

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 5 – EXAMINATION – SUMMER 2026

Subject Code: 3150613

Date: 30/05/2026

Subject Name: Pavement Design and Highway construction

Time: 02:30 PM TO 05:00 PM

Total Marks: 70

Instructions:

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

- Q.1**
- (a) Enumerate the chemical constituents of bituminous binders used in pavements. **03**
 - (b) Discuss the essential properties of subgrade soil for highway pavement. **04**
 - (c) Explain the purpose and method of the Los Angeles abrasion test on aggregates. **07**
- Q.2**
- (a) Explain the main functions of the surface, base, and subbase layers in a pavement structure. **03**
 - (b) Describe the major factors that influence the selection of pavement materials for different layers. **04**
 - (c) Explain the concept of volume stability in subgrade soils and its effect on pavement integrity. **07**
- OR**
- Q.2**
- (c) Describe Boussinesq's theory for stress distribution in pavements. **07**
- Q.3**
- (a) Differentiate between flexible pavement and rigid pavement. **03**
 - (b) Explain the difference between subgrade rutting criteria and fatigue cracking criteria in flexible pavement design. **04**
 - (c) Describe the design method as per IRC 58 for plain jointed rigid pavements. **07**
- OR**
- Q.3**
- (a) How does the modulus of resilience of subgrade influence pavement thickness design? **03**
 - (b) Describe the main features of IITPAVE software used for pavement design. **04**
 - (c) Explain Friberg's analysis for dowel bar design. **07**
- Q.4**
- (a) Discuss the importance of drainage considerations in pavement design. **03**
 - (b) Explain the difference between WBM and WMM base courses in terms of construction method. **04**
 - (c) Discuss the provision and function of each joint type used in rigid pavement construction. **07**
- OR**
- Q.4**
- (a) Compare lime stabilization to cement stabilization in pavement construction **03**
 - (b) Critically evaluate the suitability of locally available materials for sub-base construction as per IRC/MoRTH standards. **04**

(c) Evaluate the impact of using recycled materials in pavement layers on structural performance and sustainability. **07**

Q.5 (a) Compare techniques for checking surface evenness of new pavements **03**

(b) Evaluate the effectiveness of various maintenance strategies in minimizing pavement deterioration. **04**

(c) Judge the suitability of overlay techniques for strengthening damaged pavements in urban and rural contexts. **07**

OR

Q.5 (a) List key safety precautions to be followed during highway pavement construction. **03**

(b) Write a note on emission reduction potential of Warm Mix Asphalt technologies as per IRC:SP:101. **04**

(c) Examine the effectiveness of cold mix technology for rural road construction in terms of energy saving and environmental benefits as per IRC:SP:100. **07**
