**B.Tech Odd Semester (CBCS) Exam.,
December—2018**

AGRICULTURAL ENGINEERING

(3rd Semester)

Course No. : AECC05

(Farm Machinery)

Full Marks : 50
Pass Marks : 15

Time : 2 hours

Note : 1. Answer any **five** questions.
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.

1. *(a)* What are the functions of the tillage? Explain the minimum tillage system.

2+4=6

(b) State different factors for selection of machinery for use in a particular crop and field condition.   4

(2)

2. *(a)* A desi plow cuts a trapezoidal furrow section of 5 cm bottom width and 10 cm top width when operating at 5 cm depth. The horizontal draft required for the plow is 200 kg. Find out the unit draft of the plow. If the line of pull makes 15° and 10° with the vertical and horizontal surface ; find out the pull, vertical force and side draft.   6

(b) Calculate the field capacity of a 2 × 40 disc plow being operated at 4 km/hr and having field efficiency of 80%.   4

3. *(a)* Write down the working principles of MB plough.

(b) Explain bucket type sprayer in brief.

(c) What is negative draft?

(d) What is grain to straw ratio, what is its impact on threshing efficiency?

(e) What is a zero seed drill?   2×5=10

4. *(a)* Determine horizontal inertia force at each end of stroke, magnitude and direction of vertical reaction at each end of stroke for reciprocating cutter bar knife in mower if it is operated at crank speed of 1200 rpm. Details of mower are as follows : Length of pitman : 1·15 m, vertical distance between centre line of crank shaft and centre of ball joint on knife head : 40 mm, knife mass : 4·5 kg, pitman mass is 3·8 kg with centre of gravity as 0·55 m from crank end, and crank pin mass : 0·4 kg.   7

(b) What are the different types of furrow openers used in the seed drill? Give their specific use. 3

5. *(a)* A plate seed drill having cup feed mechanism has 28 cells on the plate. If the ground wheel has a diameter of 50 cm and the ground wheel shaft has a 20-teeth gear which meshes with the 40 teeth gear in the intermediate shaft which has another gear of 15 teeth which meshes with 30 teeth gear on the plate shaft. Find out the seed spacing. 6

(b) A boom sprayer is equipped with nozzles at rated delivery of 0·88 lit/min of liquid at a pressure of 275 kPa. Nozzle spacing on the boom is 70 cm. What should be the correct forward speed for an application rate of 150 lit/ha and at an operating pump pressure of 200 kPa? 4

6. *(a)* A small knife chaff cutter fitted with 2 knives cuts hay at 40 rpm giving 500 kg/ha. The throat size is 20 cm × 5 cm. Effective distance of centre of throat from fly wheel is 20 cm. The blade makes clearance angle of 14° between knife support and plane of rotation. Find the *(i)* length of cut of chaff and *(ii)* density of the hay for theoretical length of cut of 2 cm. 6

(b) Discuss the working principle of fertilizer broadcaster. 4

7. *(a)* Calculate the cost of a farm machine with its purchase price of ₹ 50,000. The life of a machine is 10 years with average use of 200 h/year. Two labours are required to operate the machine. The prevailing labour charges and interest rate were ₹ 75.00 and 20% respectively. 6

(b) Explain the calibration of a sprayer step by step. 4

8. *(a)* Write short notes on the following : 2×3=6
   (i) Cylinder concave clearance
   (ii) Manual paddy transplanter
   (iii) Three-point hitch of tractor

(b) Explain different accessories and their functions of a MB plow. 4

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