

AR16

CODE: 16CE4026

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech I Semester Regular & Supplementary Examinations, February-2021

ENVIRONMENTAL ENGINEERING-II

(Civil Engineering)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Explain about carbon and nitrogen cycle with neat sketches. 6 M
- b) Find the minimum velocity and gradient required to transport 8 M
coarse sand with particles of 1 mm diameter and specific
gravity 2.65 through a sewer of 0.9 m diameter. Assume $\beta =$
0.1 and $f = 0.03$. The sewer may be assumed to run half full.
Take $n = 0.013$ for half full condition.

(OR)

2. a) What are the methods used for estimation of quantity of storm 6 M
water?
- b) Differentiate between BOD and COD. Derive an expression 8 M
to compute BOD remaining and exerted from the first order
reaction rate principles.

UNIT-II

3. a) Write short notes on Activated sludge process. 6 M
- b) Design a rectangular grit chamber from the following data 8 M
Flow of sewage = 55×10^6 litres/day,
Specific gravity of the grit = 2.70
Size of the grit particle to be removed = 0.21 mm,
Viscosity of the water = 1.0×10^{-2} cm²/sec

(OR)

4. a) Describe the functioning of a standard rate trickling filter with 7 M
a neat sketch.
- b) Design a secondary sedimentation tank to treat effluent from 7 M
Activated Sludge plant with the following data:
Average sewage flow = 60MID;
mixed liquor suspended solids (MLSS) concentration of
influent = 3000mg/l; peak flow factor = 2.5

UNIT-III

5. a) Why is sludge digestion required? Discuss the different factors affecting the sludge digestion process. 7 M
- b) Write short notes on Sewage sickness and its remedial measures. 7 M

(OR)

6. a) Explain in detail about sewage farming. 6 M
- b) What are factors effecting the design of digestion tank and also write working principles of septic tank. 8 M

UNIT-IV

7. a) Define air pollution. Describe the different sources of air pollution. 7 M
- b) Describe impacts of air pollution on human health. 7 M

(OR)

8. a) How does air pollution affects the different zones of the atmosphere? 7 M
- b) Write about classification of air pollutants. 7 M

UNIT-V

9. a) Discuss the impacts of noise pollution in detail. 7 M
- b) Explain the control measures of noise pollution. 7 M

(OR)

10. a) Explain noise pollution and its measurement scale. 7 M
- b) What are the permissible limits for noise pollution? 7 M

AR16

CODE: 16HS4005

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech I Semester Regular & Supplementary Examinations, February-2021

**MANAGERIAL ECONOMICS AND MANAGEMENT SCIENCES
(Electrical and Electronics Engineering)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Define demand. Explain the determinants of demand. 7M
b) Discuss the different types of price elasticity of demand. 7M
(OR)
2. a) Explain the factors involved in demand forecasting. 7M
b) Describe the expert opinion and test marketing methods of demand forecasting. 7M

UNIT-II

3. a) Define production function and explain one variable proportion. 7M
b) Explain in detail Iso-quants and Iso-costs. 7M
(OR)
4. a) Explain in detail cost concepts. 7M
b) Suppose a firm incurs fixed cost of Rs.1,00,000 and variable cost of Rs.3,00,000 and its total sales receipts are Rs.4,00,000. Determine the break-even point. 7M

UNIT-III

5. What is perfect competition? Explain its features in detail. 14M
(OR)
6. Describe the price-output determination in case of monopoly. 14M

UNIT-IV

7. a) Explain the nature and importance of management. 7M
b) Describe the FW Taylor's principles of scientific management. 7M
(OR)
8. a) Explain about Maslow's theory of human needs with example. 7M
b) Write and explain the different types of leadership styles. 7M

UNIT-V

9. a) What is marketing? Explain its functions in detail. 7M
b) Describe the different channels of distribution. 7M
(OR)
10. a) Explain the managerial and operative functions of HRM. 7M
b) Define performance appraisal and discuss the different methods of it in detail. 7M

Time: 3 Hours**Max Marks: 70**

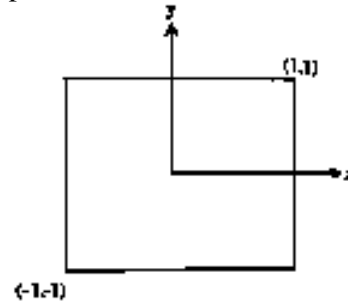
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Derive the stress strain relations for a plane stress problem 7 M
 b) A displacement field is imposed on the square element shown in Fig. 1. 7 M
 $u = 1 + 3x + 4x^3 + 6xy^2$
 $v = xy - 7x^2$

**Fig. 1****(OR)**

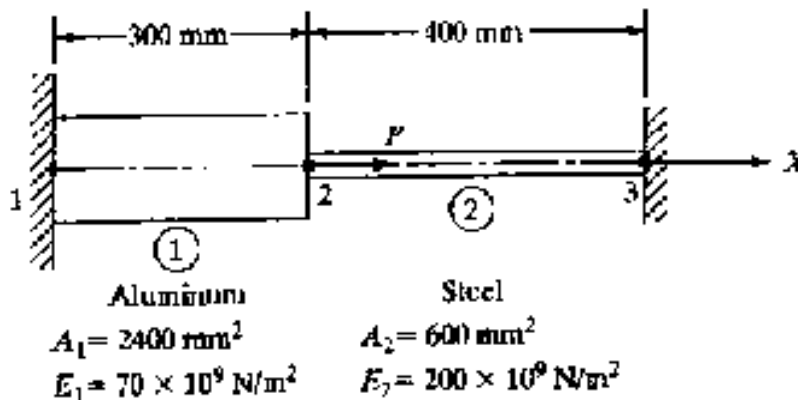
2. a) Explain the Rayleigh Ritz method with an example. 7 M
 b) Derive the material matrix $[D]$ for a 3D body from the generalized Hooke's law. 7 M

UNIT-II

3. a) Derive the stiffness matrix for a two noded 1D bar element 7 M
 b) Explain penalty and elimination approaches used for deriving finite element equations. 7 M

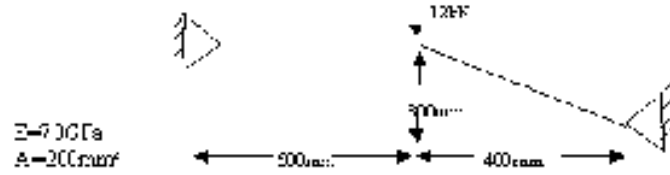
(OR)

4. Consider the bar shown in Fig. . An axial load $P = 200 \times 10^3 \text{ N}$ is applied as shown. 14 M
 Determine the following:
 (i) Determine the nodal displacement
 (ii) Determine the stress in each material.
 (iii) Determine the reaction force



UNIT-III

5. Determine the displacements at nodes and the stresses in elements shown in figure 14 M

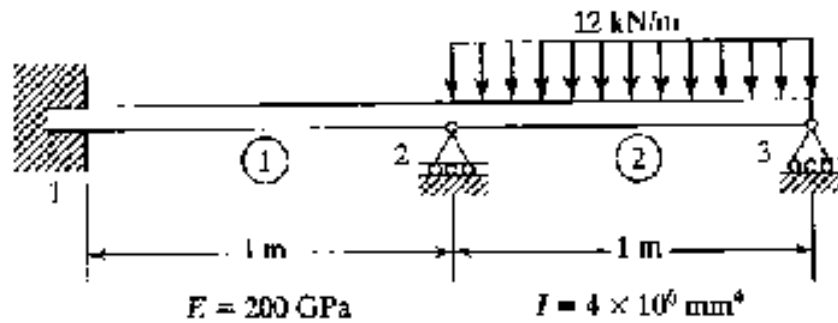


(OR)

6. a) Derive the strain displacement matrix B for a three noded constant strain triangular element 7 M
b) Explain the area coordinate approach to derive shape functions of constant strain triangular element. 7 M

UNIT-IV

7. For the beam and loading shown in Fig. determine (i) the slopes at 2 and 3 and (ii) the vertical deflection at the midpoint of the distributed load. 14 M



(OR)

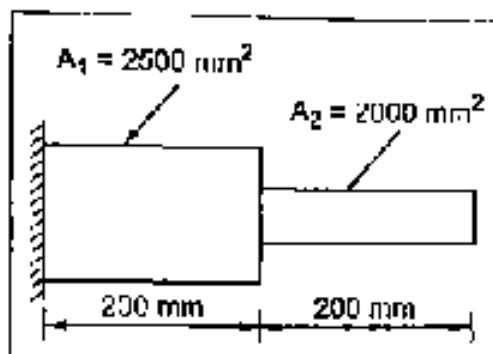
8. Derive the Hermite shape functions for a 2 noded 2D beam element 14 M

UNIT-V

9. a) Derive the mass matrix for a two noded bar element of a vibrating member 7 M
b) What is the difference between lumped and consistent mass matrices . Explain with examples 7 M

(OR)

10. Determine the lowest eigen value and the corresponding mode shape for the stepped bar shown in figure. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $\rho = 0.8 \times 10^{-4} \text{ N/mm}^3$. 14 M



AR16

CODE: 16EC4029

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech I Semester Regular & Supplementary Examinations, February-2021

**VLSI DESIGN
(Electronics and Communication Engineering)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) With neat diagrams, Explain the different steps in NMOS Fabrication of CMOS Transistor 8M
b) Explain the Enhancement mode NMOS transistor with diagrams 6M
(OR)
2. a) Compare Bipolar and CMOS technologies. 7M
b) Describe the P-well process with neat sketches of the process? 7M

UNIT-II

3. a) Develop Z_{pu} to Z_{pd} ratio for nMOS inverter driven by another nMOS inverter? 8M
b) Derive an equation for Trans conductance of an n-channel enhancement MOSFET operating in active region. 6M
(OR)
4. a) Compute the drain to source current I_{ds} versus V_{ds} relationships for saturation region? 8M
b) Explain about BiCMOS inverter with circuit diagrams 6M

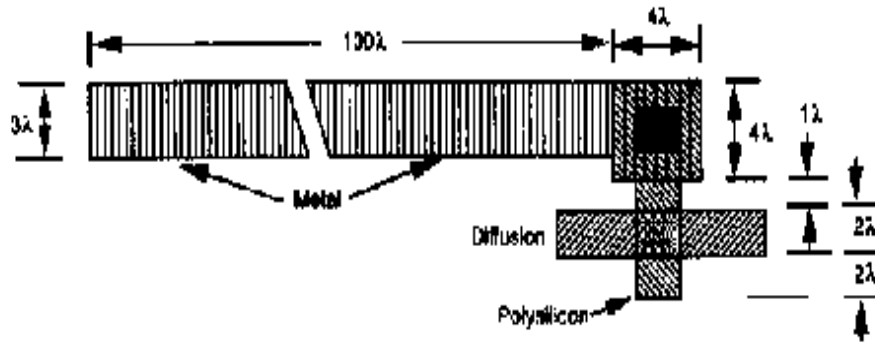
UNIT-III

5. a) Draw the Stick diagram for 3 input AND gate using CMOS Technology 7M
b) Draw the Stick diagram for 2 input OR gate using NMOS Technology 7M
(OR)
6. a) Draw the Layout for 2 input NAND gate using CMOS Technology 7M
b) Draw the Layout for NMOS Inverter 7M

UNIT-IV

7. a) Describe What is meant by sheet resistance R_s ? Explain the concept of R_s applied to MOS transistors 7M
b) Illustrate driving large capacitive loads with relevant examples. 7M
(OR)

8. a) What is the function of unit of capacitance? Compute total capacitance of below figure 7M



- b) Explain in detail of fan-in and fan-out problems 7M

UNIT-V

9. a) Explain about design capture tools. 7M
b) Explain about design verification tools. 7M

(OR)

10. a) Can you explain the concept of testing in VLSI circuit design 5M
b) Prepare short notes on 9M
i) Fault models ii) Automatic test pattern Generation iii) Fault Coverage

AR16

CODE: 16CS4026

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech I Semester Regular & Supplementary Examinations, February-2021

**DATA ANALYTICS
(Common to CSE AND IT)**

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Discuss the Viewing Named objects in brief. 7M
b) Illustrate the Structure of Data Items with suitable example. 7M
- (OR)**
2. a) Describe the working with History commands. 7M
b) Explain Writing Matrix and Data Frame Objects to Disk. 7M

UNIT-II

3. a) Distinguish between contingency and complex contingency table and explain in detail with an example. 7M
b) Explain Creating Contingency Tables from Matrix Objects with an example. 7M
- (OR)**
4. a) The results of a simple experiment to look at the visitation of various bee species to different plants. 9M
The number of bees observed was as follows:
Buff tail: 10 1 37 5 12
Garden bee: 8 3 19 6 4
Red tail: 18 9 1 2 4
Honeybee: 12 13 16 9 10
Carder bee: 8 27 6 32 23
i) Make five numeric vectors
ii) Construct a matrix for the above data.
iii) The plant names are Thistle, Vipers bugloss, Golden rain, Yellow alfalfa, and Blackberry. Use these names to create row labels for the data.
- b) Illustrate the Summary Statistics for Data Frames. 5M

UNIT-III

5. a) Discuss the Quantile-Quantile Plots with an example. 7M
b) Explain How to produce correlation and covariance matrices. 7M
- (OR)**
6. a) Define Normal Distribution. List and Explain the commands related to normal distribution with suitable examples. 7M
b) Describe the Line Charts Using Categorical Data with an example. 7M

UNIT-IV

7. a) Describe the Name node, Data Node and Secondary Name node in HDFS. 7M
b) Discuss the advantages and disadvantages of Hadoop. 7M

(OR)

8. a) Differentiate between HDFS and GFS. 7M
b) Explain with a neat sketch about processing of a job in Hadoop. 7M

UNIT-V

9. a) Explain the role of Driver code, Mapper code and reducer code within Map reduce program model by a suitable example. 7M
b) Describe in brief the Combiner and Partitioner. 7M

(OR)

10. a) Distinguish between the old and new versions of Hadoop API for Map reduce framework. 7M
b) Illustrate the map reduce concept with suitable example 7M

AR13

CODE: 13CE4024

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

IV B.Tech I Semester Supplementary Examinations, February, 2021

ENVIRONMENTAL ENGINEERING (Civil Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) What is the value of per capita demand of water for India under normal conditions?
b) Which titrant is used in determining the hardness of water?
c) What are the permissible limits of chlorides and total dissolved solids for domestic consumption?
d) For flow of 50 MLD with SOR of $200 \text{ m}^3/\text{m}^2/\text{day}$, what is the surface area of sedimentation tank?
e) Write the mechanisms of purification in filtration.
f) What are the advantages of intermittent system of supply?
g) Which one is greater among COD & BOD and why?
h) Define sewage sickness.
i) What is aerobic decomposition?
j) What is meant by Sludge Digestion?

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Describe in brief various tests conducted for physical examination of water. 6
b) The population of a locality as obtained from census report is as follows: 6

Year	1981	1991	2001	2011
Population	41,000	43,500	47,100	50,000

Calculate the population in 2021, 2031 and 2045 using Geometric Increase method.

(OR)

3. a) Name the different sources of water and explain their quality. 6
b) What are intakes? Explain any one type with a neat sketch. 6

UNIT-II

4. a) Explain the layout of a conventional water treatment plant. 6
b) Design slow sand filter beds for 50,000 population with an average per capita supply of 200 lpcd. Assume relevant data required. Keep one unit as stand by. 6

(OR)

5. a) Explain the jar test procedure of coagulation with neat sketch. 6
b) What are the various forms of chlorination? Discuss in detail. 6

UNIT-III

6. a) Explain various types of layouts of distribution system with neat sketches. 6
b) Explain the factors are required to be considered in the selection of type of pump. 6

(OR)

7. a) Write short notes on Scour valves and Check valves with neat sketches. 6
b) Discuss about the testing of the pipe lines. 6

UNIT-IV

8. a) Enumerate various Sewer appurtenances and explain any one with neat sketch. 6
b) A 5% dilution of sewage sample is incubated for 5 days at 20°C. The depletion of oxygen was found to be 4 ppm. Determine the BOD₅ of sewage at 20°C. Calculate ultimate BOD and 2 day BOD at 35°C 6

(OR)

9. a) Write the differences between water conservancy system and water carriage system. 6
b) Design a sewer for a maximum discharge of 650 l/s running half full. Consider Manning's rugosity coefficient $n = 0.012$, and gradient of sewer $S = 0.0001$. 6

UNIT-V

10. a) Explain in detail about Oxidation Pond for Municipal Wastewater Treatment. 6
b) Design a high rate Trickling Filter to treat 25 MLD of sewage. Assume suitable data. 6

(OR)

11. a) Discuss the significance of Sludge Digestion in Activated sludge Process and Trickling filter. 6
b) Determine the settling velocity of grit particle of diameter 0.15mm, given the Temperature of wastewater as 30°C, density of the particle 2.40g/cc. Also calculate the surface loading rate for the grit chamber. Assume data if needed. 6

AR13

Code: 13EC4019

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

IV B.Tech I Semester Supplementary Examinations, February, 2021
MICROPROCESSORS AND MICROCONTROLLERS
(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Write the addressing modes of 8086.
b) What is the difference between macro and subroutine.
c) What does the pin MN/MX do in 8086 processor.
d) What is the use of PUSH in 8086.
e) What is meant by segmentation.
f) Mention two features of 80386.
g) What are the features of 8257 DMA controller.
h) What is an USART.
i) Mention two addressing modes of 8051.
j) What is a PIC microcontroller.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) What do mean by pipelined architecture. How it is implemented in 8086. [8M]
b) Describe about the physical memory organization in an 8086 system. [4M]

(OR)

3. a) Explain various assembler directives with examples. [6M]
b) Explain the physical address formation in 8086 microprocessor. [6M]

UNIT-II

4. a) Explain the implementation of FOR loop in 8086 programming. [6M]
b) Explain about Interrupt service routine in 8086. [6M]

(OR)

5. a) What is an interrupt. What are different interrupts available in 8086. [6M]
b) Explain about stack structure in 8086. [6M]

UNIT-III

6. a) Draw the block diagram of 80386 microprocessor. [6M]
b) Describe the process of paging and segmentation in 80386. [6M]

(OR)

7. a) Draw the architecture diagram of 80386. [6M]
b) Explain the register organization in 80386. [6M]

UNIT-IV

8. a) Explain briefly about mode 1 output operation of 8255. [6M]
b) Explain the need of DMA. Discuss in detail about the DMA data transfer scheme. [6M]

(OR)

9. a) Discuss the output mode of operation of 8279 chip. [6M]
b) Explain the operation of Programmable interrupt controller (8259A). [6M]

UNIT-V

10. a) Explain mov, movc and movx instructions of 8051 with examples. [6M]
b) Draw the pin diagram of 8051 and explain I/O pins and control pins. [6M]

(OR)

11. a) Discuss the addressing modes of 8051. (i) Direct addressing mode. (ii) Register indirect addressing mode. (iii) Index addressing mode. (iv) Register addressing mode [8M]
b) List different applications of microcontrollers. [4M]

AR13

CODE: 13ME4027

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

IV B.Tech I Semester Supplementary Examinations, February, 2021

FINITE ELEMENT METHODS (Mechanical Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) What is meant by finite element?
b) What is the Rayleigh-Ritz method?
c) State the principle of minimum potential energy.
d) State the properties of a stiffness matrix.
e) What is a truss?
f) Write the displacement function equation for CST element.
g) Write any two shape functions of the 2-noded beam element.
h) What do you mean by Isoparametric element?
i) Write consistent mass matrix for the truss element.
j) Write down the stiffness matrix equation for 1-D heat conduction element.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

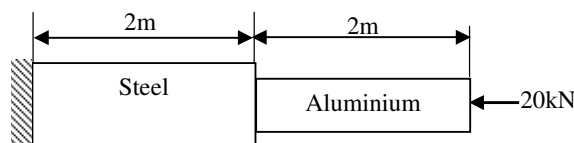
2. a) Write and explain the basic steps involved in FEM. [6M]
b) Derive stress-strain relation matrix for a three-dimensional solid mechanics problem. [6M]

(OR)

3. a) In plane strain problem, we have $\sigma_x = 20,000 \text{ N/mm}^2$, $\sigma_y = -10,000 \text{ N/mm}^2$, $E = 30 \times 10^5 \text{ N/mm}^2$, $\nu = 0.3$. Determine the value of the stress σ_z . [6M]
b) If the displacement field is described by $u = (-x^2 + 2y^2 + 6xy) \times 10^{-4}$; $v = (3x + 6y - y^2) \times 10^{-4}$. Determine ϵ_x , ϵ_y , γ_{xy} at the point $x=1$, $y=0$. [6M]

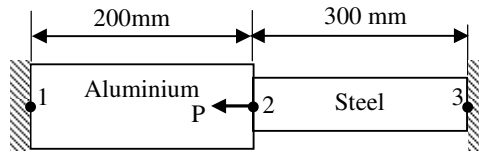
UNIT-II

4. For the bar assemblages shown in below Fig., determine the nodal displacements, element stresses and support reactions. Take $E_{st} = 200 \text{ GPa}$, $A_{st} = 4 \times 10^{-4} \text{ m}^2$, $E_{Al} = 70 \text{ GPa}$, $A_{Al} = 2 \times 10^{-4} \text{ m}^2$. [12M]



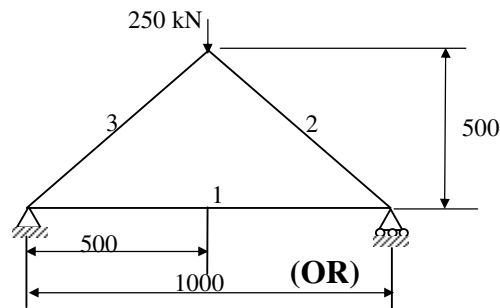
(OR)

5. The structure shown in below Fig. is subjected to an increase in temperature of 80°C . Determine the displacements, stresses and support reactions. The temperature is then raised to 60°C . $\alpha_{\text{Al}} = 23 \times 10^{-6}/^{\circ}\text{C}$, $\alpha_{\text{st}} = 11.7 \times 10^{-6}/^{\circ}\text{C}$, $E_{\text{Al}} = 70\text{GPa}$, $E_{\text{st}} = 200\text{GPa}$, $A_{\text{Al}} = 1200\text{mm}^2$, $A_{\text{st}} = 600\text{mm}^2$. $P = 60\text{kN}$. Calculate the following:
 i) Assemble the K and F matrices ii) Nodal displacements iii) Stresses in each element iv) Reactions at each nodal point. [12M]

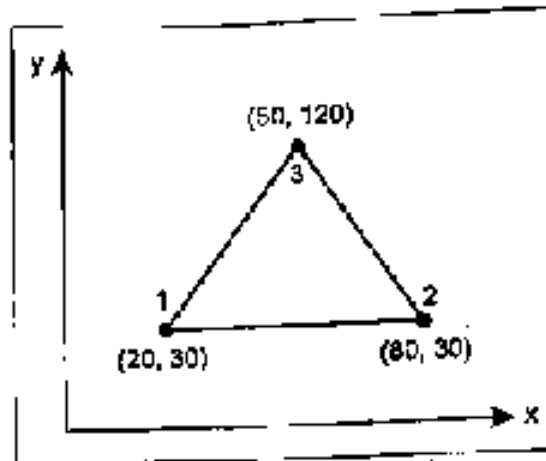


UNIT-III

6. Consider a three-bar truss as shown in below Figure. Calculate nodal displacements, stresses in each element. Take $E = 2 \times 10^5 \text{ N/mm}^2$. Cross-sectional area of element 1, 2 and 3 are 2000 mm^2 , 2500 mm^2 and 2500 mm^2 respectively. [12M]



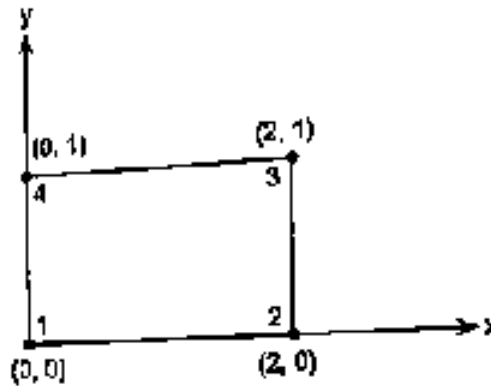
7. Determine the stiffness matrix for the constant strain triangular (CST) element shown in Fig. The coordinates are given in units of millimetres. Assume plane stress conditions. Take $E = 210 \text{ GPa}$, $\nu = 0.25$ and $t = 10\text{mm}$. [12M]



UNIT-IV

8. Derive the Hermite shape functions for a 2 noded 2D beam element [12M]
 (OR)

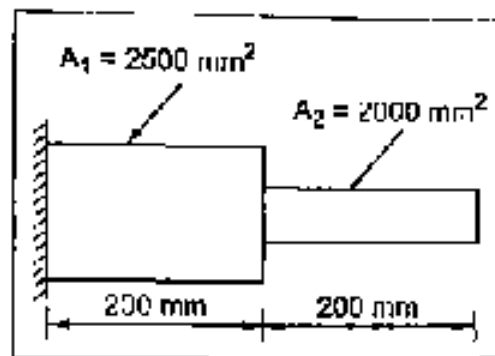
9. A four noded rectangular element is shown in Fig. Determine the [12M]
following:
1. Jacobian matrix; 2. Strain-Displacement matrix; 3. Element stresses
Take: $E = 2 \times 10^5 \text{ N/mm}^2$, $\nu = 0.25$,
 $u = [0, 0, 0.003, 0.004, 0.006, 0.004, 0, 0]^T \text{ mm}$, $\varepsilon = \eta = 0$. Assume plane stress condition.



3 of 4

UNIT-V

10. Determine the eigenvalues and frequencies for the stepped bar as shown in [12M]
Fig. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $\rho = 0.8 \times 10^{-4} \text{ N/mm}^3$.



(OR)

11. A composite wall consists of three materials of different thermal [12M]
conductivities i.e., $20 \text{ W/m}^\circ\text{C}$, $30 \text{ W/m}^\circ\text{C}$, $50 \text{ W/m}^\circ\text{C}$ of thickness 0.3 m ,
 0.15 m , 0.15 m respectively. The outer surface is 20°C and the inner surface
is exposed to the convective heat transfer coefficient $25 \text{ W/m}^2\text{K}$ at 500°C .
Determine the temperature distribution within the wall.

3 of 3
