APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

THIRD SEMESTER M. TECH. DEGREE EXAMINATION

Civil Engineering

(Structural Engineering and Construction Management)

04CE7401 Design of Steel – Concrete Composite Structures

Max. Marks : 60 Duration: 3 Hours

PARTA

Answer AllQuestions

Each question carries 3marks

1. Define the term 'limit state'. Explain about the limit state design philosophy.
2. Differentiate shored and unshored composite construction.
3. Define slip strain within a composite section.
4. List the applications of steel-concrete-steel sandwich construction.
5. Define shear lag of a composite beam.
6. Discuss briefly about different types of composite columns.
7. Discuss the development of secondary forces due to failure of classical assumptions of truss analysis.
8. Define ductility and discuss the necessity of ductility of members for better seismic performance of a structure.

PARTB

Each question carries 6marks

9. Compare no interaction and full interaction cases of a composite beam

OR

10. Explain standard push test for shear connectors and thus explain the characteristic resistance and slip capacity.

11. Discuss the structural behaviour of steel-concrete-steel sandwich beams.

OR

12. Discuss the failure modes of steel-concrete-steel sandwich elements.
13. With neat figures, discuss the determination of ultimate moment capacity of composite beam section in detail.

OR

14. Design a simple supported composite beam with 11 m span spaced at 3.5 m c/c. Thickness of the slab is 140 mm. The floor has to carry an imposed load of $3.5kN/m^2$, a construction load of 1 kN/m^2 and floor finish load of $1kN/m^2$. Assume that the floor is not propped during construction. Use M30 grade concrete.
15. Obtain the plastic resistance of a steel section made of ISHB350 encased in M30 concrete. The height of the column is 3.4 m and is pinned at both the supports. The dimension of the column is 450 mm × 450 mm. The cover to the flanges is 50 mm. Reinforcement steel is provided as 0.4 % of gross concrete area.

OR

16. Design a concrete encased composite column subjected to biaxial bending. Height of the column is 3.8 m, both ends fixed. Design axial load is 900 kN and the bending moments along both the axes are 70 kNm and 50 kNm. Use M35 concrete.

17. Discuss in detail about the loads acting over a truss, the analysis methodologies and design considerations.

OR

18. Design a composite truss of span 8 m with the following data: Truss spacing is 4 m, slab thickness 140 mm. Adopt M30 Concrete and Fe250 steel.

19. Discuss about composite girder bridges.

OR

20. Discuss about seismic behaviour of different components in a composite structure.
