

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER M.TECH DEGREE EXAMINATION (Regular), MAY 2023**STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT****(2021 Scheme)****Course Code: 21SC204-A****Course Name: Bridge Engineering****Max. Marks: 60****Duration: 3 Hours**

(Use of IS 456, IS 1343, and SP 16 may be permitted. Use of IRC 5, 6, 18, 21, 78, 83, 112, and design charts may be permitted during the examination.)

PART A***(Answer all questions. Each question carries 3 marks)***

1. List out the various classification of bridges according to the materials used in construction.
2. Write a note on the effective width method for the analysis of slab bridges.
3. State the function of the cross girder in an RCC bridge deck system.
4. Examine the advantages of prestressed concrete bridges.
5. State the conditions of stability of an abutment of a bridge.
6. List out the various forces acting on bearings.
7. Why inspection of bridges are important?
8. Explain the features of cable-stayed bridges.

PART B***(Answer one full question from each module, each question carries 6 marks)*****MODULE I**

9. a) List out the three major characteristics of an ideal site for bridge construction. (3)
b) Explain the various components of a bridge with the help of a neat sketch. (3)

OR

10. Write a detailed note on the classification of bridges. (6)

MODULE II

11. Solve a solid slab bridge for class A loading for the following data:
Clear span = 5m, the clear width of roadways = 7.5 m, the average thickness of wearing coat = 80mm. Width of the kerb on each side is 600 mm. Use M25 concrete and Fe 415 steel. (6)

OR

12. Explain the design principles of a box culvert. (6)

MODULE III

13. Design a Tee beam bridge and evaluate Courbon's reaction factor and the maximum bending moment.
Span of the bridge = 18 m
Number of main girders = 3 with c/c spacing 2.5 m
Loading Type = IRC Class A
Roadway = 2 Lanes
Kerb width = 600 mm on either side. (6)

OR

14. Design the interior deck slab panel of a T-beam and slab bridge for the following data.
Effective span-18m, Carriageway width-7.5m, Kerb- 600 mm on either side. Provide three longitudinal beams and five cross beams. Loading IRC class AA tracked vehicle. Adopt M20 concrete and Fe 415 bars. (6)

MODULE IV

15. Explain the various steps involved in the design of a post-tensioned prestressed deck slab of a bridge. (6)

OR

16. A prestressed concrete slab 400 mm thick with parallel post-tensioned cables is provided for a road bridge of an effective span of 8 m. The live load analysis indicates an equivalent live load of 40 kN.m². The force at transfer in each of the cables is 400 kN. If the compressive stress permissible in concrete at transfer is 16 N/mm², design the slab as a Class-1 type member and determine the spacing of the cables and their eccentricity at mid-span. Assume a loss ratio of 0.8. (6)

MODULE V

17. List out the design loads to be considered in abutments. Explain the step-by-step procedure for design of the abutment. (6)

OR

18. Explain the roles of bearings in bridges. List out the factors to be considered for the selection of bearings. (6)

MODULE VI

19. Write a note on the categories of bridge inspection and the instrumentation used for the process. (6)

OR

20. Write a note on long-span bridge construction techniques. (6)
