**B.Tech Odd Semester (CBCS) Exam.,
December—2017**

AGRICULTURAL ENGINEERING

(7th Semester)

Course No. : AE–702 (C)

(Building Materials and Structural Design)

Full Marks : 75
Pass Marks : 30

Time : 3 hours

Note : 1. Attempt **one** question from each Unit.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the margin indicate full marks for the questions.

UNIT—1

1. *(a)* Write a note on the composition of Portland cement. 5

   (b) Classify the various types of sand based on the sources from which they are obtained. 5

   (c) State the quick test to check the presence of clay and organic matter in sand. 5

2. *(a)* What is meant by 'bulking of sand'? What are the properties of good sand? 2+3=5

   (b) What are the different varieties of lime? 3

   (c) Write a note on hydration of cement. 5

   (d) Write a note on quicklime. 2

UNIT—2

3. *(a)* Enumerate the different types of seasoning. 6

   (b) What are the different practices involved for the preservation of timbers? 4

   (c) List out and explain the different properties of aluminium. 5

4. *(a)* Write down the thermal properties of PVC. 4

   (b) What are the advantages and disadvantages of using glass? 3

   (c) How is ply made and what are the types of plywood? 5

   (d) Write down the chemical composition of fly ash. 3

UNIT—3

5. *(a)* What do you mean by radius of gyration? Find out the moment of inertia of a triangular area with respect to axis. 2+3=5

(b) Elaborately explain about different types of indeterminate structures. 6

(c) One tonne of grain stored in a bin is cooled by aeration with ambient air at 20 °C (density $1\cdot15$ kg/m^3) at a flow rate of $0\cdot11$ m^{3}min^{-1}tonne^{-1} and the heat capacities of the grain and the air are $1\cdot67$ kJ kg^{-1}K^{-1} and $1\cdot00$ kJ kg^{-1}K^{-1}, respectively. Then, how much time will be required for cooling the grain in the bin? 4

6. *(a)* What is moment of inertia? How would you find out the moment of inertia of a plane area? 5

(b) A reinforced concrete circular column of 400 mm diameter has 4 steel bars of 20 mm diameter embedded in it. Find the maximum load which the column can carry, if the stresses in steel and concrete are not to exceed 120 MPa and 5 MPa, respectively. Take modulus of elasticity of steel as 18 times that of concrete. 6

(c) What are the differences between determinate and indeterminate structures? 4

UNIT—4

7. *(a)* Design a bag storage structure for storing 450 tonnes of wheat. Make logical and reasonable assumptions wherever necessary. 8

(b) Write a short note on stanchion barn and draw the schematic diagram of a face-in type dairy barn. 5

(c) State the advantages offered by deep litter poultry housing. 2

8. *(a)* Explain the types of poultry houses with schematic diagrams. 10

(b) A herd of dairy cows is fed 1300 kg of silage daily. The thickness of silage fed each day is 100 mm. If 1 m^3 silage weighs 650 kg, then find out the diameter of the pit. 3

(c) A farmstead demanding a maximum of about 40000 liters of water per hour for two hours during noon and only 25000 liters per hour during rest of the period. The tube well is capable of supplying at the rate of only 28000 liters per hour. Then find out the size of the overhead water tank in liters. 2

(**5**)

UNIT—5

9. *(a)* According to the materials used for construction, what are the different types of roads?　　　3

(b) What are the advantages of gravel road over an earthen road?　　2

(c) Elaborately explain about the requirements of a good road.　　10

10. *(a)* Define the following :　　　2×3=6

　　(i) Shielded metal arc welding

　　(ii) Gas metal arc welding

　　(iii) Gas tungsten arc welding

(b) What are the general guidelines for selecting one process of welding over another process?　　5

(c) Explain about the basic approaches used to estimate the welding costs.　　4

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