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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Transportation Engineering -I   Semester: V
Programme: B. Tech. (Civil Engineering)   Course Code: CEEG331
Time: 03 hrs.   Max. Marks: 100
Instructions: Please provide answer, which is relevant to the Question and support it with Suitable diagrams.

SECTION A (5 X 4 = 20 Marks)

S. No.		Marks	CO
Q 1	Explain the significance of Road/Highway development for a developing country like India.	04	CO1
Q 2	Define Extra-Widening on Horizontal curves on a highway and explain its importance. What are two different parts of extra widening as per its equation?	04	CO2
Q 3	Discuss the difference between ADT and AADT? How AADT is calculated by ADT?	04	CO2
Q 4	Explain the 5 important differences between Flexible pavements and Rigid pavements.	04	CO3
Q 5	List down various types of damages experienced by the highways during rainy seasons?	04	CO4

SECTION B (10 X 4 = 40 Marks)

Q 6	What are the various stages of planning for a new highway project? List down most important components of a highway DPR?	10	CO1
Q 7	What is the importance of conducting Spot Speed Studies? What are the various methods of conducting Spot speed studies and how the collected data is presented?	10	CO2
Q 8	Define Equivalent Single Wheel Load (ESWL)? Briefly explain the graphical method determination of the ESWL?	10	CO3
Q 9	Derive a relationship for Overtaking Sight Distance on a two-lane highway between two vehicles moving in a single lane in single direction, where one vehicle is also approaching from opposite direction in another lane. **OR** Determine the safe stopping distance to avoid a head-on collision of two cars approaching at the speeds of 70km/h and 55km/h respectively. Assume a reaction time 2.2 seconds, coefficient of friction as 0.38 and a brake efficiency of 50% for both the cars.	10	CO2

SECTION-C (2 X 20 = 40 Marks)

Q 10	Design a new flexible pavement for a two lane undivided carriageway using the following data: Design CBR value = 6%, Initial Traffic on completion of Construction = 2000 CVPD, Average growth rate = 5% per year, Design Life = 15 years, VDF value =2.5. The relevant charts have been provided below.	20	CO3

CBR design chart: TOTAL THICKNESS OF PAVEMENT, mm (400–1000) vs CSA VALUE OF DESIGN TRAFFIC, msa (10–150) for CBR 2% to CBR 10%.

CBR design chart: TOTAL THICKNESS OF PAVEMENT, mm (200–900) vs CSA VALUE OF DESIGN TRAFFIC, msa (1–10) for CBR 2% to CBR 10%.

Q 11	Write notes on following:
	  i. Various excavating machinery used in highway construction and their limitations
	  ii. Requirements and specifications of the granular base course of the flexible pavement.
		10X2= 20	CO4

	OR		
Q 12	i. With the help of detailed sectional diagrams for Rigid and Flexible pavement, briefly explain the composition and importance of various layers? **ii.** Discuss at least five examples of Intelligent Transport systems and their benefits to solve present day traffic problems.	10X2 = 20	CO1 CO2

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|	SECTION A (5 X 4 = 20 Marks)		
S. No.		**Marks**	**CO**
Q 1	Explain the three recommendations by Jayakar Committee and which organizations were formed as part of its implementation.	04	CO1
Q 2	Define Camber and discuss its advantages. In a rural area, where rainfall is heavy, a WBM road, 3.5m wide is to be constructed. Select the appropriate camber recommended by IRC for each and calculate the height of the crown with respect to its edges using parabolic equation.	04	CO2
Q 3	What are key objectives of Traffic Volume Count for a highway planning perspective?	04	CO2
Q 4	List and define various types of stresses developed in a cement concrete pavement.	04	CO3
Q 5	Neatly draw typical sections of flexible pavement and Rigid pavement and name various layers.	04	CO4
	SECTION B (10 X 4 = 40 Marks)		
Q 6	Briefly outline the major features and advantages of various road patterns in use.	10	CO1
Q 7	What is the importance of conducting Origin-Destination Studies? What are the various methods of conducting OD studies and how the collected data is presented?	10	CO2
Q 8	Explain the advantages and disadvantages of rigid pavements? Which type of pavement shall be favourable in a high rainfall area and why?	10	CO3
Q 9	As a part of analysis of super elevation on a curve, derive a relationship between rate of super elevation, vehicle speed and radius of the curve with the help of suitable diagrams. **OR** The speeds of overtaking and overtaken vehicles are 75 and 45kmph respectively on a two way road. The average acceleration during overtaking may be assumed as 0.98m/sec^2. i. Calculate safe overtaking sight distance. ii. What is the minimum length of overtaking zone?	10	CO2
	SECTION-C (2 X 20 = 40 Marks)		
Q 10	Design a new flexible pavement for a four lane undivided carriageway using the following data: Design CBR value = 5%, Initial Traffic on completion of Construction = 4500	20	CO3

CVPD, Average growth rate = 7% per year, Design Life = 15 years, VDF value =3.5. The relevant charts have been provided below.
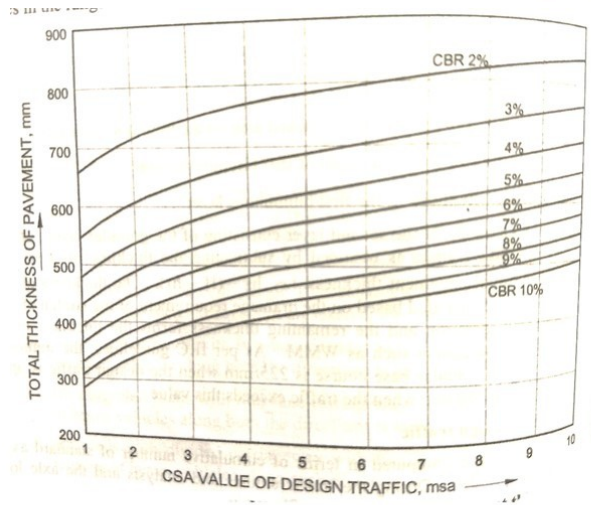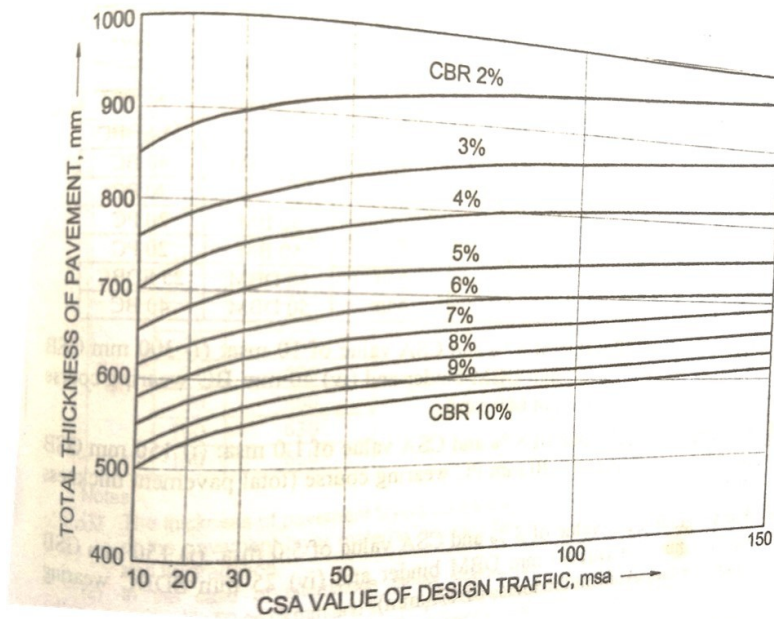
Q 11	Write notes on following:		CO4
	i. Soil Cement Stabilization and factors affecting properties of soil-Cement		
	ii. Causes of distress in flexible **p**avements and rigid pavements		
	OR	**20**	
Q 12	Define CBR and discuss its importance and applications in the design of flexible pavement. How CBR is determined in the laboratory and how it is calculated? Discuss in detail using diagram of CBR test set up and relevant graphs. What are reasons for initial concavity of the load penetration curve.		CO1