of PN junction diode. Also list its Advantages, disadvantages and its applications.	[6M]
		OR	
	b	i)What is Rectifier ? Explain the working of full-wave rectifier with their waveforms , and calculate the Efficiency, ripple factor,	[8M]
		ii) Compare half-wave and full-wave Rectifier	[4M]
		Unit-V	
5	a	i) Explain the construction and working of a bipolar junction transistor (BJT).	[6M]
		ii) Compare the characteristics of CE, CB, and CC transistor configurations.	[6M]
		OR	
	b	i) With neat diagram explain the input and output characteristics of a transistor in CE configuration.	[6M]
		Calculate the collector and emitter currents, as given the base current and current gain. Assume a CE current gain of $\beta = 150$ and a base current of $I_B = 15\mu A$. Also assume that the transistor is biased in the forward active mode.	[6M]

NEC NARASARAOPETA ENGINEERING COLLEGE
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II B.Tech I Semester Supple Examinations, October-2025

Sub Code: 19BCC3TH01 BUSINESS MANAGEMENT CONCEPTS FOR ENGINEERS

Time: 3 hours (Common to CE, CSE, IT) Max. Marks: 60

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

Q.No		Questions	Marks
		Unit-I	
1	a	i)Define Managerial economics. Explain nature and scope of ME	[6M]
		ii) Discuss various demand determinants with examples	[6M]
		OR	
	b	i) Explain the concept of Law od demand	[6M]
		ii) Define elasticity of demand. Write price elasticity of demand	[6M]
		Unit-II	
2	a	Define the term Market. List out the features of monopoly market	[12M]
		OR	
	b	i) Explain the oligopoly	[4M]
		ii) Explain journal folio no	[4M]
		iii)Differentiate sundry debtors and sundry creditors	[4M]
		Unit-III	
3	a	i) Define the term Management. Mention Henry Fayal's principles	[6M]
		ii) List out the functions of management in detail	[6M]
		OR	
	b	i) Explain scientific management period	[6M]
		ii) Summarise Theory X and Y	[6M]
		Unit-IV	
4	a	i) Out of all resources HR is most important resources. Explain	[6M]
		ii) Describe all HR manager functions	[6M]
		OR	
	b	i) Elaborate the functions of finance manager	[6M]
		ii) Explain marketing decisions are prior than production decisions. Explain	[6M]
		Unit-V	
5	a	i) Explain the rules of drawing network	[6M]
		ii) Differentiate PERT and CPM	[6M]
		OR	
	b	i) Draw the network from the following data Activity Description Labour hours 1-2 Initial consultation 6 2-3 Full consultation 12	[6M]

		3-4	Initial design	4	
		4-5	Create prototype	20	
		5-6	Final product development	16	
		4-8	Develop system documentation	6	
		5-7	Develop training material	8	
		7-8	Installation	6	
		ii) Explain the major differences of PERT and CPM			[6M]

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NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

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

Sub Code: 19BCC3TH02 **NUMERICAL METHODS AND TRANSFORMATIONS**
Time: 3 hours (Common to CE,EEE,ME) Max. Marks: 60
Note: Answer All **FIVE** questions.

<table>
<tr><th>Q.No</th><th>Questions</th><th>Marks</th></tr>
<tr><td></td><td><u>Unit-1</u></td><td></td></tr>
<tr><td>1a</td><td>(i) Find a real root of the equation $x^3 - 4x + 2 = 0$ using Newton-Raphson method correct to two decimal places.</td><td>[6M]</td></tr>
<tr><td></td><td>(ii) Find the root of the equation $x \log_{10}2(x) = 1.5$ using bisection method.</td><td>[6M]</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>1b</td><td>(i)The following data gives the population of a town over different years:
<table>
<tr><td>Year</td><td>1960</td><td>1970</td><td>1980</td><td>1990</td><td>2000</td></tr>
<tr><td>Population</td><td>20</td><td>30</td><td>50</td><td>80</td><td>120</td></tr>
</table>
Estimate the population in the year 1985 using an appropriate interpolation formula</td><td>[6M]</td></tr>
<tr><td></td><td>(ii) The values of a function f(x) are given below for certain values of x:
<table>
<tr><td>x</td><td>1</td><td>2</td><td>4</td><td>5</td></tr>
<tr><td>F(x)</td><td>10</td><td>15</td><td>35</td><td>50</td></tr>
</table>
Find f(3) using Newton's interpolation formula.</td><td>[6M]</td></tr>
<tr><td></td><td><u>Unit-II</u></td><td></td></tr>
<tr><td>2a</td><td>(i) Find y(0.1) using Taylor series method. Given that $dy/dx = x^2 + y$, y (0) = 1</td><td>[6M]</td></tr>
<tr><td></td><td>(ii) Find y (0.1) and y(0.2) using Runge-Kutta fourth order method given that $dy/dx = x + y^2$ and y(0) = 1.</td><td>[6M]</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>2b</td><td>(i) <i>Evaluate</i> $\int_0^5 \frac{1}{1+X2}$ dx using Simpson's 1/3rd rule.</td><td>[6M]</td></tr>
<tr><td></td><td>(ii) Determine $\int_0^{\pi} sinx dx$ using Trapezoidal rule with 4 subintervals (0 to π)</td><td>[6M]</td></tr>
<tr><td></td><td><u>Unit-III</u></td><td></td></tr>
<tr><td>3a</td><td>(i) Find L $\{te^{2t} \sin 3t\}$.</td><td>[6M]</td></tr>
<tr><td></td><td>(ii) Find $L\{\frac{cos3t.sin5t}{t}\}$.</td><td>[6M]</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>3b</td><td>(i) Find $L^{-1}\{\frac{s+5}{s^2-12s+35}\}$</td><td>[6M]</td></tr>
<tr><td></td><td>(ii) Using Laplace transform, solve $d^2y/dt^2 + 3\, dy/dt + 6y = e^{-t} \cos t$, given that y (0) = 0, y'(0) = 1.</td><td>[6M]</td></tr>
<tr><td></td><td><u>Unit-IV</u></td><td></td></tr>
<tr><td>4a</td><td>(i) Obtain the Fourier series expansion of f(x) given that $f(x) = (\pi - x)^3$ in(0,2π).</td><td>[6M]</td></tr>
</table>

	(ii) Expand the function $f(x) = x^3$ as a Fourier series in $[-\pi, \pi]$.	[6M]
	OR	
4b	(i) Find the Fourier series of the periodic function defined as: $f(x) = \{-x, \quad -\pi < x < 0$ $0, \quad 0 < x < \pi\}$	[6M]
	(ii) Express $f(x) = \cos 2x$ as a Fourier sine series in $(0, \pi)$.	[6M]
	<u>Unit-V</u>	
5a	(i) Using Fourier integral, show that $e^{-x}\sin x = (2/\pi)\int_0^\infty \frac{\lambda}{\lambda^2+1}\sin \lambda x \, d\lambda$	[6M]
	(ii) Find the complex Fourier transform of $e^{-b\|x\|}$.	[6M]
	OR	
5b	(i) Find $\int_0^\infty \frac{\cos px}{b^2+p^2} dp.$	[6M]
	(ii) Find the Fourier sine transform of e^{-x^2}.	[6M]

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

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

Sub Code: 19BCE3TH06 **BUILDING MATERIALS AND BUILDING CONSTRUCTION**

Time: 3 hours (CE) Max. Marks: 60

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

Q.No		Questions	Marks
		Unit-I	
1	a	i) Compare clamp-burning with kiln-burning.	[6M]
		ii) Describe the process of blasting and what are the precautions to be taken in the process of blasting?	[6M]
		OR	
	b	i) Explain about Stone Quarrying and Dressing of stones.	[6M]
		ii) What are the manufacturing methods of tiles and explain briefly any two.	[6M]
		Unit-II	
2	a	i) What are the various types of masonry explain any TWO briefly.	[6M]
		ii) Explain about Cavity Walls and Partition Walls.	[6M]
		OR	
	b	i) What are the factors responsible for causing natural defects in timber? Explain such natural defects.	[6M]
		ii) Explain any two methods of Seasoning of Timber.	[6M]
		Unit-III	
3	a	i) List out various methods of manufacturing of lime and explain any one.	[6M]
		ii) List out Various ingredients of lime and explain them.	[6M]
		OR	
	b	i) What are the important properties of cement and explain composition of ordinary Portland cement.	[6M]
		ii) Discuss in brief any two tests that are used to determine the physical properties of cement.	[6M]
		Unit-IV	
4	a	i) Explain the basic requirements of a Good Foundation.	[6M]
		ii) List out various types of floors and explain about any one.	[6M]
		OR	
	b	i) Give the classification of arches and explain with neat sketches.	[6M]
		ii) Enumerate the advantages and disadvantages of flat roofs over a pitched roof.	[6M]
		Unit-V	
5	a	i) Explain any two methods of preventing dampness.	[6M]
		ii) Write about white washing and distempering.	[6M]
		OR	
	b	i) What are the various constituents of paints and describe various types of Paints.	[6M]
		ii) Define form work. What are the stages involved in construction of form work? Explain briefly.	[6M]

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

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

Sub Code: 19BME3TH01 **FLUID MECHANICS AND HYDRAULIC MACHINERY**

Time: 3 hours (ME) Max. Marks: 60

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

Q.No.		Questions	Marks
1		Unit-I	
	a	i) Define surface tension and capillarity. How are they related to each other?	[6M]
		ii) What is meant by compressibility of a fluid? Explain its significance in fluid mechanics.	[6M]
		OR	
	b	i) A U-tube manometer is used to measure the pressure difference between two points in a fluid. If the height difference in the two arms of the manometer is 200 mm and the fluid used is mercury (density = 13600 kg/m³), calculate the pressure difference between the two points.	[6M]
		ii) A fluid has a density of 900 kg/m³ and a specific weight of 8.83 kN/m³. Calculate its specific volume and specific gravity.	[6M]
2		Unit-II	
	a	Derive Bernoulli's equation for an incompressible fluid flowing along a streamline. Explain the physical interpretation of each term in the equation and describe some of its applications.	[12M]
		OR	
	b	i) Explain the Reynolds number and its significance in fluid mechanics.	[4M]
		ii) Define Eulerian and Lagrangian descriptions of fluid flow and explain their significance in fluid mechanics.	[4M]
		iii) A fluid is flowing through a horizontal pipe of diameter 20 cm with a velocity of 2 m/s. Find the mass flow rate of the fluid in kg/s.	[4M]
3		Unit-III	
	a	i) Derive the Reynolds transport theorem. Explain the concept of similitude.	[6M]
		ii) What is dimensional analysis? Explain the Buckingham Pi theorem. Apply the theorem to derive the equation for the head loss due to friction in a pipe.	[6M]
		OR	
	b	i) Explain the concept of boundary layer and derive the equations for boundary layer thickness and momentum thickness.	[6M]
		ii) Water flows over a flat plate with a velocity of 2 m/s. The length and width of the plate are 1 m and 0.5 m, respectively. If the dynamic viscosity of water is 0.001 Ns/m²,	[6M]

		calculate the boundary layer thickness at a distance of 0.1 m from the leading edge of the plate.	
4	Unit-IV		
	a	i) Explain the working principle of a Pelton wheel turbine and derive the expression for the efficiency of the Pelton wheel.	[6M]
		ii) Explain the working principle of a centrifugal pump and derive the expression for the specific speed of the pump.	[6M]
	OR		
	b	i) A Francis turbine has a head of 20 m and a flow rate of 0.2 m^3/s. The runner diameter is 1.2 m and the blade angle at inlet is 15 degrees. If the hydraulic efficiency of the turbine is 90%, calculate the power output of the turbine.	[6M]
		ii) A single acting reciprocating pump has a plunger diameter of 10 cm and a stroke length of 20 cm. The pump is operated at a speed of 80 strokes per minute and the discharge pressure is 5 MPa. Calculate the theoretical discharge of the pump.	[6M]
5	Unit-V		
	a	i) A double acting reciprocating pump has a cylinder diameter of 20 cm and a stroke length of 40 cm. The pump is operated at a speed of 60 strokes per minute and the discharge pressure is 7 MPa. Calculate the theoretical discharge of the pump.	[6M]
		ii) A centrifugal pump is operating at 1200 rpm with a discharge of 100 liters per second. If the head developed by the pump is 30 meters, calculate the specific speed of the pump.	[6M]
	OR		
	b	i) Explain the working principle of a reciprocating pump and derive the expression for the work done by the pump.	[6M]
		ii) Derive the expression for the overall efficiency of a centrifugal pump.	[6M]

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NEC NARASARAOPETA ENGINEERING COLLEGE

(AUTONOMOUS)

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

Sub Code: 19BEC3TH02 ELECTRONIC DEVICES AND CIRCUITS

Time: 3 hours (ECE) Max. Marks: 60

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No.		Questions	Marks
1		Unit-I	
	a	i) Explain semiconductors, insulators and metals classification using energy band diagrams.	[6M]
		ii) Prove that the Fermi level lies in the centre of forbidden band for intrinsic semiconductor.	[6M]
		OR	
	b	i) Explain PN diode characteristics in forward bias and reverse bias regions.	[6M]
		ii) The current flowing through a Germanium Diode at room temperature is 8×10^{-7} amps when large reverse voltage is applied. Calculate the current flowing through the Diode when 0.1V forward bias is applied.	[6M]
2		Unit-II	
	a	i) Explain the construction and working of LCD.	[6M]
	b	ii) Explain Photo diode and Varactor diode in detail.	[6M]
		OR	
	b	i) Obtain the expression for ripple factor in the case of Full Wave Rectifier with capacitor filter.	[6M]
		ii) With circuit and necessary waveforms explain the operation of bridge rectifier.	[6M]
3		Unit-III	
	a	i) Explain CE configuration with the help of input and output characteristics.	[6M]
		ii) Compare CE, CB and CC configurations.	[6M]
		OR	
	b	i) A transistor is operated at a forward current of 2μA and with the collector open circuited. Calculate the junction voltages VC and VE, the collector to emitter voltage VCE assuming ICO = 2μA, IEO = 1.6μA and αN = 0.98.	[6M]
		ii) Explain about Common Base configuration in detail with Input-Output Characteristics.	[6M]
4		Unit-IV	
	a	i) Explain about the need for biasing in electronic circuits, what are the factors affecting the stability factor.	[6M]
		ii) In a voltage divider bias circuit, VCC = 20 V and RC = 1.5 kΩ, the Q point is VCE = 8V and IC = 4mA. Stability factor S = 12 and β = 50. Find R1, R2 and RE.	[6M]
		OR	
	b	i) Explain the voltage divider biasing method for BJT.	[6M]
		ii) Explain about Self Bias in a transistor.	[6M]
5		Unit-V	
	a	i) Draw the structure of p-channel MOSFET and qualitatively explain the static drain and gate characteristics of the device.	[6M]
		ii) Explain about Construction, Operation and Characteristics of SCR.	[6M]
		OR	
	b	i) Explain about Construction, Working of UJT.	[6M]
		ii) Explain about Drain and Transfer characteristics of JFET with neat sketches.	[6M]

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

Subject Code: **19BCC4TH01**

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

COMPLEX VARIABLES, PROBABILITY AND STATISTICS

Time: 3 Hours | Max.Marks:60 | Branch:CE & EEE

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

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1. A) I) If $f(z)=u+iv$ is an analytic function of $z=x+iy$ and $u=\frac{\sin 2x}{\cosh 2y-\cos 2x}$, Construct v and the analytic function $f(z)$.
II) Prove that the function $f(z)=\sqrt{xy}$ is not analytic at the origin, although the Cauchy-Riemann equations are satisfied at that point.

OR

B) I) Construct the conjugate harmonic of $v(r,\theta)=r^2\cos 2\theta - r\cos\theta+2$. Show that v is harmonic.
II) Prove $\left(\frac{\partial}{\partial x}|f(z)|\right)^2+\left(\frac{\partial}{\partial y}|f(z)|\right)^2=|f'(z)|^2$ if $f(z)$ is an analytic function.

2. A) I) Evaluate $\int_C^{\square}\frac{z+4}{z^2+2z+5}dz$ where C is the circle (i) $|z+1+i|=2$ (ii) $|z+1-i|=2$.
II) Evaluate $\int_0^{2\pi}\frac{\cos 3\theta}{5-4\cos\theta}d\theta$

OR

B) I) Determine the Laurent's series expansion of the function $\frac{7z-2}{z(z-2)(z+1)}$ valid in the annular region $1<|z+1|<3$.

II) Discuss the nature of singularities of the following functions
(i) $\frac{\sin z - z}{z^3}$ (ii) $\frac{e^{1/z}}{(z-a)^2}$ (iii) $\frac{\cot\pi z}{(z-a)^3}$

3. A) I) In a certain assembly plant, three machines B_1, B_2 and B_3 make 30%, 45% and 25% respectively, of the products. It is known from past experience that 2%,3% and 2% of the products made by each machine, respectively, are defective. Suppose that a finished product is randomly selected. What is the probability that it is defective?
II) In a factory producing blades, the probability of any blade being defective is 0.002. If blades are supplied in packets of 10, determine the number of packets containing (a) no defective (b) one defective and (c) two defective blades respectively in a consignment of 10000 packets.

OR

B) I) A and B play 12 games of chess of which 6 are won by A, 4 are won by B, and 2 end in a draw. They agree to play a tournament consisting of 3 games. Determine the probability that

(a) A wins all the three games, Two games end in a draw A and B win alternately

II) 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:

$P(D/P_1)=0.01,\ P(D/P_2)=0.03, P(D/P_3)=0.02$

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?

4. A) I) Suppose that X is a random variable with mean μ and variance σ^2. Let $X_1, X_2, X_3, \ldots, X_n$ be a random sample of size n from the population represented by X. Prove that the sample mean $\overline{x}$ and sample variance S^2 are unbiased estimators of μ and σ^2 respectively. Also find the standard error of the sample mean.

II) 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?

OR

B) I) A manufacturing engineer decided to check the efficiency of a new technician hired by the company. She records the time taken by the technician to complete 100 randomly selected jobs and found that in this sample of 100, the average time taken per job was 10 hours with a standard deviation of two hours. Determine a 95% confidence interval for μ, the average time taken by a technician to complete one job.

II) Discuss the terms (i) estimate, (ii) consistent estimate, (iii) unbiased estimate, of a parameter. Prove that sample mean is both consistent and unbiased estimate of the population mean.

5. A) I) Write the procedure for testing of Hypothesis.

II) A die was thrown 9000 times and a throw of 5 or 6 was obtained 3240 times. On the assumption of random throwing, do the data include an unbiased die?.

OR

B) I) The average weekly losses of man-hours due to strikes in an institute before and after a disciplinary program was implemented are as follows

Before	45	73	46	124	33	57	83	34	26	17
After	36	60	44	119	35	51	77	29	24	11

Is there reason to believe that the disciplinary program is effective at 0.05 level of significance ?

II) Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05.

x:	0	1	2	3	4
f:	419	352	154	56	19

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Sub Code: 19BCE4TH04

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

FLUID MECHANICS AND HYDRAULIC MACHINERY

Time: 3 hours (CE) Max. Marks: 60

Note: Answer All **FIVE** Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No.		Questions	Marks
		Unit-I	
1	a	i) Write briefly about different types of Pressure measuring devices	[6M]
		ii) Differentiate between: (i) Liquids and gases, (ii) Real fluid and ideal fluids, (iii) Specific weight and specific volume of a fluid.	[6M]
		OR	
	b	i) Define absolute, vacuum and gauge pressures?	[6M]
		ii) Explain about U-tube differential manometer and inverted U-tube differential manometer?	[6M]
		Unit-II	
2	a	A circular plate 2.5 m diameter is immersed in water, its greatest and least depth below the free surface being 3 m and 1 m respectively. Find (a) the total pressure on one face of the plate, and (b) the position of center of pressure	[12M]
		OR	
	b	What do you understand by Boundary Layer? Explain the development of Boundary layer over a flat plate.	[12M]
		Unit-III	
3	a	Explain the Momentum equation and its application in detail.	[12M]
		OR	
	b	Two pipes one of 10cm diameter, 200 m long and another 15cm diameter, 400 m long are connected in parallel. The friction factors are 0.0075 for the smaller pipe and 0.006 for the large pipe. The total discharge through the system is 50 lit/sec. Find the discharge and head loss in each pipe. Neglect minor losses. Calculate the equivalent length of a 20 cm diameter having f=0.005	[12M]
		Unit-IV	
4	a	i) Explain the type of open channels in brief.	[6M]
		ii) A Trapezoidal channel has a bottom width of 6.1 m and side Slopes of 2 H : 1 V .When the depth of the flow is 1.07 m. The flow is 10.47 m^3/s. What is the Specific energy of flow? Is the Flow is sub critical or super critical.	[6M]
		OR	
	b	Calculate the Specific energy ,Critical depth and the velocity of the flow of 10 m3 in a cement lined rectangular channel 2.5m wide with 2 m depth of water. Is the given flow is sub critical or super critical.	[12M]
		Unit-V	
5	a	An experiment was conducted in Hydraulic Machinery Laboratory and the following values were observed. Diameter of Pipe is 40 cm Diameter of Jet is 7.5 cm Velocity of Jet is 20 m/sec. Conditions:	[12M]

		(i) Plate is at rest. (ii) Plate is moving in the same direction of flow with velocity 5m/sec. Based on the observations find out the thrust and work done/sec for condition (i) & (ii) (iii) And also calculate the efficiency of the jet for condition (ii)	
	OR		
	b	What are the dimensionless numbers in dimensional analysis? Discuss any three of them.	[12M]

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

Subject Code: **19BEC4TH01**

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

ELECTRONIC CIRCUIT ANALYSIS

Time: 3 Hours Max.Marks:60. Branch: ECE

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

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1. A) I) Explain the concept of a two-port network and define Z, Y, and h-parameters. [6M]
II) Discuss the concept of current gain with load in a CE amplifier and derive the expression for it. [6M]

OR

B) I) Derive the h-parameter model of a transistor and explain its significance in amplifier analysis. [6M]
II) Explain the simplified hybrid model of a transistor and analyze the CE amplifier using this model. [6M]

2. A) I) Classify different types of multistage amplifiers and explain their applications. [6M]
II) For a Darlington pair amplifier, the current gain of each transistor is 100. Calculate the overall current gain of the amplifier. [6M]

OR

B) I) Explain the concept of a bootstrapped Darlington circuit. [6M]
II) An RC-coupled amplifier has a mid-band gain of 80 and a bandwidth of 3 kHz. Calculate the gain-bandwidth product. [6M]

3. A) I) Explain voltage-series feedback topology with a circuit diagram and derive the expression for voltage gain. [6M]
II) An amplifier without feedback has a gain of 1000. If negative feedback is applied with a feedback factor of 0.01, calculate the gain of the amplifier with feedback. [6M]

OR

B) I) Describe working of a voltage-shunt feedback amplifier. [6M]
II) An amplifier has a gain of 500 and a bandwidth of 2 kHz. If 10% negative feedback is applied, determine the new bandwidth. [6M]

4. A) I) Explain the working of an RC phase shift oscillator using BJT with a circuit diagram.6M]
II) Derive the expression for the frequency of oscillation in an LC oscillator. [6M]

OR

B) I) Explain the working of a Hartley oscillator using a BJT. [6M]
II) Explain the operation of a crystal oscillator. [6M]

5. A) I) Explain the working of a series-fed Class A amplifier with a circuit diagram. [6M]
II) Describe the operation of a transformer-coupled Class A amplifier. [6M]

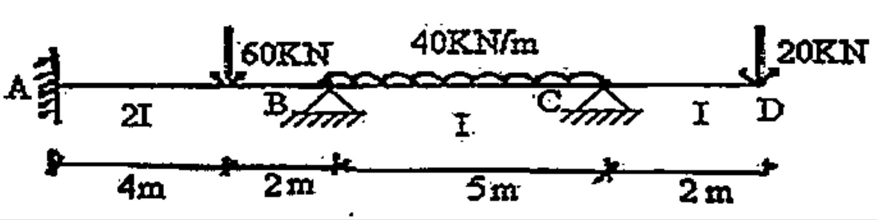
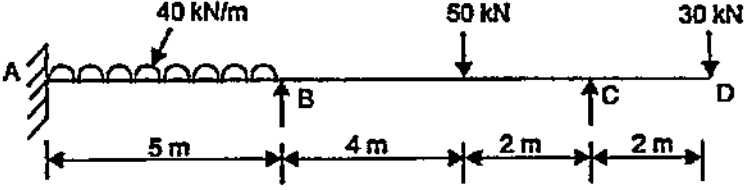
OR

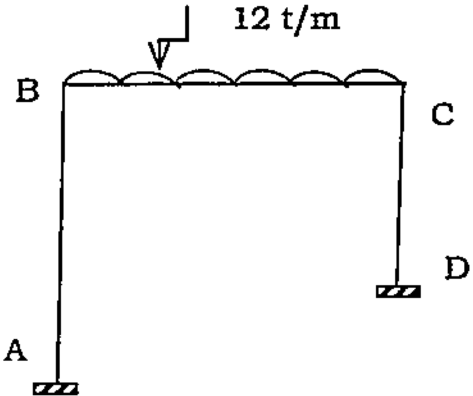
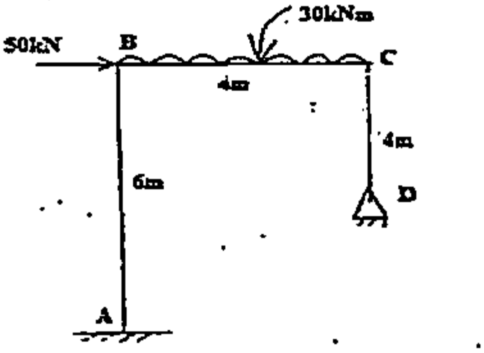
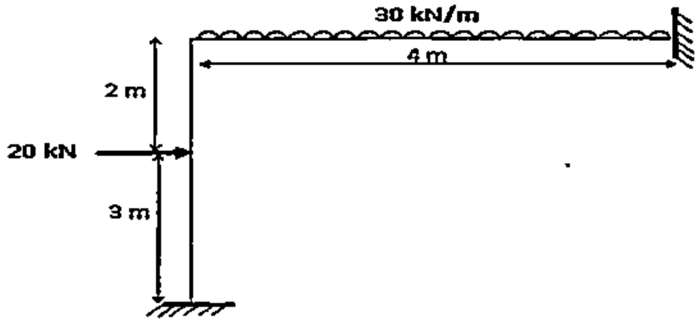
B) I) Explain the working of a Class B push-pull amplifier. [6M]
II) Describe the working of complementary symmetry Class B power amplifiers.[6M]

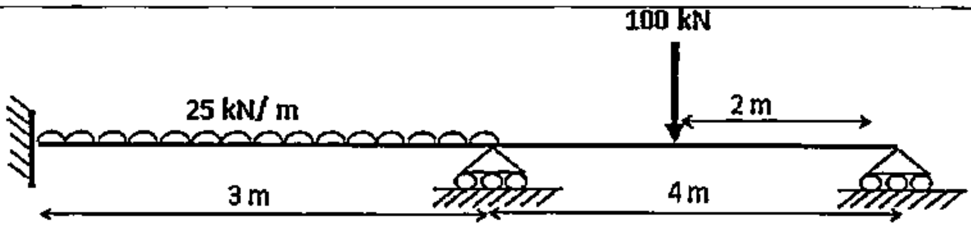
III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: 19BCE5TH02 **STRUCTURAL ANALYSIS-II**
Time: 3 hours (CE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
		Unit-I			
1	a	The propped cantilever of span 4.5m is propped at 3m from fixed end and carrying a point load of 45 kN at a distance of 1.5m from the fixed support. Determine the prop reaction and draw the SFD and BMD.	K3	CO1	12M
		OR			
	b	A beam AB of span 6m is fixed at A and propped at B. Find the prop reaction if the beam is loaded with concentrated load of 30kN at a distance of 3m from fixed end. Draw BMD and SFD	K3	CO1	12M
		Unit-II			
2	a	A two span continuous beam ABC rests on simple supports at A. B and C. All the three supports are at same level. The span AB = 5 m and span BC = 4 m. The span AB carries a uniformly distributed load of 12 kN/m and span BC carries a central point load of 22 kN. EI is constant for the whole beam. Calculate the moments and reactions at all the supports and draw the bending moment diagram using Clapeyorn's theorem of three moments	K3	CO2	12M
		OR			
	b	Analyze the continuous beam shown using three moment equation. Sketch the BM diagram. All the supports are at the same level . 	K4	CO2	12M
		Unit-III			
3	a	A two span continuous beam ABC rests on simple supports at A. B and C. All the three supports are at same level. The span AB=5m and span BC=4m. The span AB carries a uniformly distributed load of 52 kN/m and span BC carries a central point load of 62 kN. EI is constant for the whole beam. Determine the moments and reactions at all the supports and draw the bending moment diagram using slope-deflection method	K3	CO3	12M
		OR			
	b	Analyze the continuous beam shown in figure below by moment distribution method. Draw shear force and bending moment diagram 	K4	CO4	12M

<table>
<tr><td></td><td colspan="5">Unit-IV</td></tr>
<tr><td rowspan="3">4</td><td>a</td><td>A portal frame ABCD has lengths AB= 6m, BC=8m and CD=3m as shown in Fig. Analyze the portal frame using Kani's method. Sketch the bending moment diagram

 </td><td>K4</td><td>CO5</td><td>12M</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td>b</td><td>Analyze the following frame using Kani's method? Draw B.M.D

 </td><td>K4</td><td>CO5</td><td>12M</td></tr>
<tr><td></td><td colspan="5">Unit-V</td></tr>
<tr><td rowspan="3">5</td><td>a</td><td>

Using the stiffness method, analyse the frame shown in the above Figure</td><td>K4</td><td>CO6</td><td>12M</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td>b</td><td>

Using flexibility matrix method, Analyze a beam supported and loaded as shown in the above figure</td><td>K4</td><td>CO6</td><td>12M</td></tr>
</table>

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

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NEC NARASARAOPETA ENGINEERING COLLEGE

(AUTONOMOUS)

III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: 19BCE5TH04 **SOIL MECHANICS**

Time: 3 hours (CE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
1		Unit-I			
	a	i) Enlist the different types of soils in India and explain characteristics of any two soils	1	1	6M
		ii) Explain the phenomena of formation of soil and classify the soil based on formation	2	1	6M
		OR			
	b	i) define porosity ,void ratio, air content and write the limits of each.	1	1	6M
		ii) a sample of saturated soil has a water content of 30 percent and a bulk unit weight of 19 kN/m^3. Determine dry unit weight, void ratio, specific gravity of solids.	2	1	6M
2		Unit-II			
	a	Discuss Indian standard classification system of soils. and classify the soil having the following values of Atterberg limits Liquid Limit = 41%, Plastic Limit = 29%, Shrinkage Limit = 17%	3	2	12 M
		OR			
	b	i) Describe the method for determination of shrinkage limit of a soil.	2	2	6M
		ii) In variable head permeability test the initial head is 50 cm. The head drops by 15cm in 15 minutes. Find the time required to run the test for the final head to become 20 cm. Take the height and cross sectional area of the soil sample as 6 cm and 50 cm^2 respectively. Take the area of stand pipe as 0.5 cm^2	3	2	6M
3		Unit-III			
	a	i) A sand deposit consists of two layers. The top layer is 2.5m thick density=1709kg/m^3) and bottom layer is 3.5m thick (saturated density=2064kg/m^3). The water table is at a depth of 3.5m from the surface and the zone of capillary saturation is 1m above the water table. Draw the diagrams, showing the variation of total stress ,neutral stress and effective stress	4	3	12 M
		OR			
	b	i) Differentiate between Boussinesq's theory and westergaard's theory. And list the assumptions made in each theory	2	3	6M
		ii) Discuss the basis of the construction of Newmark's influence chart and how is it used.	2	3	6M
4		Unit-IV			
	a	i) Explain different methods of compaction adopted in the field. how would you select the type of roller to be used.	2	4	6M
		ii) Distinguish between Standard and modified Proctor compaction tests.	2	4	6M
		OR			
	b	i) Discuss the spring analogy for primary consolidation	2	4	6M
		ii) A 3m thick clay layer beneath a building is overlain by a permeable stratum and is underlain by an impervious rock. The coefficient of consolidation of the clay was found to be 0.025cm2/minute. The final settlement for clay layer is 8cm a) how much time it will take for 80% of the total settlement. B) determine the time required for a settlement of 2.5cm to occur. C)compute the settlement that would occur in one year.	4	4	6M

		Unit-V			
5	a	i) Derive a relationship between the principal stresses at failure using Mohr coulomb failure criteria.	3	5	12 M
		OR			
	b	i) In a drained tri axial compression test , a saturated specimen of cohesion less sand fails under a deviator stress of 535kPa when the cell pressure is 150kPa. Find the effective angle of shearing resistance of sand by analytical method.	4	5	6M
		ii) Sketch the stress -strain relationship for dense and loose sand and explain.	2	5	6M

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

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NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: 19BME5TH04 **HEAT POWER ENGINEERING**

Time: 3 hours (ME) Max. Marks: 60

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

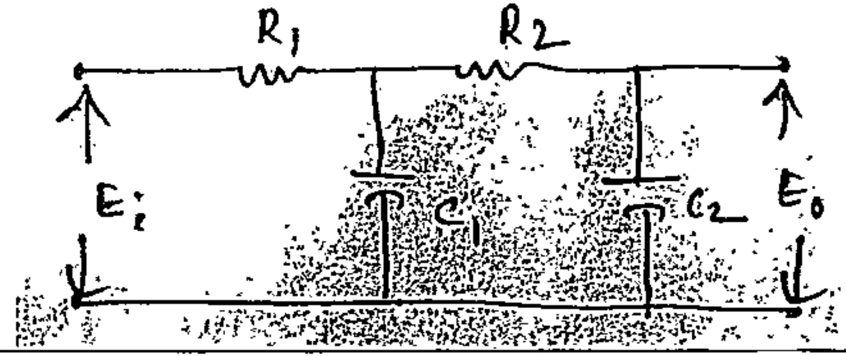
Q.No		Questions	KL	CO	M
1		Unit-I			
	a	Describe the following methods which are used to improve the performance of a rankine cycle, with the help of neat sketches and T-s diagrams. (i) Intercooling, (ii) Reheating and (iii) Regeneration	K2	1	12M
		OR			
	b	i) Illustrate the working of Orsat apparatus analysis.	K2	1	6M
		ii) What is vapour power cycle? Can a carnot cycle be used for a stem power plant? Mention the reasons to justify your answer?			6M
2		Unit-II			
	a	What is meant by fire tube boiler? Explain any one of the fire tube boiler with a neat sketch.	K3	2	12M
		OR			
	b	Discuss the advantages & disadvantages of Natural draught over Artificial draught	K2	2	6M
		Determine the condition for maximum discharge of hot gases through the chimney	K3	2	6M
3		Unit-III			
	a	Derive the condition for maximum discharge in nozzle	K3	3	12M
		OR			
	b	i) Dry saturated steam at 10 bar is expanded isentropically in a nozzle to 0.1 bar using steam tables, find the dryness fraction of the steam at exit, also find the velocity of steam leaving the nozzle when (i) Initial velocity is negligible and (ii) Initial velocity of the steam is 135 m/s.	K2	3	8M
		ii) Explain nozzle efficiency with h-s diagram	K2	3	4M
4		Unit-IV			
	a	i) Explain differences between impulse and reaction turbines.	K2	4	6M
		ii) Explain with the help of neat sketch a single stage impulse turbine. Also explain the pressure and velocity variation along the axial direction.	K2	4	6M
		OR			
	b	In a Delaval turbine, the steam issues form nozzles with a velocity of 850 m/s. The nozzle angle is 200. Mean blade velocity is 350m/s. The blades are equiangular. The mass flow rate is 1000 kg/min. Friction factor is 0.8. Determine (i) Blade angles (ii) Axial thrust on the end bearing and (iii) Power developed in kW	K4	4	12M
5		Unit-V			
	a	i) Summarize the merits and demerits of closed gas turbine cycle compared to open gas turbine cycle?	K2	5	6M
		ii) with a help of a T-S diagram briefly explain the process of intercooled gas turbine cycle	K3	5	6M
		OR			
	b	i) State the difference between liquid propellant and solid propellant.	K2	5	6M
		ii) Write the basic differences between Propeller Jet and Turbojet engines.	K2	5	6M

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: 19BEC5TH04 **CONTROL SYSTEMS**
Time: 3 hours (ECE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
1		Unit-I			
	a	i) Distinguish between open loop and closed loop systems?	2	1	6M
		ii) Explain the sailent features of a closed loop control system	3	1	6M
		OR			
	b	i) Write down Mason's gain formula and explain each term there in?	2	1	6M
		ii) For the electrical network shown in figure, obtain the transfer function. Deduce the result when $R_1 = R_2 = R$ and $C_1 = C_2 = C$? 	3	1	6M
2		Unit-II			
	a	The response of a feedback system to a step input is $C(t) = 1+ 0.2 e^{-60t} - 1.2 e^{-10t}$. i) Obtain the expression for the closed loop transfer function ii) Determine the undamped natural frequency and damping frequency and damping ratio of the system?	3	2	12M
		OR			
	b	i) What are the time domain specifications?	2	2	6M
		ii) A unity feedback system is characterized by an open loop transfer function $G(s) = \frac{k}{s(s+10)}$. Determine the gain k So that the system will have a damping ratio of 0.5. For this value k determine settling time, peak overshoot and time to peak overshoot for a unit step input?	3	2	6M
3		Unit-III			
	a	Plot the root loci for $G(s)H(s) = \frac{k}{s(s+2)(s+4)}$ and show relevent calculations	3	3	12M
		OR			
	b	Use Routh's Criterion to check the stability of a system given by the Characteristic equation $S^5 + 2S^4 + S^3 + 3S^2 + 5S + 6 = 0$	3	3	12M
4		Unit-IV			
	a	List the procedure to plot Bode plot with neat sketch	3	4	12M
		OR			
	b	Sketch the Nyquist plot for $G(s)H(s) = \frac{200}{s(s+5)(s+10)}$ and determine whether (or) not the closed loop system is stable?	3	4	12M

5		Unit-V			
	a	Briefly explain i) Lead compensation ii) Lag compensation	2	5	12M
		OR			
	b	i) What are the properties of stable transition matrix?	2	5	6M
		ii) Obtain the State transition matrix $\Phi(t)$ given the system matrix A = $\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}$	3	5	6M

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

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NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: 19BEC5TH05 COMPUTER ORGANIZATION AND MICROPROCESSORS

Time: 3 hours (ECE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
1		Unit-I			
	a	i) Explain all the functional units of microcomputer.	K4	1	6M
		ii) Demonstrate single and multiple bus structures and explain.	K2	1	6M
		OR			
	b	i) Explain instruction pipeline in detail and specify the use of it.	K4	1	6M
		ii) Distinguish between RISC and CISC.	K4	1	6M
2		Unit-II			
	a	Explain Direct Memory Access Data transfer using neat diagram.	K4	2	12M
		OR			
	b	i) Sketch the diagrams of different Cache memory mapping techniques and explain.	K3	2	6M
		ii) Determine the use of Input-Output Processor (IOP).	K3	2	6M
3		Unit-III			
	a	Sketch the architecture of 8086 and explain in detail.	K3	3	12M
		OR			
	b	i) Illustrate different addressing modes of 8086.	K4	3	6M
		ii) Implement an Assembly language program to perform multiplication of two numbers.	K3	3	6M
4		Unit-IV			
	a	i) Distinguish between Non-maskable and Maskable interrupts.	K4	4	6M
		ii) Explain the architecture of Pentium processor with neat diagram.	K4	4	6M
		OR			
	b	Explain the pin diagram of 8086 with neat diagram.	K4	4	12M
5		Unit-V			
	a	i) Interpret different modes of operation of 8255.	K2	5	6M
		ii) Summarize interfacing of A/D converter.	K2	5	6M
		OR			
	b	Explain Programmable Interrupt Controller 8259 with neat diagram.	K4	5	12M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: 19BIT5TH05 **CRYPTOGRAPHY AND NETWORK SECURITY**

Time: 3 hours (IT) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
1		Unit-I			
	a	i) Explain playfair cipher with example	K3	1	6M
		ii) Write about Security Mechanisms in cryptography	K1	1	6M
		OR			
	b	i) Differentiate passive attack from active attack with example.	K2	1	6M
		ii) Explain the security services in detail	K2	1	6M
2		Unit-II			
	a	Explain about Block cipher design principles – Block cipher mode of operation.	K2	2	12M
		OR			
	b	i) Draw the general structure of DES and explain the encryption decryption process	K2	2	12M
3		Unit-III			
	a	ii) In what way Diffie Hellman key exchange algorithm prone to man in the middle attack? Explain.	K2	3	12M
		OR			
	b	i) What is the relation between Fermat's theorem and Euler's theorem? Explain.	K2	3	6M
		ii) Perform decryption and encryption using RSA algorithm with p=3, q=11, e=7 and N=5.	K3	3	6M
4		Unit-IV			
	a	i) Enumerate the properties of Hash Function.	K2	4	6M
		ii) How digital signatures differ from authentication protocols?	K2	4	6M
		OR			
	b	i) Explain working of HMAC and write its applications.	K2	4	6M
		ii) Explain approaches of digital signature standard	K2	4	6M
5		Unit-V			
	a	ii) Write and explain various PGP services in detail.	K1	5	12M
		OR			
	b	i) Explain different Web security requirement.	K2	6	6M
		ii) What are the steps involved in SET Transaction?	K2	5	6M

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

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NEC NARASARAOPETA
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(AUTONOMOUS)

III B.Tech I Semester Supple. Examinations, Oct-2025

Sub Code: 19BCC5OE10 **OOPS THROUGH JAVA**
Time: 3 hours (ME) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
		Unit-I			
1	a	i) List and explain the features of JAVA.	K2	1	6M
		ii) Explain the structure of JAVA program.	K2	1	6M
		OR			
	b	i) List and explain the principles of OOP.	K2	1	6M
		ii) Explain the need of JVM and explain how it achieves architectural neutral.	K2	1	6M
		Unit-II			
2	a	Define constructor. Explain method overloading and constructor overloading with appropriate examples.	K2	2	12M
		OR			
	b	i) Infer the use of this keyword with an example program.	K2	2	6M
		ii) Develop a JAVA program to perform addition of two numbers. Take input from command line argument.	K3	2	6M
		Unit-III			
3	a	i) Explain the use of super keyword and write any example that illustrates super keyword.	K2	3	6M
		ii) Explain with an example, how JAVA achieves multiple inheritance.	K2	3	6M
		OR			
	b	i) What is meant by method overriding? Explain with example program.	K2	3	6M
		ii) List and explain the methods available in Universal Super class of JAVA.	K2	3	6M
		Unit-IV			
4	a	i) Write a JAVA program that handles arithmetic exception.	K3	3	6M
		ii) Explain any two layout managers with appropriate code snippet.	K2	4	6M
		OR			
	b	i) Explain the use of finally with appropriate example.	K2	3	6M
		ii) Explain any two AWT components with examples.	K2	4	6M
		Unit-V			
5	a	i) Explain about delegation event model in JAVA.	K2	4	6M
		ii) List and explain different event sources in AWT.	K2	4	6M
		OR			
	b	i) Develop a JAVA program to handle mouse or key board or window events.	K3	4	6M
		ii) Write the use of Adapter classes in JAVA. List and explain different types of adapter classes available in JAVA.	K2	4	6M

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

NARASARAOPETA
ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BCE6TH01 DESIGN & DRAWING OF STEEL STRUCTURES

Time: 3 hours (CE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
1		UNIT 1			
	A	A tie member of a truss consisting of an angle section ISA 65 x 65 x 6 of Fe 410 grade is welded to an 8-mm gusset plate. Design a weld to transmit a load equal to the full strength of the member. Assume shop welding.	4	CO1	12
	B	An ISMC 250 is used to transmit a factored load of 700kN. The channel section is connected to a gusset plate 10mm thick. Design a fillet weld if the overlap is limited to 300mm	4	CO1	12
2		UNIT 2			
	A	Design a SSB of 4m effective span carrying a load of 50kN/m. The compression flange of a beam is laterally supported.	3	CO2	12
	B	Design a laterally unsupported SSB of 3.5m effective span carrying a factored dead load of 20 kN/m and live load of 25 kN/m.	3	CO2	12
3		UNIT 3			
	A	Design a suitable angle section to carry a factored tensile force of 250 kN assuming a single row of M24 bolts. The yield strength and ultimate strength of the material is 250 MPa and 410 MPa, respectively. The length of the member is 3 m.	3	CO2	12
	B	An ISMB 400 columns 6 m long is pinned at its ends. It is also restrained against translation in the y-y direction by its connection to a bracing member running at right angles to the web at mid hright. Determine the design compressive load for the columns.	3	CO2	12
4		UNIT 4			
	A	Design a built-up column with two channels placed front to front to support a factored load of 1350 kN. The effective length of the column is 6m. Design single lacing system.	4	CO3	12
	B	Design a built-up column with two channels placed front to front to support a factored load of 1000 kN. The effective length of the column is 6m. Design battened column. Connections are to be made with fillet weld.	4	CO3	12

5					
	A	Design a slab base to carry an axial factored load of 1000 kN. The column is ISHB 450 @ 855 N/m. The effective height of the column is 5m. The column is rest on M20 concrete pedestal. Considered weld for connections.	3	CO3	12
	B	A hand operated 50 kN overhead crane is provided in a workshop. The details are given below: i) Centre to centre between gantry girders = 18m ii) Span of the gantry girder = 5.5m iii) Weight of the crane = 40 kN iv) Wheel spacing = 3 m v) Weight of the crab = 10 kN vi) Maximum edge distance = 1 m Design a simply supported gantry girder, assuming the flange is laterally supported.	4	CO4	12

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BCE6TH03 **FOUNDATION ENGINEERING**

Time: 3 hours (CE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
		UNIT-I			
1	a	i) Explain in detail about soil investigation methods with neat sketches.	K2	1	6M
		ii) Write a detail notes on Standard Penetration Test procedure and corrections required.	K2	I	6M
		OR			
	b	i) Explain the direct, semi-direct and indirect methods of soil exploration?	K2	1	6M
		ii) Explain the Augor and Wash boring for exploration of soils with neat sketches?	K2	1	6M
		UNIT-II			
2	a	i)Explain the Rankine's theory for various backfill condition to calculate active and passive state earth pressure	K2	2	5M
		ii) A retaining wall 6m height retains the backfill of bulk unit weight19 kN/m^3, C = 20 kN/m^3, angle of internal friction 30° and with the top horizontal. The backfill carries a surcharge of 30 kN/m^2 Compute the total active and passive earth pressure on the wall and their point of application. Draw the earth pressure distribution diagram.	K2	3	7M
		OR			
	b	i)What are the different modes of failure of a retaining wall	K2	2	4M
		ii)A wall of 8 m height retains sand having a density of 1.936 Mg/m3 and angle of internal friction of 34°. If the surface of the backfill slopes upwards at 15° to the horizontal, find the active thrust per unit length of the wall. Use Rankine's conditions.	K2	3	8M
		UNIT-III			
3	a	i)Give a brief note on the Cantilever Retaining Wall with variation of pressure distribution	K2	3	5M
		ii) Determine the ultimate bearing capacity of a strip footing of 1.5m wide and having the depth of foundation of 1.2m. use terzaghi's theory and assume the general shear failure. Take $\phi`=35°$, $\gamma=20KN/m^3$, and cohesion of 18KN/m^2 by considering the bearing capacity factors of 57.8, 41.4, and 42.4 respectively.	K2	3	7M
		OR			
	b	i)What are the assumptions made in the derivation of Terzaghi's bearing capacity theory?	K2	3	5M
		ii)Compute the safe bearing capacity of a continuous footing 1.5 m wide, at a depth of 1.8 m, in a soil with $\gamma = 18$ kN/m^3 , c = 19 kN/m^2 , and $\varphi = 30°$. Terzaghi's factors of $\varphi = 25°$ are Nc = 25, Nq = 12.5, and Nγ = 10. What is the safe load per metre run if the factor of safety is 3?	K3	3	7M
		UNIT-IV			
4	a	i) Discuss different methods for the installation of piles.	K2	4	4M
		ii) Design a friction pile group to carry a load of 3500 kN including the	K3	4	8M

		weight of pile at a site where. the soil is uniform clay to a depth of 10 m underlain by rock. The average compressive strength of clay is 50 kN/m^2. The clay may be assumed to be of normal sensitivity and normally loaded with a liquid limit of 70%. Adopt a factor of safety 2.5 against shear failure.			
	OR				
		i)What is negative skin friction in piles? Explain the causes of negative skin friction.	K2	4	5M
	b	ii) A group of 12 piles of 60 cm diameter is arranged with a centre to centre spacing of 1.0 m. The piles are 9 m long and are embedded in soft clay with cohesion 30 kN/m^2. Bearing resistance may be neglected for the piles. Negative adhesion factor is 0.55. Determine the ultimate load capacity of the pile group.	K3	4	7M
5	UNIT-V				
	a	What is well foundation? Explain the various components in well foundations with neat sketches?	K2	5	8M
		What is tilt and shift in well foundations?	K2	5	4M
	OR				
		i)Explain the process of sinking of wells with neat sketches?	K2	5	5M
	b	ii)What do you understand by grip length? What is its importance in well foundations?	K2	5	7M

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

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NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BCE6TH04 **TRANSPORTATION ENGINEERING**

Time: 3 hours (CE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
1	a	i) What are the salient features of Nagpur Road Development Plan?	KL2	CO1	6M
		ii) What are obligatory points? How they influence highway alignment?	KL2	CO1	6M
		OR			
	b	i) Briefly outline the highway development in India also write it's any two practical examples.	KL3	CO1	8M
		ii) What are the objects of reconnaissance in engineering surveys?	KL3	CO1	4M
2	a	What is a transition curve. Design a transition curve for a circular curve having a radius of 300 m in a plain terrain. It is proposed to introduce the super elevation in the 4 lane National highway having a width of 14m by rotating the alignment with reference to central line. The design speed of highway is 120 kmph. The rate of introduction of super elevation is 1 in 150.	KL3	CO2	12M
		OR			
	b	i) What are the various gradients used in highways? What do you understand by Grade compensation?	KL2	CO2	6M
		ii) Derive an expression of summit curve for SSD.	KL2	CO2	6M
3	a	i) Explain spot speed, running speed, space mean speed, time mean speed and average speed. How is spot speed studies carried out?	KL3	CO3	8M
		ii) Explain various types of road markings.	KL3	CO3	4M
		OR			
	b	i) Mention the types of intersections.	KL3	CO3	4M
		ii) What are the advantages and disadvantages of traffic signs?	KL3	CO3	8M
4	a	i) Enumerate the steps involved in Marshall Method of design.	KL2	CO4	8M
		ii) Write a note on California Bearing Ratio.	KL2	CO4	4M
		OR			
	b	i) What are temperature stresses.	KL3	CO4	4M
		i) Determine spacing of contraction joints of 6.5 cm thick slab having 30 cm thickness and f=1.5 for the following cases. ii) For plain cement concrete, allowable Sc=0.6 kg/cm^2 iii) For reinforced cement concrete, 1cm diameter bars at 0.3 m spacing	KL3	CO4	8M
5	a	Discuss the highway drainage system in detail?	KL3	CO5	12M
		OR			
	b	i) Write about various processes of pavement evaluation	KL3	CO5	6M
		ii) Write the construction processors of WBM roads	KL3	CO5	6M

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

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NEC **NARASARAOPETA ENGINEERING COLLEGE**

(AUTONOMOUS)

III B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BME6TH01 COMPLEX VARIABLES, PROBABILITY STATISTICS

Time: 3 hours (ME) Max. Marks: 60

Note: Answer All **FIVE** Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

<table>
<tr><th>Q.No</th><th></th><th>Questions</th><th>KL</th><th>CO</th><th>M</th></tr>
<tr><td rowspan="6">1</td><td colspan="5">Unit-I</td></tr>
<tr><td rowspan="2">a</td><td>i) Determine p such that the function $f(z)=\frac{1}{2}\log_e(x^2+y^2)+i\tan^{-1}\left(\frac{px}{y}\right)$ be an analytic function.</td><td>4</td><td>1</td><td>6M</td></tr>
<tr><td>ii) Prove that $\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}=4\frac{\partial^2}{\partial x\partial y}$.</td><td>3</td><td>1</td><td>6M</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td rowspan="2">b</td><td>i) Show that $u(x,y)=x^3-3xy^2$ is harmonic and find its harmonic conjugate and the corresponding analytic function $f(z)$ in terms of z.</td><td>3</td><td>1</td><td>6M</td></tr>
<tr><td>ii) Prove that the function $f(z)$ defined by $f(z)=\begin{cases}\frac{xy^2(x+iy)}{x^2+y^4} if\, z\neq 0\\ 0 if\, z=0\end{cases}$ is analytic or not.</td><td>3</td><td>1</td><td>6M</td></tr>
<tr><td rowspan="6">2</td><td colspan="5">Unit-II</td></tr>
<tr><td rowspan="2">a</td><td>i) Evaluate $\oint_C \frac{sin\pi z^2+cos\pi z^2}{(z-1)(z-2)}dz$ where C is the circle $|z|=3$.</td><td>5</td><td>2</td><td>6M</td></tr>
<tr><td>ii) Evaluate $\oint_C \frac{z^2e^z}{(z-1)^3}dz$ where C is $|z|=1$.</td><td>5</td><td>2</td><td>6M</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td rowspan="2">b</td><td>i) Find the Laurent's expansion of $f(z)=\frac{7z-2}{(z+1)z(z-2)}$ in the region $1<z+1<3$.</td><td>3</td><td>2</td><td>6M</td></tr>
<tr><td>ii) Evaluate $\oint_C \frac{e^{2z}}{(z+2)(z+4)(z+7)}dz$ where C is $|z|=3$ using Residue theorem.</td><td>5</td><td>2</td><td>6M</td></tr>
<tr><td rowspan="5">3</td><td colspan="5">Unit-III</td></tr>
<tr><td rowspan="2">a</td><td>i) A random variable X has the following probability function
Find (i) k (ii) Mean (iii) Variance
<table>
<tr><td>X</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>P(X)</td><td>k</td><td>0.1</td><td>k</td><td>0.2</td><td>2k</td><td>0.4</td><td>2k</td></tr>
</table></td><td>3</td><td>3</td><td>6M</td></tr>
<tr><td>ii) The probability that students A,B,C,D solve a problem are $\frac{1}{3},\frac{2}{5},\frac{1}{5}$ and $\frac{1}{4}$ respectively. If all of them try to solve the problem, what is the probability that the problem is solved?</td><td>3</td><td>3</td><td>6M</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td>b</td><td>i) In a bolt factory, machines A, B and C manufacture respectively</td><td>2</td><td>3</td><td>6M</td></tr>
</table>

<table>
<tr><td></td><td></td><td>25%, 35% and 40% of the total. If their output 5, 4 and 2 per cent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine B?</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>ii) Ten coins are thrown simultaneously. Find the probability of getting (i) at least seven heads (ii) exactly six heads.</td><td>3</td><td>3</td><td>6M</td></tr>
<tr><td></td><td colspan="5">Unit-IV</td></tr>
<tr><td>4</td><td>a</td><td>i) In a study of an automobile insurance a random sample of 80 body repair costs had a mean of ₹472.36 and the S.D of ₹62.35. If $\bar{x}$ is used as a point estimate to the true average repair costs, with what confidence we can assert that the maximum error doesn't exceed ₹10.</td><td>3</td><td>4</td><td>6M</td></tr>
<tr><td></td><td></td><td>ii) The mean and standard deviation of a population are 11.795 and 14.054 respectively. What can one assert with 95% confidence about the maximum error if $\bar{x}$ = 11.795 and n = 50. And also construct 95% confidence interval for the true mean</td><td>3</td><td>4</td><td>6M</td></tr>
<tr><td></td><td colspan="5">OR</td></tr>
<tr><td></td><td></td><td>A professor's feelings about the mean mark in the final examination in "Probability" of a large group of students is expressed subjectively by normal distribution with $\mu_0 =$ 67.2 and σ_0 =1.5.
(a) If the mean mark lies in the interval (65.0, 70.0) determine the prior probability the professor should assign to the mean mark.
(b) Find the professor mean μ_1 and the posterior S.D σ_1 if the examinations are conducted on a random sample of 40 students yielding mean 74.9 and S.D 7.4. Use S =7.4 as an estimate σ .
(c) Determine the posterior probability which he will thus assign to the mean mark being in the interval (65.0,70.0) using results obtained in (b).
(d) Construct a 95% Bayesian interval for μ.</td><td>3</td><td>4</td><td>12M</td></tr>
<tr><td></td><td colspan="5">Unit-V</td></tr>
<tr><td>5</td><td>a</td><td>i) The nicotine contents in milligrams of two samples of tobacco were found to be as follows. Test whether there is a significant difference between the two samples.
<table>
<tr><td>Sample A</td><td>24</td><td>27</td><td>26</td><td>23</td><td>25</td><td>--</td></tr>
<tr><td>Sample B</td><td>29</td><td>30</td><td>30</td><td>31</td><td>24</td><td>36</td></tr>
</table></td><td>5</td><td>5</td><td>6M</td></tr>
<tr><td></td><td></td><td>ii) An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the claim at 0.05 level of significance.</td><td>5</td><td>5</td><td>6M</td></tr>
<tr><td></td><td colspan="5">OR</td></tr>
<tr><td></td><td>b</td><td>i) In a big city 325 men out of 600 men found to be smokers Does this information support the conclusion that the majority of men in this city are smokers?</td><td>5</td><td>5</td><td>6M</td></tr>
<tr><td></td><td></td><td>ii) Given the following contingency table for hair colour and eye colour. Find the value of χ^2.
Is there good association between the two?</td><td>5</td><td>5</td><td>6M</td></tr>
</table>

		Hair colour			
		Fair	Brown	Black	Total
Eye colour	Blue	15	5	20	40
	Grey	20	10	20	50
	Brown	25	15	20	60
	Total	60	30	60	150

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

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NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BEC6TH01 ANTENNAS AND WAVE PROPAGATION

Time: 3 hours (ECE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
		Unit-I			
1	a	i) Analyze the working principle of a single wire antenna?	K4	1	6M
		ii)Define effective height (h_{eff}) of an antenna? Compare h_{eff} for half wave Dipole with short dipole antenna?	K4	1	6M
		OR			
	b	i) calculate an approximate directivity of the following unidirectional power Pattern $p(\theta,\Phi)= 5\sin\theta$. Also compare with exact value of directivity?	K4	1	6M
		ii) Analyze the Current Distribution on a thin wire antenna for different lengths	K4	1	6M
		Unit-II			
2	a	Derive the field equations at a far-field from an Halfwave dipole antenna and find Rrad is 73Ω	K5	2	12M
		OR			
	b	i) Analyze the retarded potentials and derive them using Maxwell's approach.	K5	2	6M
		ii) Derive the field equations from a small loop antenna?	K5	2	6M
		Unit-III			
3	a	i)Evaluate Null-to-Null beam width and half-power beam width in degree for an array contains 100 isotropic radiators with an inter element spacing of 0.5λ. It is required to produce broadside and end-fire beams.	K5	3	6M
		ii) Prove that the array factor is same for 2-element linear uniform array Placed on a zimuthal or elevation planes.	K5	3	6M
		OR			
	b	i) Derive the equations for main lobe and side lobe of an N-element linear array	K5	3	6M
		ii) Calculate the radiation pattern of N=3 element, d=λ/2 of binomial array Antenna by using pattern multiplication technique	K5	3	6M
		Unit-IV			
4	a	i) Design and explain the working principle of a microstrip antenna?	K5	4	6M
		ii) Analyze the working principle of lens antenna	K5	4	6M
		OR			
	b	i) Analyze the working principle of a helical antenna in normal mode?	K5	4	6M
		ii) Define long wire antenna? Based on Equations, draw the radiation pattern of 2λ, 5λ and 10 λ length antennas?	K5	4	6M
		Unit-V			
5	a	i) Write a notes on i) Ionospheric Abnormalities ii) duct propagation	K3	5	6M
		ii) Draw the atmospheric layers and discuss about each layer in ionospheric Region	K3	5	6M
		OR			
	b	i) Derive the field strength equation at a distance in space wave propagation	K3	5	6M
		ii) Write short notes on Ground wave Propagation?	K3	5	6M

NARASARAOPETA
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III B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BEC6TH02 **DIGITAL SIGNAL PROCESSING**
Time: 3 hours (ECE) Max. Marks: 60

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

No		Questions	KL	CO	M
		Unit-I			
	a	i) State and prove the frequency shifting property of DTFT	2	1	6M
		ii) Explain the concept of Frequency domain representation of Discrete Time Signals in detail	2	1	6M
		OR			
	b	i) List out different Classification of Discrete–Time Signals along with examples	3	1	6M
		ii) write short notes on properties of DTFT	3	1	6M
		Unit-II			
2	a	Find the 4-point DFT of the sequence x n = 2, 1, 4, 3 by using DIF FFT algorithm? Also, plot its magnitude and phase spectra	4	2	12 M
		OR			
	b	i) Explain the procedure to compute 8-point DFT using DIT FFT algorithm.	5	2	6M
		ii) State and prove any two properties of DFT.	5	2	6M
		Unit-III			
	a	i) Obtain the bilinear transformation formula for designing IIR digital filter?	2	3	6M
		ii) write short notes on Lattice structures of IIR systems	2	3	6M
		OR			
	b	i) Design a high pass FIR filter using Hamming window with a cutoff frequency of 1.2 rad and N = 9	3	3	6M
		ii) write short notes on Conversion from Lattice structure to direct form	3	3	6M
		Unit-IV			
	a	i) Derive the necessary and sufficient condition for linear phase characteristic in FIR filter.	1	4	6M
		ii) Explain the concept of Chebyshev filter design in detail	1	4	6M
		OR			
	b	i) Explain the concept of Low pass to Band pass filter design in detail	4	4	6M
		ii) write short notes on Butterworth filter design	4	4	6M
		Unit-V			
5	a	i) List out different Characteristics of FIR Digital Filters	2	5	6M
		ii)List out few Comparison of IIR and FIR filters	2	5	6M
		OR			
	b	Explain the following terms in detail (a) Hanning Window (b)Blackman Window.	3	5	12 M

Blooms Taxonomy Knowledge Level CO: Course Outcome M:Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech II Semester Supple. Examinations, September-2025

Sub Code: 19BEC6TH04 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Time: 3 hours (ECE) Max. Marks: 60

Note: Answer All **FIVE** Questions.

All Questions Carry Equal Marks (5 X 12 = 60M)

Q.No		Questions	KL	CO	M
		Unit-I			
1	a	i) Explain the need for Object-Oriented Programming with suitable examples.	L2	CO1	6M
		ii) List and describe the features of Java that make it robust and secure.	L2	CO1	6M
		OR			
	b	i) Differentiate between Procedural Programming and Object-Oriented Programming.	L4	CO1	6M
		ii) Explain the role of Java Virtual Machine (JVM) in program execution.	L2	CO1	6M
		Unit-II			
2	a	Write a Java program to demonstrate method overloading and constructor overloading	L3	CO2	12M
		OR			
	b	i) Describe the purpose of the static keyword and the this keyword with examples.	L2	CO2	6M
		ii) Write a Java program using arrays to find the sum and average of elements	L3	CO2	6M
		Unit-III			
3	a	i) List and explain the types of inheritance supported in Java with examples.	L1	CO3	6M
		ii) Compare and contrast abstract classes and interfaces in Java.	L4	CO3	6M
		OR			
	b	i) Write a Java program to demonstrate use of super keyword.	L3	CO3	6M
		ii) Explain exception handling in Java with try, catch, throw, throws, and finally keywords.	L2	CO2	6M
		Unit-IV			
4	a	i) Explain the lifecycle of a thread in Java with a neat diagram	L2	CO4	6M
		ii) Write a Java program to create multiple threads by extending the Thread class	L3	CO4	6M
		OR			
	b	i) Explain thread synchronization with an example.	L2	CO4	6M
		ii) Illustrate HashSet and HashMap with example programs.	L3	CO4	6M
		Unit-V			
5	a	i) Explain the concept of passing parameters to applets with example program.	L2	CO5	6M
		ii) Write a Java program to handle button click events using the Event Delegation Model.	L3	CO5	6M
		OR			
	b	i) Explain the purpose of Adapter classes	L2	CO5	6M
		ii) Write a JAVA program that displays the x and y position of the cursor movement using Mouse.	L3	CO5	6M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

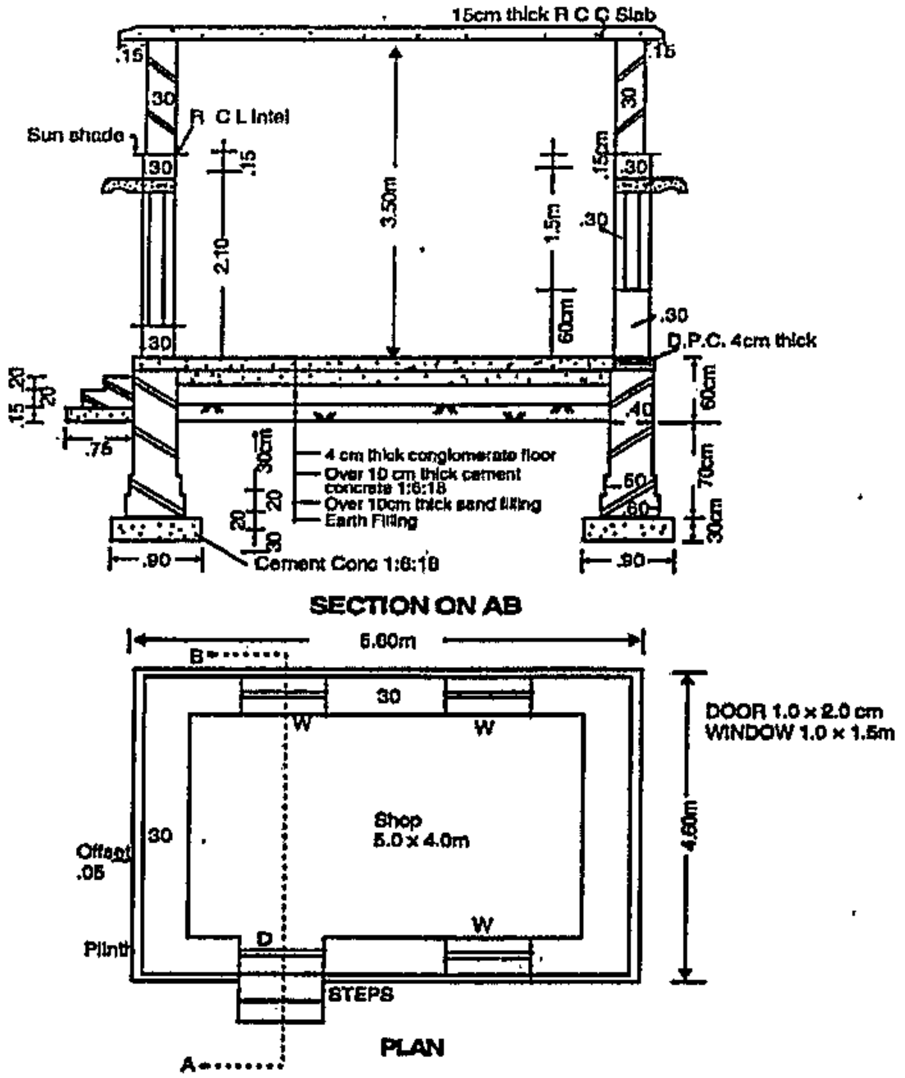
IV B.Tech I Semester Supple. Examinations, Oct-2025

Sub Code: 19BCE7TH01 ESTIMATION SPECIFICATIONS AND COSTING

Time: 3 hours (CE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
1		Unit-I			
	a	i) Explain the different types of detailed estimates in detail	K3	CO1	12M
		OR			
	b	Explain any four types of approximate estimates in detail.	K2	CO1	12M
2		Unit-II			
	a	Estimate the quantities of the following items using Centre line Method i) Earthwork in Excavation in foundation ii) Lime Concrete in foundation iii) Ist Class Brick work in cement mortar 1:6 in foundation & plinth. iv) 2.5 cm c.c damp proof course v) Ist class brickwork in lime mortar in super structure.	K6	CO2	12M
		OR			
	b	i) Discuss the method of estimation for a framed RCC building with a suitable example.	K2	CO2	12M
3		Unit-III			
	a	Calculate the quantity of each work for 300m length for a portion of a road in an uniform ground the heights of bank at the two ends being 2.00m and 2.60m. The formation width is 1.0 m and side slopes 2:1 (H:V). Assume that there is no transverse slope. Use the following methods and justify which method is good. a) Prismoidal formula and b) Mean - sectional area method	K3	CO3	12M
		OR			
	b	i)Give standard specifications for the items in the construction of class 'A' residential building: a) Earthwork Excavation b) cement concrete. c) Masonry work.	K2	CO3	12M
4		Unit-IV			
	a	i) Explain in detail the different types of standard specifications used in building construction.	K2	CO4	12M
		OR			
	b	i) Describe the detailed specification of various items of works for the following (i) RCC (ii) Color washing (iii) Brick I Class (iv) Plastering cement Mortar or lime mortar	K2	CO4	12M
5		Unit-V			
	a	i) What do you understand by rate analysis, what are the factors affecting analysis of rates of civil works? and explain	K2	CO5	6M
		ii) Brief the application about any five types of contracts in construction industry with their suitability.	K3	CO5	6M
		OR			
	b	Estimate the following quantities using Centre line method by using the given diagram.(i) Earthwork in excavation in foundation (ii) Lime concrete	K2	CO5	12M

		 in foundation (iii) First class brick work in cement mortar.(1:6) for foundation and plinth (iv) First class brickwork in superstructure.			

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

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NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

IV B.Tech I Semester Supple. Examinations, October-2025

Sub Code: 19BCE7TH02 **ENVIRONMENTAL ENGINEERING**
Time: 3 hours (CE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
		Unit-I			
1	a	i) The population of a locality as obtained from census report is as follows : Census year Population 1940 8000 1950 12000 1960 17000 1970 22500 1980 29000 1990 37500 2000 47000 2010 57000 2020 66500 Estimate the population of locality in 2030 by Arithmetical Increase method	KL3	C01	6M
		ii) Write short notes on provision for fire demand in water supply?	KL2	C01	6M
		OR			
	b	i) What is meant by design period of a water supply scheme? Discuss various factors affecting design period?	KL2	C01	6M
		ii) Write a note on seasonal and hourly variations in water demand	KL1	C01	6M
		Unit-II			
2	a	Write about design aspects of pipe lines. laying and testing of pipe lines.	KL2	C02	12M
		OR			
	b	i) Explain River intake with neat diagram. Mention important design features?	KL1	C02	6M
		ii) Explain the stepwise procedure to determine the reservoir capacity using mass curve technique?	KL2	C02	6M
		Unit-III			
3	a	i) Write a note on Drinking water quality standards.	KL1	C03	6M
		ii) Compare and contrast surface and subsurface water quality	KL2	C03	6M
		OR			
	b	i) Write a note on Water borne diseases also mention the causative organism	KL2	C03	6M
		ii) Write a note on Biological Analysis of water	KL1	C03	6M
		Unit-IV			
4	a	i) With a neat diagram explain the functioning of Slow Sand Filter	KL2	C04	6M
		ii) With suitable chemical equations explain the functioning of Coagulation	KL2	C04	6M
		OR			

	b	i) A water has to purify the water for a town whose daily demand is 12 x 10^6 litres/day. Design the suitable sedimentation tank of the water works fitted with mechanical sludge remover. Assume the velocity of flow in the sedimentation tank is 20 cm/minute and the detention period as 8 hours.	KL3	C04	6M
		ii) Differentiate between Slow sand filter and Rapid Sand filter	KL2	C04	6M
5	Unit-V				
	a	i) Write about the requirements of a good distribution system	KL2	C05	6M
		ii) Write about the Grid Iron layout of system of water supply.	KL2	C05	6M
	OR				
	b	i) Describe hardy cross method of analysis of distribution network	KL3	C05	6M
		ii) Compare and contrast Gravity system and Pumping system of distribution of water supply	KL2	C05	6M

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

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NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

IV B.Tech I Semester Supple. Examinations, October-2025

Sub Code: 19BCE7PE07 **PRESTERESSED CONCRETE**
Time: 3 hours (CE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
		Unit-I			
1	a	i) Explain the advantages and limitations of prestressed concrete.	K1	CO1	6M
		ii) Explain with Neat sketches Fressinet System of Post tensioning	K2	CO1	6M
		OR			
	b	i) Explain with neat sketches freez net system of post tensioning	K2	CO1	12M
		Unit-II			
2	a	i)Explain with neat sketch Magnel Blaton system of Prestressing ii)Explain the Gifford Udall system of prestressing with the help of a neat sketch	K3	CO2	12M
		OR			
	b	i) A pre tensioned beam 350 mm wide and 460 mm deep is pre stressed by 20 wires of 8mm dia. Initial stress to 2000N/mm2. The centroid of the steel wires is located at 105mm from the soffit. Determine the max stress in concrete immediately after transfer allowing elastic shortening of concrete only at the level of centroid of the steel. If however, the concrete is subjected to additional shortening due to the creep and shrinkage and the steel is subjected to relaxation of stress of 5% of initial stress. Find the final percentage of loss of stress in steel wires. Take Es=210kN/mm2, Ec=36.85kN/mm2, ϕ=1.60, take residual shrinkage strain =3X10-4. Derive the loss due to elastic shortening of concrete.	K3	CO2	12M
		Unit-III			
3	a	A prestressed concrete beam 200 × 300 mm deep is prestressed with wires (area = 320 mm^2) located at 50 mm from the bottom carrying an initial stress of 1000 N/mm^2. The span of the beam is 10 m. Calculate the percentage loss of prestress in wires when the beam is post-tensioned. Assume Es = 210 kN/mm^2, Ec = 35 kN/mm^2. Relaxation of steel stress = 5% initial stress, shrinkage of concrete = 200×10^{-6}, creep coefficient = 1.6, slip at anchorage = 1 mm, friction coefficient = 0.0015 per metre.	K3	CO3	12M
		OR			
	b	i) A pretensioned T section has a Flange width of 1200 mm and 150 mm thick the width and depth of the rib are 300 mm and 1500 mm respectively the High Tension Steel has an area of 4700 mm2 and is located at an effective depth of 1600 mm if the characteristic cube strength of the	K3	CO3	12M

		concrete and the tensile strength of Steel are 40 and 1600 MPA respectively calculate the flexural strength of the section			
4		Unit-IV			
	a	i) A post tensioned concrete beam of rectangular section 300mm wide and 500mm deep has a span of 12m and carries a superimposed load of 9kN/m. the tendon is provided with a parabolic profile with a central dip of 150mm and with no eccentricity at the ends. The effective prestressing force is 875kN. Determine: (a) the principal stresses at the support section. (b) the principal stresses at the support section without prestress. Take weight of concrete as 24kN/m3	K4	CO4	12M
		OR			
	b	i) Explain the Different types of flexure failures modes in PSC beams	K2	CO4	6M
		ii) Discuss the various methods of predicting long term deflections	K2	CO4	6M
5		Unit-V			
	a	i) What are the Different ways of improving the Shear resistance of Structural concrete members by prestressing Techniques? Explain	K3	CO5	12M
		OR			
	b	The support section of prestressed concrete beam, 100 mm wide by 250 mm deep, is BT1 required to support an ultimate shear force of 80 KN. The compressive prestress at the centroidal axis is 5 N/mm^2. The characteristic cube strength of concrete is 40 N/mm^2. The cover to the reinforcement is 50 mm. if the characteristic tensile strength of stirrups is 415 N/mm^2, design suitable shear reinforcement in the section using IS code recommendations.	K2	CO5	12M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

IV B.Tech I Semester Supple. Examinations, October-2025

Sub Code: 19BCE7PE12 PHOTOGRAMMETRY AND REMOTE SENSING

Time: 3 hours (CE) Max. Marks: 60

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

<table>
<tr><th>Q.No</th><th></th><th>Questions</th><th>KL</th><th>CO</th><th>M</th></tr>
<tr><td rowspan="6">1</td><td colspan="5">Unit-I</td></tr>
<tr><td rowspan="2">a</td><td>i) Distinguish between maps and aerial photographs</td><td>K2</td><td>CO1</td><td>6M</td></tr>
<tr><td>ii) Define photogrammetry. Explain its importance and applications in modern surveying</td><td>K2</td><td>CO1</td><td>6M</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td rowspan="2">b</td><td>i) Three points A,B and C were photographed and their coordinates with respect to the lines joining the collimation marks on the photograph are:
<table>
<tr><th>Point</th><th>X</th><th>Y</th></tr>
<tr><td>a</td><td>-35.52mm</td><td>19.43mm</td></tr>
<tr><td>b</td><td>8.48mm</td><td>-18.38mm</td></tr>
<tr><td>c</td><td>48.26mm</td><td>36.72mm</td></tr>
</table>
The focal length of the lens is 130.80mm. Determine the azimuths of the lines OB and OC, if that of OA is 354°30′ and the vertical angles of a, b and c. The axis of the camera was level at the time of the exposure at the station O.</td><td>K3</td><td>CO1</td><td>8M</td></tr>
<tr><td>ii) What is terrestrial photogrammetry? Explain its working principle with a neat diagram</td><td>K2</td><td>CO1</td><td>4M</td></tr>
<tr><td rowspan="6">2</td><td colspan="5">Unit-II</td></tr>
<tr><td>a</td><td>i) Explain how the length of a line on the ground is computed from an aerial photograph.</td><td>K2</td><td>CO2</td><td>6M</td></tr>
<tr><td></td><td>ii) Explain in detail about the flight planning in aerial photography</td><td>K2</td><td>CO2</td><td>6M</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td rowspan="2">b</td><td>i) Differentiate between vertical, tilted, and oblique photographs with neat sketches.</td><td>K3</td><td>CO2</td><td>6M</td></tr>
<tr><td>ii) A section line AB appears to be 10.16cm on a photograph for which the focal length is 16cm. The corresponding line measures 2.54 cm on a map which is to a scale 1/50000. The terrain has an average elevation of 200m above mean sea level. Calculate the flying altitude of the aircraft above mean sea level, when the photograph was taken.</td><td>K2</td><td>CO2</td><td>6M</td></tr>
<tr><td rowspan="2">3</td><td colspan="5">Unit-III</td></tr>
<tr><td>a</td><td>A photographic Survey was carried out to a scale of 1:18000 Find the error in the height where given hat there is an error of 0.15mm in measuring the</td><td>K4</td><td>CO3</td><td>12M</td></tr>
</table>

		parallax of the point Given f=210 mm, Size of the photograph is 250X250mm and overlap is 50%			
	OR				
	b	i) Describe ortho-rectification and its significance in ortho-mosaic	K2	CO3	6M
		ii) Compare digital photogrammetry with analytical photogrammetric systems. Highlight the key differences.	K2	CO3	6M
4	Unit-IV				
	a	i) Explain the basic principles of electromagnetic remote sensing with a suitable diagram.	K2	CO4	6M
		ii) Explain how electromagnetic radiation interacts with different earth surface materials such as vegetation, water, and soil.	K2	CO4	6M
	OR				
	b	i) Explain different types of satellite orbits and their significance in remote sensing applications.	K2	CO4	6M
		ii) What are the Different Types of resolutions used as parameters of sensors?	K2	CO4	6M
5	Unit-V				
	a	i) Write a note on Land use/land cover classification and analysis	K2	CO5	6M
		ii) Discuss the applications of remote sensing in environmental monitoring and management.	K2	CO5	6M
	OR				
	b	i) What are the different data formats used in remote sensing? Explain their importance.	K2	CO5	6M
		ii) Explain different remote sensing data products and their characteristics.	K2	CO5	6M

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

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NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

IV B.Tech I Semester Supple. Examinations, October-2025

Sub Code: 19BME7TH02 **FINITE ELEMENT METHODS**
Time: 3 hours (ME) Max. Marks: 60

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

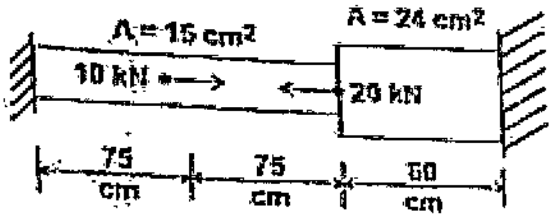
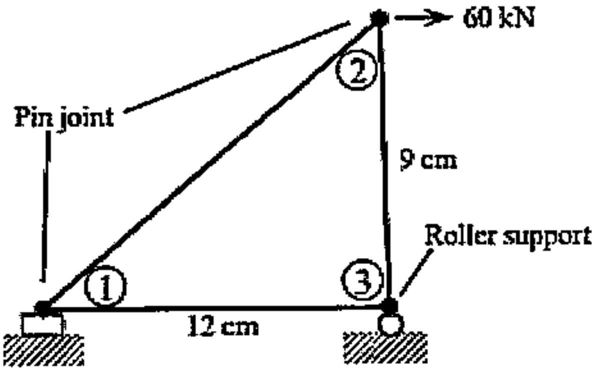
Q.No		Questions	KL	CO	M
		Unit-I			
1	a	i) Explain the concept of FEM briefly and outline the procedure	K3	CO1	6M
		ii)Explain the advantages and disadvantages of FEM over i) Classical method ii) Finite difference method	K3	CO1	6M
		OR			
	b	List and briefly explain the general steps of the finite element method	K3	CO1	12M
		Unit-II			
2	a	Explain the essential properties required to define a one-dimensional bar element?	K3	CO2	3M
		For a stepped bar loaded as shown in Fig.1 Determine a) Nodal displacements b) support Reactions c)Element Stress  Fig.1	K5	CO2	9M
		OR			
	b	Consider a one-dimensional bar element with a length L=2 meters, cross-sectional area A=0.02 $m2$, and Young's modulus E=2×10^5 N/m². If a tensile force of F=5000 N is applied at one end of the bar while the other end is fixed, calculate the displacement at the free end.	K3	CO2	12M
		Unit-III			
3	a	A two–dimensional truss shown in the Fig.2 is made of aluminum with Young's modulus E = 80 GPa and failure stress σY = 150 MPa. Determine the minimum cross-sectional area of each member so that the truss is safe with safety factor 1.5.  	K5	CO3	12M

		Fig.2			
		OR			
	b	Consider a simply supported beam with a length L=3 meters, a rectangular cross-section with height h=0.2 meters and width w=0.1 meters, and subjected to a uniformly distributed load of q=1000 N/m. Use FEM to calculate the vertical displacement at the midpoint of the beam.	K3	CO3	12M
4		Unit-IV			
	a	Given a triangular element with nodes at coordinates (0, 0), (2, 0), and (0, 3), and subjected to a displacement boundary condition of u=0 at node 1 and v=0 at node 2, calculate the nodal displacements using linear interpolation.	K3	CO4	12M
		OR			
	b	i) Explain the term Iso-parametric element?	K3	CO4	4M
		ii) Derive the stiffness matrix equation for two dimensional CST elements.	K4	CO4	8M
5		Unit-V			
	a	Consider a stepped bar with uniform material properties and cross-sectional areas $A1$ and $A2$ at its two sections. The lengths of the sections are $L1$ and $L2$, respectively. Calculate the eigenvalues and eigenvectors for the vibration modes of the bar.	K3	CO5	12M
		OR			
	b	Consider a simply supported beam with a length L=4 meters and a uniform cross-sectional area A. The beam is made of a material with a known density ρ and Young's modulus E. Calculate the first three natural frequencies of vibration for the beam.	K3	CO5	12M

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

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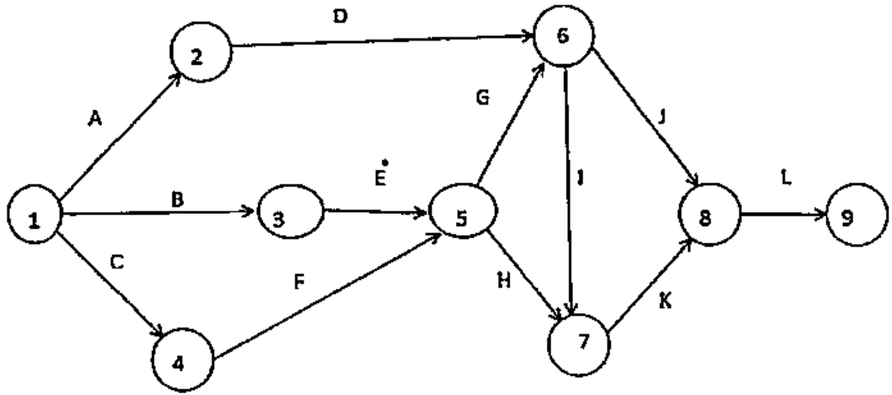
NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

IV B.Tech II Semester Supple. Examinations, October-2025

Sub Code: 19BCE8TH01 CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Time: 3 hours (CE) Max. Marks: 60

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

<table>
<tr><th>Q.No</th><th></th><th>Questions</th><th>KL</th><th>CO</th><th>M</th></tr>
<tr><td rowspan="7">1</td><td colspan="5">Unit-I</td></tr>
<tr><td rowspan="2">a</td><td>i) What are the methods of scheduling? Explain with the help of a suitable example, the method of preparing a bar chart.</td><td>2</td><td>1</td><td>6M</td></tr>
<tr><td>ii) Bring out the differences between bar chart and milestone chart.</td><td>1</td><td>1</td><td>6M</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td rowspan="2">b</td><td>i) A project consists of 6 activities namely A, B, C, D, E and F with time (weeks) 4,5,2,3,9 and 5 respectively.
•Activity A is the initial activity.
•Activities B and C can start only after activity A is completed.
•Activity D depends on activity B.
•Activity E depends on the completion of activities C and D.
•Activity F is the final activity after activity E.
Prepare a Gantt chart and calculate the completion time of the project (in days) from the above relationships.</td><td>2</td><td>1</td><td>6M</td></tr>
<tr><td>ii)Discuss the main objectives and applications of construction management.</td><td>3</td><td>1</td><td>6M</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td rowspan="2">2</td><td colspan="5">Unit-II</td></tr>
<tr><td>a</td><td>i)A project network consists of 12 activities namely A, B, C, D, E, F, G, H, I, J, K and L as shown in the figure. Find Expected time for all activities and Event Times.
<table>
<tr><th>S.no</th><th>Activity</th><th>Time estimates</th><th>S.no</th><th>Activity</th><th>Time estimates</th></tr>
<tr><td>1</td><td>A</td><td>4-7-9</td><td>7</td><td>G</td><td>4-9-10</td></tr>
<tr><td>2</td><td>B</td><td>3-6-12</td><td>8</td><td>H</td><td>3-5-7</td></tr>
<tr><td>3</td><td>C</td><td>7-11-13</td><td>9</td><td>I</td><td>5-12-14</td></tr>
<tr><td>4</td><td>D</td><td>9-10-12</td><td>10</td><td>J</td><td>3-7-9</td></tr>
<tr><td>5</td><td>E</td><td>2-6-10</td><td>11</td><td>K</td><td>4-8-10</td></tr>
<tr><td>6</td><td>F</td><td>11-13-15</td><td>12</td><td>L</td><td>5-9-12</td></tr>
</table>


</td><td>3</td><td>2</td><td>6M</td></tr>
</table>

		ii)What are the steps involved in Cost Optimization? Explain with a suitable example.	3	2	6M
	OR				
	b	i) What is meant by Project Updating. What is the data required for updating. Explain with a flow chart	3	2	6M
		ii) Define the terms: independent float, interfering float, intermediate float and total float with a suitable example.	2	2	6M
3	Unit-III				
	a	i) Discuss the importance of a project controlling system.	3	3	6M
		ii) Explain the purpose and maintenance of M. Book, R.A. Bills, and Muster Rolls in construction contracts.	2	3	6M
	OR				
	b	i) Explain the process of developing a construction project plan.	3	3	6M
		ii) Explain the different types of construction contracts and their suitability for various projects.	3	3	6M
4	Unit-IV				
	a	i) Explain the ABC classification of materials.	3	4	6M
		ii) Differentiate between resource leveling and resource smoothing.	2	4	6M
	OR				
	b	i) Briefly describe the significance of the National Building Code (NBC) 2016 in material management.	2	4	6M
		ii) Discuss in brief the resources allocation problem. What are the methods of solving the problem?	2	4	6M
5	Unit-V				
	a	i) Describe the organization required for quality control in a construction project.	3	5	6M
		ii) Explain the prevention of fires in construction industries and the role of a safety information system.	2	5	6M
	OR				
	b	i) Discuss the concept of Total Quality Management (TQM) and the role of ISO 9000 standards.	3	5	6M
		ii) Discuss how safety measures contribute to reducing accidents and improving efficiency.	2	5	6M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

IV B.Tech II Semester Supple. Examinations, October-2025

Sub Code: 19BME8PE04 **ROBOTICS AND APPLICATIONS**

Time: 3 hours (ME) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
1		**Unit-I**			
	a	i) Define the term 'Robot'. Explain different Robot types.	K3	01	6M
		ii) What is the future scope of robotics? Explain.	K4	01	6M
		OR			
	b	For the point P_{xyz} =(8,3,6)T perform following operations i) Rotate 60° about the Y-axis followed by translation of 4 units along x-axis? ii) Rotate 30° about the Z-axis followed by rotation of 60° about X-axis? iii) Translate 10 units along Z-axis followed by rotation of 45° along Z-axis?	K5	01	12M
2		**Unit-II**			
	a	Explain about types of sensors with a neat sketch. List any two applications.	K5	02	12M
		OR			
	b	i) Explain the potentiometers in detail with a neat sketch.	K4	02	6M
		ii) Write short notes on pneumatic devices.	K3	02	6M
3		**Unit-III**			
	a	i) Mention the differences between forward and inverse kinematics.	K3	03	6M
		ii) Discuss the fundamental principles of kinematics in robotic systems. How do these principles help in the modeling and control of robotic movements.	K4	03	6M
		OR			
	b	i) Describe how to perform forward kinematics for a simple 2-link planar robot.	K4	03	6M
		ii) Explain the significance of the Jacobian matrix in robot kinematics.	K3	03	6M
4		**Unit-IV**			
	a	i)Define configuration space and explain its significance in robotic motion.	K3	04	6M
		ii) Explain the basic principles behind the Newton-Euler method for robot dynamics.	K4	04	6M
		OR			
	b	i) Describe the steps involved in solving a dynamics problem using the Lagrange method.	K4	04	6M
		ii) What implications do singularities have for robot control and motion planning?	K3	04	6M
5		**Unit-V**			
	a	i) Explain the applications of robots in continuous arc welding and spray painting.	K4	05	6M
		ii) What are the benefits of using robots for inspection tasks in production lines?	K3	05	6M
		OR			
	b	i) In which type of production, robots are preferred for loading and unloading function? Explain.	K4	05	6M
		ii) Describe one algorithm commonly used for path planning in robotic applications.	K4	05	6M

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

IV B.Tech II Semester Supple. Examinations, October-2025

Sub Code: 19BEC8PE06 **RADAR SYSTEMS**
Time: 3 hours (ECE) Max. Marks: 60

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

Q.No		Questions	KL	CO	M
1		Unit-I			
	a	i) Draw and explain the simple Radar system with neat block diagram.	K2	1	6M
		ii) Derive the Radar range equation.	K4	1	6M
		OR			
	b	i)Explain the significance of Radar cross section in range equation	K2	1	6M
		ii) Derive an equation for probability of false alarm.	K4	1	6M
2		Unit-II			
	a	i) Write a short note on FM-CW altimeter.	K3	2	6M
		ii) write a short note on CW Radar.	K3	2	6M
		OR			
	b	i) Explain the working principle of multiple frequency CW Radar.	K2	2	6M
		ii) What are the bandwidth requirements for a receiver?	K3	2	6M
3		Unit-III			
	a	i) Explain the working principle and function of each block of power amplifier transmitter in MTI Radar.	K2	3	6M
		ii) Explain the function of pulse Doppler Radar and how it is different from simple pulse Radar?	K2	3	6M
		OR			
	b	i) What is an A-scope display? How it generates butterfly effect in MTI Radar system?	K2	3	8M
		ii) Explain the limitations of MTI Radar.	K2	3	4M
4		Unit-IV			
	a	i) Briefly explain the various tracking techniques of Radar.	K2	4	6M
		ii) Explain the working of one-coordinate amplitude comparison mono pulse Radar.	K2	4	6M
		OR			
	b	i) Explain the function of sequential lobe tracking.	K2	4	6M
		ii) Explain the working of phase comparison mono pulse Radar.	K2	4	6M
5		Unit-V			
	a	i) Explain the function of balanced duplexer.	K2	5	6M
		ii) Explain the designing criteria of a matched filter receiver.	K2	5	6M
		OR			
	b	i) Derive the effective noise temperature of N-Antenna system.	K4	5	6M
		ii) Explain the working principle of Branch –type duplexer.	K2	5	6M

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

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