

MANIPAL INSTITUTE OF TECHNOLOGY

V SEMESTER B.TECH. (CIVIL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: PAVEMENT MATERIALS AND DESIGN [CIE 4011]

REVISED CREDIT SYSTEM (01/12/2016)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:	
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- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A.	Describe the various components of the road structure.					4	CO1
1B.	List out the difference between Flexible and Rigid Pavements.					3	CO2
1C.	Explain the HRB classification of soil						CO2
2A.	Explain the concept of	of Pavement Serv	viceability			3	CO4
2B.	What are the different types of soil available in India and mention the features of alluvial soil					3	CO2
2C.	It is proposed to widen an existing 2-lane National Highway section to 4-lane single carriageway road. Design the pavement for new carriageway with the following data: i. Initial traffic in the year of construction = 5800 CVPD ii. Design life = 15 years iii. Design CBR of subgrade soil = 10 % iv. Traffic growth rate = 7.5% v. Vehicle growth factor = 4.5 vi. Lane Distribution Factor = 0.4					4	CO3
3A.	What are modified bitumen and list out its advantages and applications					5	CO2
3B.	Why bitumen emulsion is used for road construction?					4	CO2
3C.	The specific gravities and weight proportions for aggregate and bitumen are as under for the preparation of Marshall mix design. The volume and weight of one Marshall specimen was found to be 475 cc and 1100 g. Assuming the absorption of bitumen in aggregate is zero, find Vc, Vb, VMA and VFB.ItemA_1A_2A_3A_4BWeight (g)8251200325150100Sp. Gr2.6320512.462.431.05					3	CO3

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4 A.	What is the purpose of providing joints in concrete roads and explain the	3	CO1			
	functions and specifications of expansion Joints					
	Design dowel bar with the following data					
	Design wheel load = 8000 kg					
	% of load transfer = 40					
	Slab thickness = 33 cm					
4B.	Joint width $= 2 \text{ cm}$					
	Radius of relative stiffness $= 103.53$ cm					
	Characteristic compressive strength of concrete cube (15 cm) after 28 days					
	$curing = 400 \text{ kg/cm}^2$					
	Diameter of dowel bar = 3.3 cm					
	Assumed spacing between the dowel bars $= 32$ cm					
	Assume length of dowel bars = 50 cm, k= 41500					
40	Explain the different factors affecting mechanical stabilization					
<u>тс.</u>	Explain the different factors affecting meenanear stabilization					
5A.	What is soil - bituminous stabilization and explain the factors affecting	4	CO2			
	properties of soil bitumen					
5B.	Explain briefly the following types of flexible pavement failures by mentioning					
	causes and remedial or maintenance measures.					
	i. Alligator cracking					
	ii. Corrugation and showing					