

No. of Printed Pages : 03

Roll No.

CC-724

Ph. D. (Course Work)

EXAMINATION, Dec. 2018

CE

CEH-653

HIGHWAY DRAINAGE SYSTEMS

Time : 3 Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. Describe in detail the special problems of highway drainage and maintenance in high rain fall areas. **15**

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P.T.O.

2. (a) Discuss the maintenance issues in rigid pavements. **8**
- (b) Discuss the importance of highway drainage system. What are the requirements of a good drainage system ? **7**

Unit II

3. Discuss the problems caused in subgrade due to poor drainage. What are the remedial methods of drainage related problems in embankments and subgrades ? **15**
4. Describe the importance of GSB layer in highway structure. What are the design guidelines and materials requirements of GSB ? **15**

Unit III

5. Discuss the failures in highway pavements due to hydraulic pressure. What are the remedial measures for such failures ? **15**

6. (a) List failures in highway pavements due to poor drainage systems. Briefly describe when they occur. **8**
- (b) Discuss the methods of drainage of porous surface courses and methods of prevention of ingress of water. **7**

Unit IV

7. (a) Describe the various components of drainage system of urban roads. **8**
- (b) What are the minimum gradients recommended by IRC for road side drainings ? Also describe IRC recommendations for camber. **7**
8. Describe in detail with neat sketch the design and construction of sub-surface drainage systems for highways and airports. **15**