



KERALA AGRICULTURAL UNIVERSITY
B. Tech. (Agrl. Engg.) 2021 Admission
IV Semester Final Examination – July 2023

Iden.2205

Design of Structures (1+1)

Marks: 50
Time: 2 hours

I

Fill in the blanks

(10x1=10)

1. The maximum area of tension reinforcement in beams shall not exceed
2. On designing retaining walls it is necessary to take care of exerted by soil mass.
3. Members used to carry wall loads over wall openings are called

Match the following

4. (a) Joist (i) tension member in roof truss
(b) Girder (ii) member supporting purlin
(c) Tie (iii) member supporting roof building
(d) Rafter (iv) major floor beam in building

Choose the correct answer

5. Which of the following is not a load on columns in buildings?
(a) load from floors
(b) load from foundation
(c) load from roofs
(d) load from walls
6. A foundation rest on
(a) base of the foundation
(b) subgrade
(c) foundation soil
(d) base of the foundation, subgrade and foundation soil
7. In a singly reinforced beam, the effective depth is measured from its compression edge to
(a) Tensile edge
(b) Tensile reinforcement
(c) Natural axis of the beam
(d) Longitudinal central axis
8. Select the incorrect Statement
(a) There are multiple load paths in one-way slabs.
(b) The design of wall supported two-way slab is similar to a one-way slab.
(c) Primarily, the one-way slab deforms in one direction.
(d) Two -way slab deforms in two mutually perpendicular directions.
9. What are loads on columns in industrial buildings?
(a) wind load only
(b) crane load only
(c) wind and crane load
(d) load from foundation

Answer the following

10. What are retaining walls?

II

Write short notes on ANY FIVE of the following

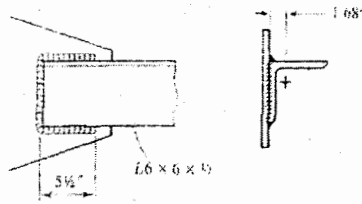
(5x2=10)

1. What is Lug angle?
2. Define Tie member.

3. Mention the advantages and disadvantages of welded connections.
4. What is web crippling?
5. What is meant by slab base?
6. What is the main function of providing horizontal stiffener in plate girder?
7. What are the forces acting on retaining wall?

III Answer ANY FIVE of the following (5x4=20)

1. A circular plate, 200 mm in diameter is welded to another plate by means of 6 mm fillet weld. Calculate the ultimate twisting moment capacity that can be resisted by the weld use steel grade Fe 410 and shop welding
2. Using Rankine's formula find the crippling load for a mild steel strut of 500 mm long with a rectangular cross-section 50 mm x 12.5 mm having
 - (a) hinged ends, and
 - (b) both ends fixed.
 Take $\sigma_c = 330$ MPa and for hinged ends $= 1/7500$.
3. Design a one-way slab with a clear span of 5m, simply supported on 230mm thick masonry walls and subjected to a live load of 4 kN/m^2 and a surface finish of 1 kN/mm^2 . Assume Fe 415 steel. Assume that the slab is subjected to moderate exposure conditions.
4. Find the moment of resistance of a singly reinforced concrete beam of 200 mm width 400mm effective depth, reinforced with 3-16 mm diameter bars of Fe 415 steel. Take M20 grade of concrete.
5. Consider the welded single angle L 6 x 6 x 1/2 tension member made from A36 steel shown below. Calculate the tension design strength.



6. Derive the moment of resistance equation for singly reinforced rectangular section.
7. Write brief notes on:
 - (a) Partial safety factor for loads,
 - (b) Partial safety factor for materials,
 - (c) Characteristic loads
 - (d) Characteristic strength

IV Write an essay on ANY ONE of the following (1x10=10)

1. Design an isolated footing of uniform thickness of a RC column bearing a vertical load of 600 KN and having a base of size 500x500 mm. the safe bearing capacity of soil may be taken as 120 KN/m^2 . Use M20 concrete and Fe 415 steel.
2. A doubly RC beam 230 mm wide and an effective depth of 450 mm and the beam is reinforced with 2#16 mm diameter in compression zone and 4# 20 mm diameter in tension zone with a clear cover of 25 mm for both the steel. Calculate the depth of lever arm for the force of compression for both of compression steel and concrete, also find the moment of resistance (flexural capacity) of the beam section. Assuming M 20 concrete and Fe 415 grade of steel.
