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MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH. (CIVIL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2018 SUBJECT: HIGHWAY ENGINEERING [CIE 3104] REVISED CREDIT SYSTEM (28 /11 /2018)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions. Draw the neat sketch wherever necessary.
- ✤ Missing data may be suitably assumed.
- Code books are not allowed only the design charts and tables are permitted.

Sl.No	Questions					
1A.	What is realignment of highway? Explain the necessity of realignment of					
	highway in India.					
1 B .	With a neat sketch describe different types of camber. Mention the advantages	4	2			
	and disadvantages.					
1C.	Two state highways each with two way traffic intersect each other at right angles	4 2				
	and the line of sight available is 186m. If one of the highway is designed for a					
	speed of 75kmph, find the maximum speed that can be permitted on the other					
	highway if the line of sight available is 180m. assume longitudinal friction as					
	0.35 and lateral friction as 0.15					
2A.	What are different types of friction on road surface? Discuss its usefulness.	2	2			
2B.	Derive an expression for extra widening on curves.	4	2			
2C	Explain the functional requirements of pavements	4	4			
3A.	With a neat sketch explain the flexible pavement system	5	4			
3B.	Enumerate the design procedure of flexible pavement as per IRC:37-2012 method	5	4			
4A.	From the analysis of axle load distribution studies it is found that the 98 th	6	4			
	percentile load on single axles is 12t and that on tandem axles is 20t. The number					
	of over loaded vehicles estimated during the design life of 30 years are:					
	a) On single axle: 32×10^4 repetitions of 14t and 8×10^4 repetitions of 16t load					
	b) On tandem ayle: 18×10^4 repetitions of $24t$ load and 3×10^4 repetitions of $28t$					
	The contact pressure is 7 5 kg/cm ² The spacing between the longitudinal joint and					
	contraction joints are 3.5m and 4.2m respectively. The max Temperature					
	differential on concrete payements of thickness 20, 25 and 30cm in the location is					
	found to be 16.6, 17.4 and 18.0°C respectively. The supporting layer consists of					
	GSB and DLC layers with estimated modulus K value of 30kg/cm^2 The flexural					
	strength of concrete is 45kg/cm^2 Design the thickness of CC navement as per					
	IRC: 58 guidelines					
4B.	Discuss the objectives of surface and subsurface drainage system	4	4			
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5A.	Explain with the sketch the methods of controlling of seepage flow	4	4
5B.	Calculate the annual cost of a sketch of highway from the following particulars.	6	5
	Take the average cost of maintenance of road as Rs.%Lakhs/year		

ITEM	TOTAL COST IN	ESTIMATED	RATE OF
	RS.LAKHS	LIFE,IN YEARS	INTEREST %
Land	45.0	100	6
Earth work	40.0	40	8
Bridges, Culvert	60.0	60	8
and drainage			
Pavement	100.0	20	10
Traffic signs etc.	20.0	5	10