

Roll No: -----

**UNIVERSITY OF PETROLEUM  
AND ENERGY STUDIES**



**End Semester Examination, April, 2017**

**Program/course: B Tech Civil Engineering**  
**Subject: Advanced Transportation Engineering**  
**Code : IFEG - 485**  
**No. of page/s: 01**

**Semester – VIII**  
**Max. Marks : 100**  
**Duration : 3 Hrs**

**No code books are allowed in the exam hall**

**Section A: Attempt all questions**

1. Differentiate between main tunnel and pilot tunnel [5]
2. Mention the uses of polymer modified bitumen. [5]
3. Differentiate Spalling and traverse crack. [5]
4. Write a note on traffic bound macadam [5]

**Section B: Attempt all questions**

5. Explain the salient features of any one railway tunnel in India and an under-water tunnel outside the country [10]
6. Explain clearly the circumstances under which you would prefer a WBM road, BM road and CC road and why? [10]
7. Write a note on cement concrete lining for a tunnel. [10]
8. Explain pavement evaluation by deflection [10]

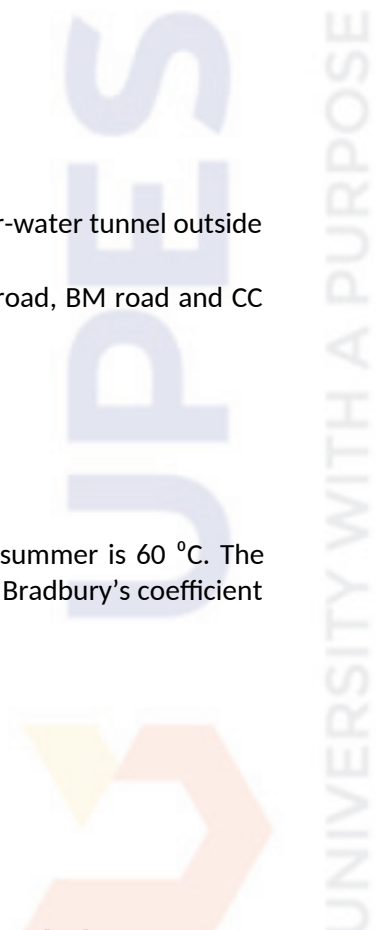
**Section C: Attempt all questions**

9. Explain the methods of strengthening damaged pavements [10]
10. The laying temperature is 20° C and the maximum slab temperature in summer is 60 °C. The coefficient of thermal expansion of concrete is  $10 \times 10^{-6}$  mm/mm / °C and Bradbury's coefficient is 0.5, Calculate the edge warping stresses [10]

$$S_{te} = \frac{E \alpha t C}{2}$$

Hint:

11. Write short notes on:
  - (a) Tunnels for carrying water [4]
  - (b) D section [3]
  - (c) Horse-shoe section [3]
12. Enumerate the components and aspects of a tunnel which need maintenance [10]



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**Section A: Attempt all questions**

1. Write a note on the investigations required for a tunneling job [5]
2. What are the critical load positions? [5]
3. What are alligator cracks? [5]
4. A pavement designer has arrived at a design traffic of 100 msa for a newly developed NH as per IRC 37, design life = 15 years, Commercial vehicle count before construction is 4500 veh/day, annual traffic growth rate is 8 percent. Calculate VDF [5]

**Section B: Attempt all questions**

5. Define mucking. Mention the different methods of mucking process and explain any one method [10]
6. Explain the different types of mountings used for drilling equipment [10]
7. Why are joints provided in CC road? Explain about expansion and contraction joints. [10]
8. Write short notes on (in case of hill roads)
  - (a) Retaining wall[4]
  - (b) Breast wall[3]
  - (c) Parapet[3]

**Section C: Attempt all questions**

9. Write short notes on
  - (a) Natural ventilation [3]
  - (b) Ducts for exhaust [3]
  - (c) Noise control pollution in tunnels [4]
10. What are the different types of maintenance explain their need uses in different types of pavements [10]
11. Discuss the causes for the disintegration of flexible pavements [10]

12. Design a flexible pavement for the following data [10]

Using IRC: 37 - 1984 "Guidelines for the Design of Flexible Pavements" and the following data, choose the total thickness of the pavement.

No. of commercial vehicles when construction is completed = 2723 veh/day

Annual growth rate of the traffic = 5.0%

Design life of the pavement = 10 years

Vehicle damage factor = 2.4

CBR value of the subgrade soil = 5%

Data for 5% CBR value

No. of Standard Axles, msa	Total Thickness, mm
20	620
25	640
30	670
40	700



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