Code No: R1622351 **R16** SET - 1

II B. Tech II Semester Regular Examinations, April- 2018
THEORY OF STRUCTURES
(Agricultural Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Define and draw the Stress-Strain relation for concrete (3M)
   b) List out the shear failures of beams without shear reinforcement (2M)
   c) How to decide the curtailment of bars (2M)
   d) Discuss about Rankine, Grashoff theory (3M)
   e) What is effective span (2M)
   f) List out the conditions for stability of retaining walls? (2M)

PART -B

2. a) Derive an expression for critical neutral axis (5M)
   b) A singly reinforced RCC beam is 200mm wide and 400mm deep, 10mm dia of 4 bars are embedded in the tension zone of the beam at an effective concrete cover of 50mm. if permissible stresses for concrete & steel are 5N/mm^2 & 140N/mm^2. Find the moment of resistance and determine the type of beam. Take m=16 (9M)

3. a) Derive an equation for shear stress induced in RC beam (5M)
   b) A beam 250x500mm is reinforced with 2-16mm dia at top & 4-22mm dia at the bottom each at an effective cover of 38mm. If safe stresses in material are 5N/mm^2 & 140N/mm^2. Find the stress in concrete surrounding compression steel. m=19 (9M)

4. a) Discuss the anchorage bars in compression along with neat sketches (6M)
   b) A reinforced concrete beam of size 200 x 400 mm carries a maximum shear force of 150KN. The beam is reinforced with 4-20 mm dia for flexural resistance. Calculate the shear reinforcement required for M20 concrete and Fe250 steel. Take τ_c = 0.56 N/mm^2 and τ_{max} = 2.8 N/mm^2 (8M)

5. Design a floor slab simply supported over a clear span of 3m. the slab is to be finished with 25mm thick cement concrete flooring. The super imposed load on the slab is to be 3500N/m^2. The bearing of the slab on the supporting walls may be taken as 230mm. Adopt M15 grade of concrete and mild steel. Assume σcbc is 5 N/mm^2, σst is 140 N/mm^2, m=19, neutral axis factor K =0.404 and lever arm factor j=0.5865. And also assume the diameter of main and distribution bars as 10 and 6 mm respectively. Take τ_c = 0.33 N/mm^2, K=1.3, Modification factor is 1.6. (14M)
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6. a) Explain about basic rules for the design of columns (4M)
   b) A 400mm x 400mm column 12000mm long is restrained at both ends and is required to carry an axial load of 900 Kn. Design the column using M20 grade of concrete and mild steel reinforcement. (10M)

7. Design a RCC footing for a 300mm thick brick wall carrying a load of 120 KN per meter length of wall. The Safe bearing capacity of soil is 90 KN/m^2.Use M15 grade of concrete and mild steel. σcbc is 5 N/mm^2, σst is 140 N/mm^2, m=19, neutral axis factor K =0.404 and lever arm factor j=0.865 and R =0.874 (14M)