

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- V EXAMINATION-SUMMER 2023****Subject Code: 2150610****Date: 23/06/2023****Subject Name: Advanced Structural Analysis****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)** Derive an expression for meridional stress and hoop stress for a spherical dome subjected to a heavy point load W at crown, neglect self weight of dome. **07**
- (b)** Derive the formula for M_P required for the fixed beam loaded by a collapse udl of W_C kN/m for its right half span. **07**
- Q.2 (a)** State assumptions made in Plastic Analysis and explain Plastic Bending of Beam section. **07**
- (b)** Derive expressions for meridional thrust and hoop force for a conical dome subjected to point load at crown. **07**
- OR**
- (b)** Derive an expression for meridional thrust and hoop force for a spherical dome subjected to uniformly distributed load. **07**
- Q.3** Analyse a beam shown in figure 1 using flexibility method and plot SF & BM diagrams. **14**
- OR**
- Q.3** Analyse a beam shown in figure 1 using stiffness method and plot SF & BM diagrams. **14**
- Q.4** Analyse a frame shown in figure 2 using flexibility method and plot SF & BM diagrams. **14**
- OR**
- Q.4** Analyse a frame shown in figure 2 using stiffness method and plot SF & BM diagrams. **14**
- Q.5 (a)** Calculate meridional stress and hoop stress for a spherical dome having base diameter 10m, rise 2.2m and thickness 120 mm. It is subjected to floor finish of 0.5 kN/m^2 and live load of 2 kN/m^2 . Show the values at 10° interval and also find the maximum values. **07**
- (b)** Calculate maximum values of meridional thrust, hoop thrust, meridional stress and hoop stress for a conical dome having thickness 100 mm. It is subjected to live load of 1.5 kN/m^2 . Consider base diameter 12m and height 2m at center. **07**
- OR**
- Q.5 (a)** Calculate shape factor for a symmetrical T section having flange as 300mm x 10 mm and web as 10mm x 300mm. **07**
- (b)** Calculate M_P required for a continuous beam loaded as shown in figure 3. **07**

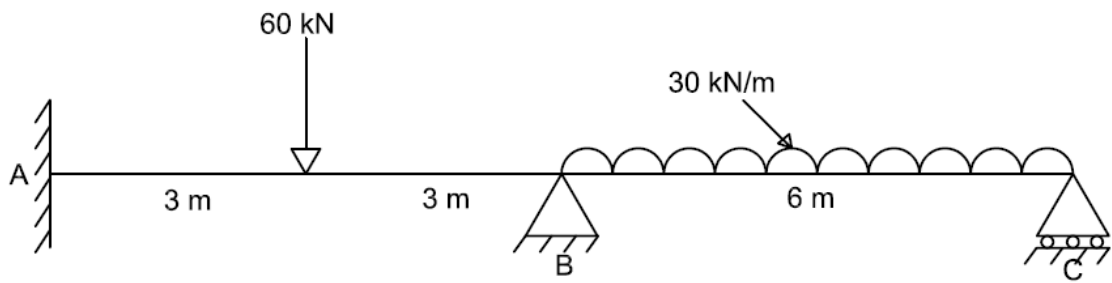


Figure – I

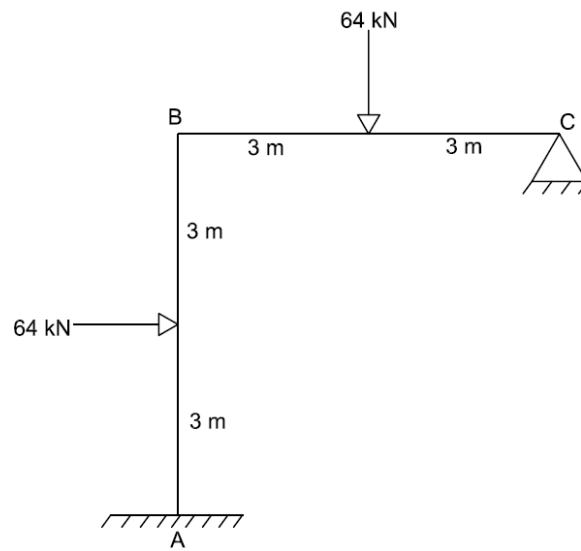


Figure – II

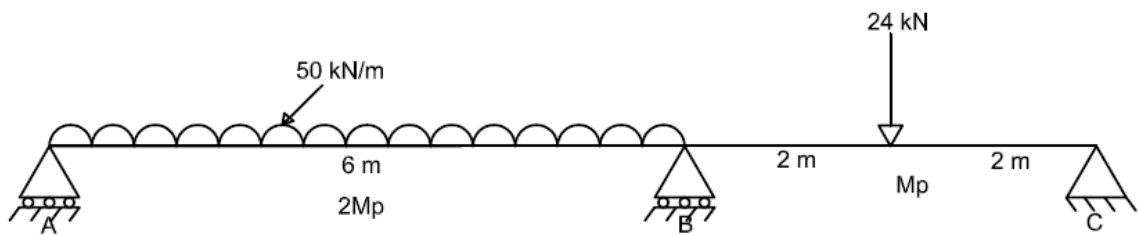


Figure – III