Code No: R1622016 **R16** SET - 1

II B. Tech II Semester Regular/Supplementary Examinations, November - 2020
TRANSPORTATION ENGINEERING-I
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Discuss the recommendations of the Jaykar Committee.
   b) Calculate the stopping sight distance and intermediate sight distance for a design speed of 40 mph. Take total reaction time 2.5 seconds and coefficient of friction 0.35.
   c) Explain summit and valley curves and the various cases when these are formed while two different gradients meet.
   d) Discuss the desirable properties of bitumen and explain why stripping occurs.
   e) Explain the following: Seal coat, tack coat and prime coat in asphalt construction.
   f) Explain the typical failure design criteria in flexible and rigid pavements.

PART -B

2. a) Four new road links P, Q, R and S are to be constructed during a five year plan period. Suggest the order of priority for phasing the road construction programme based on the maximum utility approach. Assume utilities of 1,2,3 and 4 for the four population ranges and 3, 3 and 5 units per 1000 t of agricultural, raw material and industrial products from the following data:

Road link	Length km	No. of villages served with a population range				Productivity served (tons)		
		<500	501-1000	1001-2000	>2000	Agric-cultural	Raw material	Indus-trial
P	75	20	15	10	5	8000	3000	1500
Q	35	25	10	9	4	6000	2000	1000
R	40	15	12	8	2	7000	1500	3000
S	50	30	8	7	3	5000	5000	800

   b) Explain the various factors controlling the alignment of roads. Explain with neat sketches the obligatory points.

3. a) Calculate the length of the transition curve and the shift using the following data:
   - Design speed = 23 m/s
   - The radius of the circular curve = 225 m
   - Allowable rate of introduction of superelevation (Pavement rotated about the centerline) = 1 in 150
   - Pavement width including extra widening = 7.5 m

   b) The speed of overtaking and overtaken vehicles are 65 and 40 kmph, respectively on a two-way traffic road. If the acceleration of the overtaking vehicle is 0.95 m/sec^2.
   a) Calculate the safe overtaking sight distance
   b) mention the minimum length of the overtaking zone
   Assume all other data suitably.
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4. a) List the different types of traffic accidents? Briefly explain the causes of accidents. Explain various measures that can be taken to prevent the accident.
   b) What are the functions and requirements of traffic signs? Indicate the type of road signs adopted in India, giving one example for each one.

5. a) What do you mean by pavement evaluation? What are the various methods of pavement evaluation techniques explain them?
   b) Explain the factors affecting the pavement design. Calculate the VDF or truck factor for the following wheel loads from axle load survey data. 5.52, 2.66, 5.28, 3.42, 3.76, 3.23, 4.78, 3.96, 4.66, 5.89, 5.66, 3.74, 3.44, 2.08, 2.59, 4.81, 3.67, 2.79, 4.10, 2.98, 4.79 tonnes.

6. a) A bituminous mix has been compacted with Marshall hammer using 75 blows. The following data were obtained in the laboratory. Calculate the air voids (VIM), voids in mineral aggregate (VMA) in the mix, absorbed bitumen content in the mix.

Aggregate blend	
Aggregate saturated surface dry (SSD) weight	459.34 gm
Weight of measuring flask & water	2345.67 gm
Weight of measuring bottle, water & aggregate	2640.35 gm
Aggregate weight after being dried in the oven	454.12 gm
Compacted bituminous sample	
Weight of dry compacted asphalt mixture in air	3600.00 gm
Weight of SSD compacted mixture in air	3724.20 gm
Weight of compacted mixture in water	2200.86 gm
Theoretical maximum density	2.50 gm/cm3
Effective bitumen content (by wt of mix) [excluding absorbed bitumen]	5%
The specific gravity of binder	1.01

   b) Discuss the CBR method of determining the strength of subgrade in the laboratory and its limitations.

7. a) Under what condition do you adopt a grade-separated highway? Indicate the advantages and disadvantages of constructing grade-separated roads.
   b) Discuss the maintenance of highways with net sketches.