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B.Tech Even Semester (CBCS) Exam., May—2018

AGRICULTURAL ENGINEERING

(8th Semester)

Course No. : AE 803 (C)

(Testing and Evaluation of Tractors and Machines)

Full Marks : 75

Pass Marks : 30

Time : 3 hours

Note :
1. Answer **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)* How do you classify tractor-drawn implements? Explain the salient features of each type of tractor-operated implements. 9

(b) What are the functions of mould board plow? With a neat sketch, show the salient design features of a mould board plow. 6

2. *(a)* Distinguish between active and passive tillage implements. Explain the procedure for the determination of pulverization of soil by the farm implements. 9

(b) How do you determine the following, during testing of farm implements? 6

(i) Slip of drive wheels of tractor

(ii) Theoretical field capacity

(iii) Actual field capacity

UNIT—II

3. *(a)* What are the uses of power tiller? How is engine power of the power tiller gets transmitted to drive wheels and rotary tiller? Explain with neat diagram. 6

(b) What is puddling? Why is it done in rice cultivation? Explain the method of evaluation of quality of puddling. 9

4. What is field efficiency? A power tiller with 60 cm width of operation is tested for its performance in a field of size 30 m×18 m. The forward speed of the power tiller was found to be 2 km/h. There was an overlap of 5 cm in each run. The average time loss during turning was found to be 30 s/turn. The time lost in the field adjustment and preparation of tractor for the field operation was 5 minutes for this field. The driver is habituated to take rest for 8 minutes for every one hour of operation. Determine the field efficiency if the power tiller is operated *(i)* along the length of the field and *(ii)* along the width of the field. 15

UNIT—III

5. *(a)* Explain the working of 3-point hitch system of tractor along with a neat sketch. 6

(b) Distinguish between position control and draft control modes to implement control of tractor. What are the operations performed under each of these control modes? 9

6. *(a)* What is draft? How do you determine the draft of bullock-drawn and tractor drawn implements under actual field conditions? Explain. 6

(b) What are virtual hitch point and virtual line of pull? Show that real hitch point and real line of pull do not coincide with virtual hitch point and virtual line of pull. 9

UNIT—IV

7. *(a)* Distinguish between a seed drill and a planter. Explain the working of a pneumatic planter. 9

(b) A horizontal plate planter has 54 cells on 160 mm diameter circle. The effective radius of the ground drive wheel is 0·45 m. A 20-tooth sprocket on the drive wheel drives a 10-tooth sprocket on the feed shaft. A 15-tooth bevel gear on the feed shaft drives a 24-tooth gear on the plate shaft. Calculate—

(i) the seed spacing in the row for 100% cell fill;

(ii) the desired forward speed in km/h for 100% cell fill if the plate speed is 15 m/min. 6

8. *(a)* What is the purpose of calibration of a sprayer? Explain the procedure for the calibration of a tractor operated sprayer. 6

(b) A field sprayer is equipped with nozzles having a rated delivery of 0·42 L/min of water at 275 kPa. The nozzle spacing on the boom is 51 cm. Each kilogram of active ingredient (2, 4-D) is mixed with 80 L of water and the desired application rate is 0·95 kg of chemical per hectare. What is the correct forward speed for a nozzle pressure of 200 kPa? 9

UNIT—V

9. (a) Draw a neat sketch of the cutter-bar assembly of a reaper. Explain the functions of each component of the assembly. 9

(b) Write the function of combine harvester. Explain the calculations of various grain losses that occur in the combine harvester. 6

10. (a) Explain design and purpose of various types of threshing cylinders used in a power thresher. 6

(b) What are the various indicators of the performance of a grain thresher? Explain the procedure for their calculations. 9

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