B.Tech Even Semester (CBCS) Exam., April—2017

AGRICULTURAL ENGINEERING

(6th Semester)

Course No. : AE–602 (C)

(Farm Machinery)

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—I

1. *(a)* Discuss the difference between primary tillage and secondary tillage. 5

(b) Calculate the area covered per day of 8 hours by a tractor drawn four bottom 35 cm plough, if the speed of the ploughing is 5 kmph, the time lost in turning is 10%. 5

(c) Draw the neat diagram of subsoiler. 5

2. *(a)* What are the main objectives of secondary tillage? Enlist the secondary implements. 4

(b) Draw the neat diagram of any secondary tillage implements. 5

(c) A 5-tine cultivator, having tine spacing 8 cm, working depth of 5 cm and speed is 3 km/hr. Turning loss is 10%. Soil resistance is 0·6 kg /cm^2. Width of each furrow is 5 cm. Calculate—

(i) time to cover one hectare;

(ii) maximum draft;

(iii) required power. 6

UNIT—II

3. *(a)* Enlist and explain different components of seed drill. 8

(b) Calculate the size of a tractor to pull a four bottom 35 cm MB plough through a depth of 8 cm. The soil resistance is 0 8 kg /cm^2. The speed of the tractor is 5·5 kmph, transmission and tractive efficiency of the tractor being 80% and 30% respectively. 7

4. *(a)* What are the functions of planter? 3

(b) Find out the distance travelled, in kilometers, while ploughing 2 hectare area with an animal drawn indigenous plough working at a speed of 2·50 km/h. The size of the plough is 12 cm and the depth of operation is 8 cm. 5

(c) A country plough cuts a trapezoidal furrow having 8 cm top width and 3 cm bottom width. The depth of the furrow is 8 cm. Assume the average soil resistance to be 0·60 kg / cm^2. Calculate the pull exerted by bullocks if the plough chain forms an angle of 30° with the horizontal. 7

UNIT—III

5. *(a)* What is sprayer? Enlist the sprayers. Explain any sprayer with neat sketch. 8

(b) Maximum productivity of maize is to be obtained with the population of 50,000 plants per hectare at row spacing 60 cm. If, the seed emergence is 90%, determine the seed spacing if the number of seeds dropped per hill is 2. 7

6. *(a)* What is the procedure for calibration of a seed drill? 8

(b) The following results were obtained while calibrating a seed drill : 7

No. of furrow openers—8, Spacing between furrows—15 cm

Diameter of drive wheel—1·5 m

RPM of the drive wheel—600

Seed collected— 25 kg.

Calculate the seed rate per hectare.

UNIT—IV

7. A tractor costing ₹ 7,00,000 is expected to have useful life of 10 years and trade-in value of 10 per cent of the initial cost. Calculate the depreciated value after 6 years by different methods. 15

8. Determine the cost of operation per hour of a 35 horsepower tractor pulling 8 × 30 cm seed drill at a speed of 4 km/h. The cost of drill is about 12,000 whereas the cost of tractor is ₹ 3·50 lakh. 15

UNIT—V

9. *(a)* Write a short note on combine harvester. 5

(b) Explain the different methods of sowing. 4

(c) Calculate the cost of seeding one hectare of land with bullock drawn seed drill of 5 × 30 cm size. The speed of bullocks is 3 kmph. Hire charges of bullocks is ₹ 100 per pair, hire charges of seed drill is ₹ 200 per day and wage of operator is ₹ 200 per day of 8 hours. 6

10. *(a)* Write a short note on reaper. 5

(b) A fluted feed seed drill has eight furrow openers of single disc type. The furrow openers are spaced 30 cm apart and the main drive wheel has a diameter of 110 cm. How many turns of main drive wheel would occur when the seed drill has covered one hectare of area?

Total draft of four-bottom 40 cm MB plough when ploughing 17·5 cm deep at 5·5 kmph speed is 1700 kg. Field efficiency is 75%. 5

(c) Calculate the following :

(i) Unit draft

(ii) Actual power requirement

(iii) Area covered/hr 5

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