

Government College of Engineering, Aurangabad
(An Autonomous Institute of Government of Maharashtra)

M.E.(Struct.) PTD REV Examination
End Semester Examination Nov.-Dec. 2016

AM-561

AM-561 ELECTIVE-II: ADVANCED DESIGN OF STEEL STRUCTURES

Time: Three Hours

Max. Marks: 60

"Verify the Course Code and check whether you have got the correct question paper"

N.B.:-

1. Answer any Two Questions from Q. No. 1 To Q. No.3 and any ONE question from Q. No.4 and Q. No.5
2. Figures to the right indicate full marks
3. Assume suitable data if necessary and state it clearly
4. Use of non-programmable calculator is allowed
5. Use of IS 800; IS 875: Railway Loading Standards, Steel table is allowed

Q. 1 An industrial shed of 80 m in length, 21 m in width and 9.5 m in height from ground up to eaves is to be constructed near sea shore at Chennai industrial area. The area is surrounded by scattered buildings below 10 m height on a ground having ground slope of 3.1° at the base of hill. Shed is to be used for storing harmful gases. The area of openings 17% of the area of walls. GI sheet roofing is proposed.

- a) Plan a suitable knee braced truss arrangement to support roofing (04)
- b) Calculate Dead Loads, Live Loads, and wind loads per panel point on the knee braced truss. (12)
- c) Find the loads on knee braced column and state methods of analyzing knee brace with columns with both end hinged and both ends fixed (03)
- d) Design a knee brace subjected to a working tensile load of 185 kN and a working compressive force of 130 kN. Use double angle section connected back to back on either side of gusset of 8 mm thickness. Use bolted connection with 16 mm diameter bolts of 4.6 grade. Take $f_y = 250$ MPa, $f_u = 410$ MPa for member. Take length of knee brace as 2.4 m. (06)

Q. 2 A G+2 storied factory building for chemical factory consisting of a halls having clear dimension 11.5 m x 45 m on every floor is to be constructed at MIDC, Jalna. It is proposed to provide RCC slab of 135 mm thickness with a floor finish of 0.50 kN/m². Live load on floor is 4 kN/m². Consider moving machinery load of 95 kN which can occupy any position on floor. Floor to floor height is 3.3 m. Take thickness of wall as 230 mm. SBC of soil as 300 kN/m². M₂₀ grade concrete is used for PCC concrete block.

- a) Propose a suitable framework of steel beams, columns and column base to support the slab and to transfer loads safely from floors to the ground. (03)
- b) Design Critical main beam and secondary beam and their connections to each other. (10)
- c) Design any one critical steel column. (06)
- d) Design the column base. (06)

Q. 3 Design a plate girder railway bridge of span 28.5 m centre of bearings of broad gauge single track main line. Show design of stiffeners, lateral bracings and design of end cross frames. Use standard charts for loading. (25)

Q. 4 Design the gable portal frame for the dimensions of industrial shed as below:

- a) Span = 17 m
- b) Rise = 3.60 m
- c) Height upto eaves level = 7 m
- d) Centre to centre spacing of frames = 4.5 m
- e) Roofing material = GI sheeting
- f) No. of panels = 4 on each slope. (10)

(PTO)

Q. 5 a) What is Pre-Engineered Building? What are its advantages over conventional steel building? (05)

Q. 5 b) With neat sketches state forms of light gauge sections. Also explain stiffened, unstiffened and multistiffened elements. (05)
