BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE **SEMESTER: IV**
BRANCH: CIVIL **SESSION : SP/2019**

SUBJECT : CE4005 TRANSPORATTION ENGINEERING-I

TIME: 1.5 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1 (a) What are the different road classifications as per Nagpur Road plan and Lucknow Road plan? [2]
(b) Write a short note of Jayakar Committee recommendations. [3]

Q2 We have an imaginary area with existing road network. There are four alternate plan proposals P, Q, R and S with different road lengths by adding extra road links to the existing roads in the area and the details of the population and the products are given below: [5]

Proposal	Total Road Length, km	Number of towns and villages served with population range				Total agricultural and industrial products, thousand tonnes
		1000-2000	2001-5000	5001-10000	>10000	
P	300	160	80	30	6	200
Q	400	200	90	60	8	270
R	500	240	110	70	10	315
S	550	248	112	73	12	335

Assume utility per unit length for each of the systems and indicate which of the plans yields the maximum utility based on saturation systems.

Assume utility units as given below:

Population	Units	Productivity	Unit
1000-2000	0.25	1000 tonnes	1.0
2001-5000	0.50		
5001-10000	1.00		
>10000	2.50		

Q3 Discuss the different stages of engineering survey for fixing highway alignment. [5]

Q4 (a) Draw cross-section details of a roadway showing carriageway, formation width, right of way, road shoulder, road margin, road boundary, building line, control line. [2]
(b) What is camber? What are the reasons for providing cambers in roads? What are the factors on which camber depends upon? [1+1+1]

Q5 An ascending gradient of 1 in 50 meets a descending gradient of 1 in 80. Determine the length of summit curve to provide (a) ISD (b) OSD for a design speed of 80 km/hr. Assume all other standard data. [5]

PTO

Q6 A two-lane state highway passing through a rolling terrain has a horizontal curve of radius 230 metres. Design the following geometric features: [5]

i. Superelevation
ii. Extra widening of pavement
iii. Length of transition curve
iv. SSD, ISD
v. Minimum set-back distance from the center-line of the two-lane highway. The setback distance should be so provided that a clear vision = ISD available throughout the circular curve.

Data given:

Design given: 80 km/hr

Length of wheelbase of longest truck = 6m

Assume pavement rotated about centerline during attainment of full superelevation.

Allowable rate of change of centrifugal acceleration, $C = 80/(75+V)$ m/sec^3, $0.5<C<0.8$.

Mixed traffic conditions.

Allowable rate of introduction of superelevation = 1 in 150.

:::: 05/03/2019 ::::::E