

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****IV B.Tech I Semester Supplementary Examinations, January-2020****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) Describe Sewerage systems, their relative merits and suitability 6
- b) A small town having population of 2,75,000 residing over an area of 120 hectares. 8
Find the design discharge for combined sewerage system and partially combined Sewerage system for the following data.
Rate of water supply = 150 lpcd
Intensity of Rainfall = 65 mm/hr
The surface details of the town are given below
Impermeability factor for
roof tops - 0.9 and its coverage is 25%,
pavements- 0.8 and its coverage is 35%,
parks - 0.5 and its coverage is 10% and
open land - 0.15 and its coverage is 30%.

(OR)

2. a) Describe a typical Manhole and Flushing tank with neat sketches 8
- b) In a BOD test, 6 ml of sewage is mixed with 294ml of diluting water containing 7.2mg/l of DO. After 5days incubation, the DO content of the mixture is 3.2mg/l. Calculate the 5day-BOD of the sewage. Assume initial DO of the sewage is Zero. 6

UNIT-II

3. a) Enumerate the importance of primary treatment of sewage. State various units of Primary treatment and discuss them briefly. 8
- b) With the help of neat sketch, describe the functioning of a trickling filter 6

(OR)

4. Write short notes on the following 14
i) Recirculation ii) Return sludge iii) Sludge bulking iv) S V I

UNIT-III

5. a) Draw and explain Oxygen Sag curve along with critical parameters. 7
- b) What is sewage sickness? How can it be prevented? 7

(OR)

6. a) What is sludge digestion? Explain the stages of sludge digestion. 7
- b) Explain the working of septic tank along with design criteria, with a neat sketch 7

UNIT-IV

7. a) What are the various types of Air Pollutants? Explain about primary and secondary air pollutants with examples 7
- b) What is Inversion? What are the various types of Inversions? Explain 7

(OR)

8. a) Describe any eight air pollutants w.r.t. source and impact 8
- b) Sketch a cyclone separator and explain how it works 6

UNIT-V

9. a) Discuss various sources, their noise levels and permissible limits 7
- b) Write a note on measurement of noise. 7

(OR)

10. a) Explain the effects of Noise pollution 7
- b) Discuss the methods of controlling Noise pollution 7

**VLSI DESIGN
(Electronics and Communication Engineering)****Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks

UNIT-I

1. Explain the fabrication of NMOS transistor with neat diagrams? 14M
(OR)
2. a) Explain the fabrication of PMOS transistor with neat diagrams? 7M
b) Compare between CMOS and bipolar transistor. 7M

UNIT-II

3. a) Derive the relation between $I_{ds} - V_{ds}$. 7M
b) Derive the expression for pull-up to pull down ratio for an nmos inverter driven by another nmos inverter through pass transistor? 7M
(OR)
4. a) Draw the circuit diagram of BiCMOS inverter and explain the operation? 7M
b) Draw the circuit diagram of NMOS inverter with resistive load and explain the operation? 7M

UNIT-III

5. a) Draw the schematic, stick diagram and layout for CMOS NOR gate? 7M
b) Draw the schematic diagram and Stick diagram for the following expression 7M
$$Y = ((a+d).(c+d).e)^1$$

(OR)
6. a) Discuss the design rules for Contacts with neat diagrams? 7M
b) Draw Layout for NMOS Inverter? 7M

UNIT-IV

7. a) What are the issues involved in driving large capacitor loads in VLSI circuit regions? Explain. 7M
b) What is Sheet resistance and mention sheet resistance for different layers? 7M
(OR)
8. a) Why scaling is required? Write the scaling factors for different types of device parameters? 7M
b) Explain in detail about wiring capacitances? 7M

UNIT-V

9. a) Mention the levels at which testing of a chip can be done? 7M
b) Mention the defects that occur in a chip? 7M
(OR)
10. Explain design verification tools. 14M

**FINITE ELEMENT METHODS
(Mechanical Engineering)****Time: 3 Hours****Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

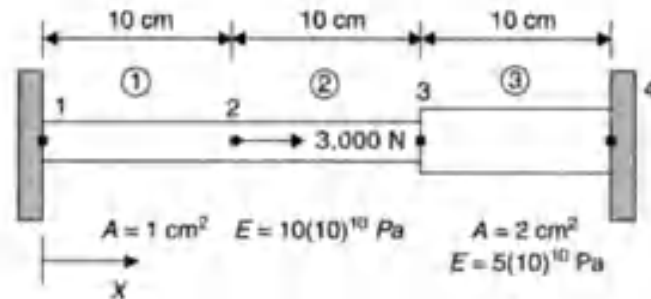
All parts of the Question must be answered at one place

UNIT-I

1. a) Derive the stress strain relations for a plane stress problem 8M
 b) Explain the applications of finite element method 6 M
- (OR)**
2. a) Explain the steps used in formulation of variational functional with example. 7 M
 b) What are the different types of boundary conditions . Explain with examples. 7 M

UNIT-II

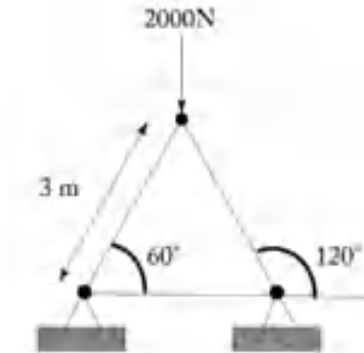
3. a) Derive the shape functions for a two noded bar element. 7 M
 b) Explain about global and local node numbering scheme. 7 M
- (OR)**
4. For the 1D bar shown in Figure , determine (a) the assembled stiffness matrix, (b) the displacements of nodes 2 and 3, and (c) the reactions at nodes I and 4. 14 M

**UNIT-III**

5. Derive the shape functions in area coordinate system and stiffness matrix for a three noded constant strain triangular (CST) element. 14 M

(OR)

6. A truss structure has a load applied as shown in Fig. Each member has a cross sectional area of 27 cm^2 and a Young's modulus of 190 GPa . Find the displacements under the load, reaction forces, and stress in each truss member. 14 M



UNIT-IV

7. Derive the Hermite shape functions for a 2 noded 2D beam element. 14 M
(OR)
8. a) Derive the shape functions for a four noded quadrilateral element in local coordinate system 7 M
b) Derive the Guass points and corresponding weights for a two point Guass Quadrature. 7 M

UNIT-V

9. Explain the eigen value problem to determine natural frequencies of 1D bar element. 14 M
(OR)
10. Consider the simply supported beam having length of the beam is 1 m , cross section area is 30 cm^2 , second moment of area is 100 mm^4 , density is 7800 kg/m^3 and modulus of elasticity E is 200 GPa . Obtain the natural frequencies of vibration of the beam by considering one element idealization. 14 M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****IV B.Tech I Semester Supplementary Examinations, January-2020****DATA ANALYTICS
(Common to CSE & 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) Illustrate Structure of Data Items 7M
b) Explain the types of analytical data set. 7M
(OR)
2. a) Analyse the challenges faced by traditional system 7M
b) Describe in detail the analysis of Saving Your Work in R 7M

UNIT-II

3. a) Summerize Testing and Converting 7M
b) Assess the significances Summarizing Samples 7M
(OR)
4. a) Examine in detail the Manipulating Objects 7M
b) Explain what is Manipulating Objects 7M

UNIT-III

5. a) Explain how to copy Graphics to Other Applications 7M
b) Give the Differences between Line Charts, Pie Charts and Bar Charts 7M
(OR)
6. Illustrate in detail about Covariance 14M

UNIT-IV

7. Analyse how google file system differs from the Hadoop file system and explains the google file system architecture with a neat sketch. 14M
(OR)
8. a) Generalize with a neat sketch about processing of a job in Hadoop. 7M
b) How can you Configure XML files 7M

UNIT-V

9. a) Discuss about Partitioner? 7M
b) Differentiate between Driver code and Mapper code 7M
(OR)
10. a) List the methods for analyzing time series data 7M
b) Assess the difference between hive and map reduce 7M

Time: 3 Hours**Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) What are the permissible limits of chlorides and fluorides for domestic consumption as per IS code?
- b) What is the fire demand for a population of 100 thousands using Kuichling's formula?
- c) On what principle does a Nephelometer work?
- d) If in a sedimentation tank, volume of tank is 20 m x 10 m x 3 m and flow rate is 3600m³/d, calculate the detention time.
- e) Write the equation of the economical diameter of the pipe.
- f) What are the advantages of intermittent system of supply?
- g) Write the BOD equation of first order.
- h) Name any two sewer appurtenances.
- i) What is sewage farming?
- j) Write any two examples for Aerobic decomposition.

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) Explain in brief the factors affecting water demand. 6
 - b) Write a note on coliform index. How do you determine it? 6
- (OR)**
3. a) Explain in detail about the various types of wells with the help of sketches. 6
 - b) Describe in brief various important tests conducted for chemical examination of water. 6

UNIT-II

4. a) Design a rectangular sedimentation tank unit intended to treat a design discharge of 10 million liters per day. Assume required data, check for important design criteria. 6
 - b) Describe with the help of sketches a slow sand filter. Explain its working. 6
- (OR)**
5. a) Describe various methods of application of coagulants. 6
 - b) Name various disinfection methods and explain any one of them in detail. 6

UNIT-III

6. a) What are the different kinds of pipes available for use in water supply system? Discuss their merits. 6
 - b) Differentiate between Hardy cross and equivalent pipe methods. 6
- (OR)**
7. a) What do you understand by an equivalent pipe? How do you determine its length when the pipes are (i) in series (ii) in parallel? 6
 - b) Write short notes on scour valves and check valves. 6

UNIT-IV

8. a) Explain the term sewage sickness and its remedial measures. 6
b) Estimate capacity of centrifugal pump in Hp to pump water to discharge $1.5\text{m}^3/\text{sec}$. 6
Delivery head-12 m and Suction head-5 m. Efficiency of the pump-75%.

(OR)

9. a) Mention various formulae generally used in the design of sewers and analyze. 6
b) Determine the design peak flow in m^3/sec for an area of 6.25 Sq.km with a density 6
of population of 330/Hectare. Assume per capita water supply as 150lpcd and
sewage contribution of 70% of water supply. Peak factor of 2.25.

UNIT-V

10. a) Write short notes on i) Screening and ii) Grit chamber. 6
b) Design septic tank with two chambers to treat sewage for 300 persons. Follow 6
design procedure as given in BIS 2470(Code of practice for design and
construction of septic tanks).

(OR)

11. a) What is the schematic of a typical wastewater treatment plant? Explain. 6
b) Design an Oxidation pond to treat sewage for a population of 10000. Capita 6
Water Supply may be assumed as 135lpcd .Sewage discharge may assume – as
75% of water supply with a BOD5 of 240mg/L. The BOD5 loading rate
=225kg/day/Hectare. Draw the sketch of oxidation pond for the design.

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

**IV B.Tech I Semester Supplementary Examinations, January-2020
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) What are the differences between microprocessor and microcontroller?
- b) Draw the flag register in 8086 microprocessor.
- c) Explain the STRUCT and ENDS directives.
- d) Define interrupt and ISR.
- e) List any two features of 80386 Processor.
- f) What is paging in 80386.
- g) What is the need of DMA controller?
- h) Write the control word format in the BSR mode?
- i) If the 8051 adds 87H and 79H, specify the contents of the accumulator and the status of the Z, and CY flag?
- j) List out the features of PIC microcontroller.

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) Explain the addressing modes of 8086 with examples. **6M**
- b) How is a 20 bit physical memory address calculated in the 8086 microprocessor? **6M**

(OR)

3. a) Explain the general purpose registers of 8086 microprocessor. **4M**
- b) Draw & explain Read and Write cycle timing diagram of 8086 in Minimum mode configuration. **8M**

UNIT-II

4. a) Explain the organization of interrupt vector table in 8086 microprocessor. **6M**
- b) Write an ALP for a given data is odd or even using 8086 instruction set. **6M**

(OR)

5. a) Explain the Push and Pop instructions with examples. **6M**
- b) Write an ALP to Sort Numbers in Descending Order using 8086 instruction set. **6M**

UNIT-III

6. a) Draw and explain the architecture of 80386. **8M**
- b) Explain the register organization of 80386. **4M**

(OR)

7. a) List out the features of 80486. **4M**
- b) Explain Real address mode of 80386 with neat sketch. **8M**

UNIT-IV

8. a) What is the purpose of 8255? Explain the operating modes in 8255. **6M**
- b) With neat sketch explain the architecture of Programmable communication interface 8251. **6M**

(OR)

9. a) Draw the block diagram of Programmable interrupt controller (8259A) and explain each block in detail. **6M**
- b) Draw and explain DMA operation state diagram. **6M**

UNIT-V

10. a) Explain various functional blocks of 8051 with a neat diagram **7M**
- b) Write short notes on i) MOVC ii) MOVX iii) SBUF **5M**

(OR)

11. a) Explain the addressing modes of 8051 with examples. **6M**
- b) Evaluate the memory organisation of 8051 microcontroller. **6M**

AR13

CODE: 13ME4027

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

IV B.Tech I Semester Supplementary Examinations, January-2020

FINITE ELEMENT METHODS

(Mechanical Engineering)

Time: 3Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[10x1=10M]

1.

- What is meant by pre-processing in FEA?
- Give an example for plane strain problem.
- Write down strain displacement relations for 3D object
- What is meant by banded matrix?
- Write potential energy equation for one dimensional bar.
- Write the difference between bar element and beam element from the point of view of degree of freedom and loading.
- Write the shape functions for constant strain triangle
- Write the Hermite shape functions of 2D beam.
- What is the need of higher order elements in FEA?
- State Hamilton principle

PART-B

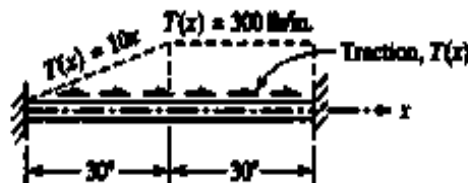
Answer one question each from each unit

UNIT-I

2. A steel rod is attached to rigid walls at each end and is subjected to a distributed load $T(x)$ as shown in Figure-2 take conversion $\text{lb/inch}=173.78\text{N/m}$ and $1\text{psi}=6894.724\text{N/m}^2$

(a) Write the expression for potential energy π [3M]

(b) Determine the displacement $u(x)$ using Rayleigh-Ritz method. Assuming displacement field $u(x) = a_0 + a_1x + a_2x^2$ [9M]



$$E = 30 \times 10^6 \text{ psi} \quad A = 2 \text{ in}^2$$

(OR)

3. a) Explain basic steps of Finite Element method in detail [5M]
b) Derive D matrix relating stresses and strains under plane stress conditions for a linear elastic isotropic material with young's modulus E and Poisson's ratio ν [7M]

UNIT-II

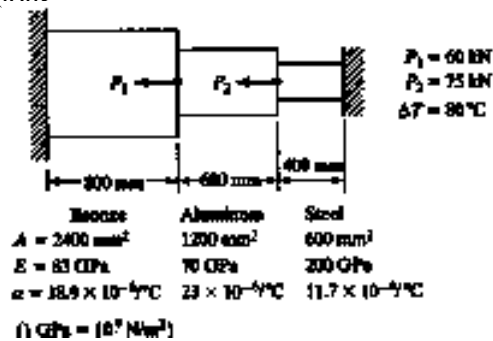
4. a) Derive the stiffness matrix for one dimensional bar element. [7M]
b) Obtain Global stiffness matrix and global force vector by considering three element FE model with 1D bar element. [5M]

(OR)

5. The structure shown in the Figure-1 is subjected to increase in temperature of 80°C . Using elimination method of handling boundary conditions determine

(a) Displacements at load locations P_1 and P_2 [7M]

(b) Support reactions [5M]



(OR)

UNIT-III

6. For the three member truss shown in the Figure-3 find displacement at node 1 and stresses induced in the three members [12M]

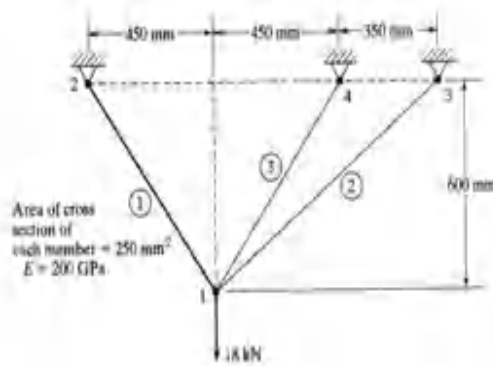


Figure-3

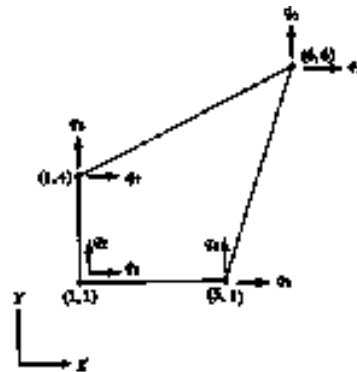


Figure-4

(OR)

7. Derive the strain-displacement matrix B and stiffness matrix K for CST element. [12M]

UNIT-IV

8. a) Derive the element stiffness matrix for Beam element. [9M]
 b) Explain how to obtain shear force and bending moment at any point within the element. [3M]

(OR)

9. For a four node quadrilateral element shown in the Figure-4 the element displacement vector is given by $q = [0 \ 0 \ 0.2 \ 0 \ 0.15 \ 0.10 \ 0 \ 0.05]$ find

(a) x and y coordinates of a point P whose location in the master element is given by $\xi = 0.5$ and $\eta = 0.5$ [8M]

(b) the u and v displacements of the point P [4M]

UNIT-V

10. Derive element mass matrices for 1D bar element and truss element [12M]

(OR)

11. Explain how elimination approach and penalty approach is used to obtain unknown temperatures, when three boundary conditions specified heat flux, specified temperature and convection are present with an example. [12M]