

K S R M College of Engineering (Autonomous), KADAPA – 516 003
B. Tech VIII Semester Regular Examinations, 2020 - Model Paper
Sub: DESIGN & DRAWING OF IRRIGATION STRUCTURES
(Civil Engineering)

Time: 03:00 Hrs.

Max. Marks: 70

Note: Answer any ONE question. Assume any missing data.

1. Design a surplus work of a tank forming part of the group of tanks is 28.89Km^2 and areas of the catchment intercepted by the upper tanks is 20.91Km^2 . It is decided to store water in the tank to a level of 12M above M.S.L limiting submersion of fore shore lands up to a level of 12.75M above M.S.L. The general ground level at the proposed site work is 11M and the ground level below the surplus slopes of till reaches 10M in about 6M distance. The tank bund has a top width of 2M at a level 14.50 with 2:1. Give slopes on either side. The tank bunds are designed for a saturation gradient of 4:1 with 1M clear cover. The foundations of hard graves at a level of 9.50M near the site work. Draw the following
 - a) Plan of surplus work
 - b) Cross section.

2. Design a canal drop of 2M with the following data.

Hydraulic Particulars of the canal	U/s of the drop	D/s of the drop
Full supply discharge	$4\text{m}^3/\text{sec}$	$4\text{m}^3/\text{sec}$
Bed width	6M	6M
Bed level	10.0	8.0
Full supply depth	1.5M	1.5M
Full supply level	11.5	9.5
Half supply depth	1.0M	--
Top level of bank 2M wide		10.5

G.L. at the site work is 10.5

Good soil is available at R.L. of 8.5

Draw the following

- a) Longitudinal section along the canal
- b) Half plan at top and hurl plan at foundation level.

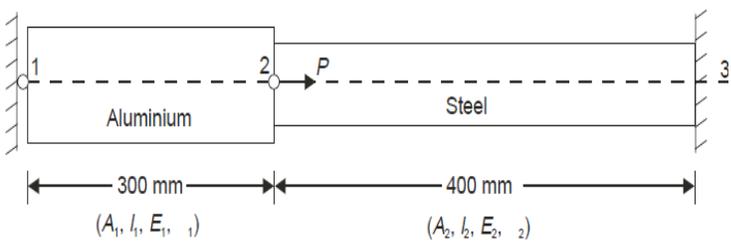
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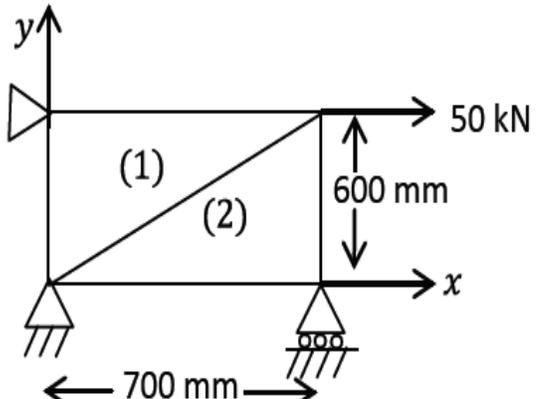
K S R M College of Engineering (Autonomous), KADAPA – 516 003
B.TechVIII Semester Regular Examinations (R-15), 2020 - Model Paper
Finite Element Method
(Civil Engineering)

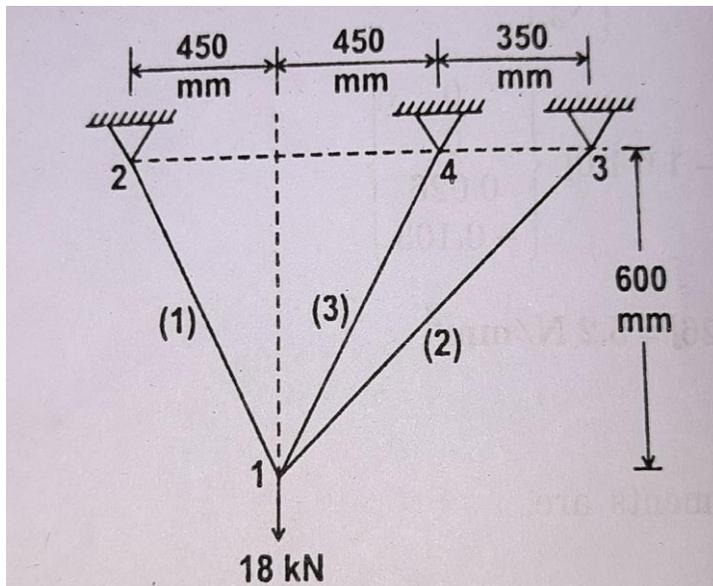
Time: 03:00 Hrs.

Max. Marks: 70

Answer any FIVE questions choosing one question from each unit
All questions carry Equal Marks

S.No.	QUESTION	Marks	CO	Blooms Level
	Unit – I			
1	a) Explain the advantages and limitations of finite element method. b) Explain the different steps involved in FEM.	7 7	1 1	L2L2
	OR			
2	a) Discuss briefly about Finite Element modeling and discretization. b) Discuss briefly about Interpolation and Shape Function.	7 7	1 1	L3L3
	Unit – II			
3	<p>Determine the nodal displacements at node 2, stresses in each material and support reactions in the bar shown in Fig, due to applied force $P = 400 \times 10^3 \text{N}$ and temperature rise of 30°C. Given:</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: left;"> <p>$A_1 = 2400 \text{ mm}^2$ $l_1 = 300 \text{ mm}$ $E_1 = 0.8 \times 10^5 \text{ N/mm}^2$ and $\alpha_1 = 23 \times 10^{-6}/^\circ\text{C}$</p> </div> <div style="text-align: left;"> <p>$A_2 = 1200 \text{ mm}^2$ $l_2 = 400 \text{ mm}$ $E_2 = 2.6 \times 10^5 \text{ N/mm}^2$ $\alpha_2 = 14 \times 10^{-6}/^\circ\text{C}$</p> </div> </div> <div style="text-align: center; margin-top: 10px;">  </div>	14	2	L3
	OR			

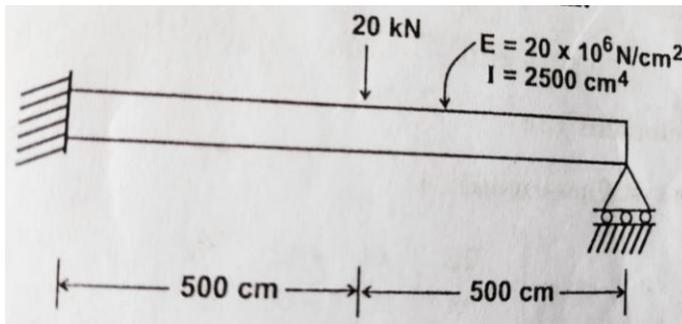
4	<p>a) Explain the following: i) Natural coordinates, ii) Area coordinates, and iii) Convergence and compatibility requirements for displacement functions.</p> <p>b) Using area coordinates, derive the shape functions for a 3-node triangular element</p>	7 7	2 2	L2 L3
Unit – III				
5	<p>Calculate the displacements and stresses in a beam shown in fig 1. Idealize the beam into two ‘CST’ elements shown in fig. Assume Plane Stress condition take $\mu = 0.25$, $E = 2 \times 10^5 \text{ N/mm}^2$, thickness = 20mm</p> 	14	3	L3
OR				
6	<p>Determine the horizontal and vertical displacements of the nodes and the stresses in each element. All elements have $E = 200 \text{ GPa}$ and $A = 250 \text{ mm}^2$</p>	14	3	L3



Unit – IV

7 Calculate the deflection under the load and construct the shear force and bending moment diagrams for the beam.

14 4 L3, L4



OR

8 a) Discuss Shape functions for a beam element and derive.
b) Derive stiffness matrix by Strain Energy Concept for a beam

7 4 L2
7 4 L2

Unit - V

9. For a four noded rectangular element the coordinates are (0, 0), (3, 0), (3, 2) and (0,2). All dimensions are in cm. Determine the following 1. Jacobian Matrix 2. Strain – Displacement matrix 3. Element Strains and 4. Element stresses. Take $E = 210\text{GPa}$, $\mu = 0.25$; $\xi=0; \eta=0$ $\{\delta\} = [0, 0, 0.002, 0.003, 0.005, 0.004, 0, 0]^T$. Assume plane stress condition.

14 5 L3

	OR			
10.	a) Discuss briefly static condensation. b) Discuss briefly about solution techniques for static loads	6 8	5 5	L2 L2

[R 15]

Code-1501801

K.S.R.M COLLEGE OF ENGINEERING – KADAPA – 516003 (AUTONOMOUS)

DEPARTMENT OF CIVIL ENGINEERING

B.Tech VIII Sem Regular Examinations -2020 Model Paper

Sub: SANITARY ENGINEERING

Time: 3 Hours

Maximum: 70 Marks

Answer any five questions, choosing one question from each unit.

All questions carry equal marks.

UNIT-I

1. (a) Determine the merits and Demerits of Separate Sewerage system? **4M**

(b) A combined sewer of circular section is to be laid to serve an area of 250 hectares with a population of 50,000. Assuming an impermeability factor of 0.65 and time of concentration of rainfall “t” as 20 minutes. Calculate the size of the sewer when it has to half full with a velocity of 0.3m/s. **10M**

Or

2.(a) What is Self-Cleaning Velocity and Non- Scouring Velocity? **4M**

(b) A combined sewer was designed to serve an area of 60 sq. km with an average population density of 185 persons/hectare. The average rate of sewage flow is 350 L/Capita/day. The maximum flow is 50% in excess of the average sewage flow. The rainfall equivalent of 12 mm in 24 h can be considered for design, all of which is contributing to surface runoff. What will be the discharge in the sewer? Find the diameter of the sewer if running full at maximum discharge? **10M**

UNIT-II

3.(a) Explain about BOD and COD ? **4M**

(b) Derive the empirical equation for finding the 5 day BOD of the wastewater sample. And also determine the ultimate BOD? **10M**

OR

4. (a) Briefly explain the Screening procedure in Wastewater treatment and also indicate the types of screens generally we employ? **4M**

(b) Design a rectangular grit chamber for a flow of 65 MLD. Specific gravity=2.65 and size to be removed is 0.35mm. Determine settling velocity, critical horizontal velocity and dimensions of the tank. Assume dynamic viscosity of the liquid =0.1N-s/m² **10M**

UNIT-III

5.(a) With a neat sketch explain the function of Activated Sludge Process and also mention its modifications and discuss. **7M**

(b) Determine the volume of aeration tank of Activated sludge process given the BOD of sewage as 250 mg/L, MLSS-2750mg/L, and F/M-0.30 and sewage flow 5MLD. Also estimate aerators capacity. Assume suitable data. **7M**

OR

6. Design an Oxidation pond to treat sewage for a population of 10000. Capita Water Supply may be assumed as 135 lpcd. Sewage discharge may assume - as 75% of water supply with a BOD₅ of 240 mg/L. The BOD₅ loading rate =225 kg/day/Hectare. Draw the sketch of oxidation pond for the design. **14M**

UNIT -IV

7. a) Write about need for Nitrification and Denitrification **4M**

(b) Design septic tank with two chambers to treat sewage for 300 persons. Follow design procedure as given in BIS 2470(Code of practice for design and construction of septic tanks). **10M**

OR

8. a) Discuss the need for sludge treatment and explain the various stages of sludge treatment. **7M**

b) Enumerate anaerobic sludge digestion process with a neat diagram of digester. **7M**

UNIT-V

9.a) Compose the functional elements in atypical solid waste management system. **7M**

b) Explain the factors influencing solid waste generation. **7M**

OR

10. a) Classify different types of air pollutants and indicate their sources. **7M**

b) Discuss about primary and secondary air pollutants. **7M**