

Shri Shankaracharya Institute of Professional Management & Technology

Department of Civil Engineering

Class Test – I Session: July-Dec, 2023 Month – November

Semester – 5th Subject – Transportation Engineering Code – C020514(020)

Time Allowed: 2 hrs. Max Marks: 40

Note: - In Part I & II, Question A is compulsory and attempt any two from B, C & D.



Q. No.	Questions	Marks	Levels of Bloom's taxonomy	CO's
<b>Part I</b>				
A.	Define gradient. Describe different types of gradient.	[4]	Understand	CO1
B.	Calculate the safe stopping sight distance while travelling at a speed of 80 kmph on an upward gradient of 2 percent. Make suitable assumptions.	[8]	Apply	CO1
C.	Design the rate of super elevation for a horizontal highway curve of radius 500 m and speed 100 kmph.	[8]	Apply	CO1
D.	Calculate the safe overtaking sight distance for a design speed of 100kmph. Assume all other data suitably.	[8]	Apply	CO1
<b>Part II</b>				
A.	Describe sleepers and its function.	[4]	Understand	CO4
B.	Briefly explain the terms : Fish Plate, Coning of wheel, Types of rail	[8]	Understand	CO4
C.	Describe with neat sketches various types of rail. Write its merits and demerits.	[8]	Understand	CO4
D.	Draw the diagram of rail cross-section and make the detailed description of each components used in railway cross section.	[8]	Understand	CO4





Shri Shankaracharya Institute of Professional Management & Technology, Raipur  
Department of Civil Engineering

Class Test – I Session: July- Dec, 2023 Month – November  
Semester – 5<sup>th</sup> Subject – Geotechnical Engineering Sub. Code –C020513(020)

Time Allowed: 2 hrs. Max Marks: 40

Note: - In Part I & II, Question A is compulsory and attempt any two from B, C & D.

Q. No.	Questions	Marks	Levels of Bloom's taxonomy	CO's
<b>Part I</b>				
A.	The mass specific gravity (apparent specific gravity) of a soil equals 1.64. The specific gravity of solids is 2.70. Determine the voids ratio under the assumption that the soil is perfectly dry. What would be the voids ratio, if the sample is assumed to have a water content of 8%?	[4]	Analyze	CO1
B.	An embankment, having total volume of 2000 m <sup>3</sup> is to be constructed having a bulk density of 1.98 g/cm <sup>3</sup> and a placement water content of 18%. The soil is to be obtained either from borrow area A or borrow area B, which have voids ratio of 0.78 and 0.69, respectively and water content of 16% and 12%, respectively. Taking G = 2.66, for both the soils, Evaluate the volume of soil required to be excavated from each of the areas. If the cost of excavation is Rs. 35 per m <sup>3</sup> in each area, but cost of transportation is Rs. 32 and Rs. 36 per m <sup>3</sup> from areas A and B respectively, which of the borrow areas is more economical?	[8]	Evaluate	CO1
C.	Explain IS Soil Classification system. Mention the equation and significance of A-line in plasticity chart.	[8]	Understand	CO1
D.	Derive the functional relationship of followings: (i) Relation between $\gamma$ , G, e, and S. (ii) Relation between $\gamma_d$ , G, w, $n_a$ .	[8]	Analyze	CO1
<b>Part II</b>				
A.	(i) Explain various types of samplers.	[4]	Understand	CO5
B.	An undisturbed soil sample has a volume of 100 cm <sup>3</sup> and mass of 195 gm. on oven drying for 24 hours; the mass is reduced to 163 gm. If the specific gravity of grains is 2.65, evaluate (i) water content (ii) void ratio, and (iii) degree of saturation of soil.	[8]	Evaluate	CO1
C.	Define Consistency of soil and various atterberg's limit with neat sketches.	[8]	Understand	CO1
D.	Describe various methods of site exploration and soil investigation.	[8]	Understand	CO5





# Shri Shankaracharya Institute of Professional Management & Technology

## Department of Civil Engineering

Class Test – I Session: July - December, 2023 Month – November

Semester – 5<sup>th</sup> Subject – SED - I, Code – C020511(020)

Time Allowed: 2 hrs Max Marks: 40

Note: -Question (a) is compulsory. Attempt any two from b, c and d form Part I and Part II.

Q. No.	Questions	Marks	Levels of Bloom's taxonomy	COs
<b>Part- I</b>				
(a)	Draw the stress-strain curves of concrete and steel.	[4]	Analyze	CO1
(b)	Evaluate the moment of resistance of R.C.C beam 350 x 550 mm (effective) and is reinforced with 3 bars of 20 mm diameter. The Permissible stress in concrete and steel are 7 N/mm <sup>2</sup> and 230 N/mm <sup>2</sup> . $m = 13.33$	[8]	Evaluate	CO1
(c)	Evaluate the stress set up in steel and concrete from following data $b = 400$ $d = 600$ 4-25mm diameter $m = 13.33$ B.M. = 150 kNm	[8]	Evaluate	CO1
(d)	A concrete beam 400 mm x 600 mm effective is reinforced with 4 – 25 mm $\varnothing$ bars on tension side and 4 – 20 mm $\varnothing$ bars on compression side. Evaluate moment of resistance of the beam. Use M20 concrete and Fe 415 steel. Take effective cover to the centre of compressive reinforcement as 40 mm and $m = 13.33$ .	[8]	Evaluate	CO1
<b>Part- II</b>				
(a)	Draw the Block stress parameter of Singly and Doubly Reinforced Beam.	[4]	Analyze	CO2
(b)	Evaluate the moment of resistance of beam having dimension as 300 x 550 mm (effective). The beam is reinforced with 1963 mm <sup>2</sup> of steel in the tension zone. Use M20 concrete and Fe 415 steel.	[8]	Evaluate	CO2
(c)	Design the beam for flexure. An R.C.C beam is required to carry a uniformly distributed load 25 kN/m inclusive of its weight. The effective span of the beam is 8 m. Use M30 and Fe 415 Steel	[8]	Create	CO2
(d)	Design rectangular beam 230 mm x 600 mm over an effective span of 5 m. The Superimposed load on the beam in 50 kN/m. Effective cover to reinforcement is taken as 50 mm. Use M20 concrete and Fe 415 steel.	[8]	Create	CO2



**Shri Shankaracharya Institute of Professional Management & Technology**  
**Department of Civil Engineering**



**Class Test – I      Session: July-December 2023**

**Month – November**

**Semester – 5th      Subject – Hydrology & WRE**

**Code – C020512(020)**

**Time Allowed: 2 hrs.**

**Max Marks: 40**

*Note- 1) In Part-I & Part-II, Question No. 1 is compulsory*

*2) In Part-I & Part-II, Solve any two from Question No. 2,3 and 4*

Q. No.	Questions	Marks	Levels of Bloom's taxonomy	CO's
--------	-----------	-------	----------------------------	------

**Part I**

1)	i) Briefly explain the different stages of Hydrological Cycle ii) What is meant by Probable Maximum Precipitation (PMP) over a basin?	4	Understand	CO1														
2)	A sub-basin has six numbers of rain gauges. Annual rainfall recorded by the gauges are given below. Considering 12% error in the estimation of mean annual rainfall. Comment on the sufficiency of present system of rain gauges. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Rain Gauge Name</th> <th>Annual Rainfall (cm)</th> </tr> </thead> <tbody> <tr><td>A</td><td>110.3</td></tr> <tr><td>B</td><td>82.8</td></tr> <tr><td>C</td><td>98.8</td></tr> <tr><td>D</td><td>136.7</td></tr> <tr><td>E</td><td>180.3</td></tr> <tr><td>F</td><td>102.9</td></tr> </tbody> </table>	Rain Gauge Name	Annual Rainfall (cm)	A	110.3	B	82.8	C	98.8	D	136.7	E	180.3	F	102.9	8	Apply	CO1
Rain Gauge Name	Annual Rainfall (cm)																	
A	110.3																	
B	82.8																	
C	98.8																	
D	136.7																	
E	180.3																	
F	102.9																	
3)	The Normal annual rainfall at stations A, B, C, D and E are 80.97, 67.59, 76.28, 92.11 and 102.76 cm respectively. During the year 1985, the precipitation recorded by stations A, B, C and E were 91.11, 72.23, 79.89 and 86.75 cm respectively. Station D was inoperative. Estimate the rainfall at station D during the year 1985.	8	Apply	CO1														
4)	Describe in detail the working of any one recording type rain gauge with diagram	8	Analyze	CO1														

**Part II**

1)	Discuss in brief the process of Evaporation and the factors affecting it	4	Understand	CO2																		
2)	Describe in detail the terms "Infiltration" & "Infiltration Capacity." Also explain the factors affecting Infiltration Capacity of an area.	8	Analyze	CO2																		
3)	The infiltration capacity for a catchment is represented by Horton's Equation as- $f_t = 0.5 + 1.2 e^{-0.5t}$ , Assuming the infiltration to take place at capacity rates in a storm of 4hours duration, Calculate:- i. Total infiltration depth ii. Average rate of infiltration	8	Apply	CO2																		
4)	A catchment area of 30 km <sup>2</sup> has one recording gauge. During a storm, the following rainfall data was observed <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Time from start of storm (hr)</th> <th>0</th> <th>2</th> <th>4</th> <th>6</th> <th>8</th> <th>10</th> <th>12</th> <th>14</th> </tr> </thead> <tbody> <tr> <td>Accumulated Rainfall (mm)</td> <td>0</td> <td>6</td> <td>17</td> <td>57</td> <td>70</td> <td>81</td> <td>87</td> <td>90</td> </tr> </tbody> </table> <p>If the Volume of runoff due to the storm measured is <math>1.2 \times 10^6</math> m<sup>3</sup>. Estimate the <math>\phi</math> Index of the catchment.</p>	Time from start of storm (hr)	0	2	4	6	8	10	12	14	Accumulated Rainfall (mm)	0	6	17	57	70	81	87	90	8	Apply	CO2
Time from start of storm (hr)	0	2	4	6	8	10	12	14														
Accumulated Rainfall (mm)	0	6	17	57	70	81	87	90														



# Shri Shankaracharya Institute of Professional Management & Technology, Raipur

## Department of Civil Engineering

Class Test – I    Session: Jul – Dec, 2023    Month – November

Semester – 5<sup>th</sup>

Subject – Structural Analysis-II

Code – C020531(020)

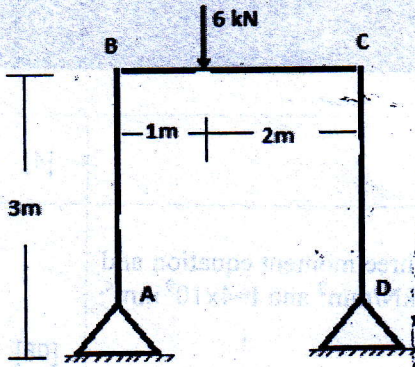
Time Allowed: 2 hrs    Max Marks: 40

Note: - In every part Question A is compulsory, Attempt any two Questions from B, C and D.

Q. No.	Questions	Marks	Levels of Bloom's taxonomy	COs
<b>Part-I</b>				
A.	I. Discuss Degree of freedom. II. Discuss Moment Curvature Relationship.	[4]	Understand	CO1 CO2
B.	Analyze the continuous beam as shown in figure, using three moment equation and if support B sinks by 10 mm under the given load. $E=15 \text{ kN/mm}^2$ and $I=4 \times 10^9 \text{ mm}^4$ . Draw shear force and Bending moment diagram.	[08]	Analyze	CO1
C.	For a two span beam shown in figure, Find the support moments and plot the Bending moment diagram. Use three moment theorem	[08]	Analyze	CO1
D.	Analyze the continuous beam as shown in figure, using three moment equation and Draw the SFD and BMD. Take $EI$ is constant. Take $E=15 \text{ kN/mm}^2$ . Moment of inertia is constant throughout and is equal to $5 \times 10^9 \text{ mm}^4$ .	[08]	Analyze	CO1
<b>Part-II</b>				
A.	i. Discuss the Betti's Theorem. ii. Discuss Castigliano's theorem of minimum strain Energy.	[04]	Understand	CO2
B.	Analyse the portal frame shown in figure, using method of minimum strain energy and plot the bending moment diagram. $EI$ is constant.	[08]	Analyse	CO2



A portal frame ABCD is hinged at A and D and rigid joint B and C. The frame is loaded as shown in figure using method of min. strain energy Analyze the frame and plot the B.M.D.

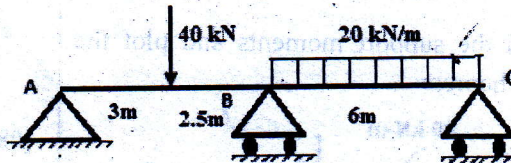


[08]

Analyse

CO2

Draw the bending moment diagram of the beam as shown in figure using strain energy method.



[08]

Analyse

CO2