

AGRICULTURAL ENGINEERING

Paper - II

Time Allowed : Three Hours

Maximum Marks : 200

INSTRUCTIONS

Candidates should attempt questions 1 and 5 which are compulsory, and any THREE of the remaining questions, selecting at least ONE question from each Section.

All questions carry equal marks.

Marks allotted to each part of a question are indicated against each.

Answers must be written in ENGLISH only.

Assume suitable data if considered necessary and indicate the same clearly in your answer.

Unless indicated otherwise, symbols, notations and abbreviations have their usual meanings.

Neat sketches to be drawn, wherever necessary.

IMPORTANT NOTE :

All parts/sub-parts of a question must be answered contiguously. That is, where a question is being attempted on the answer-book, all its constituent parts/sub-parts must be attempted before moving on to the next question.

Pages left blank in the answer-book(s), if any, must be clearly struck out. Answers that follow pages left blank may not be given credit.

SECTION A

1. Write short notes not exceeding 125 words each, on the following : 8×5=40
- (a) Prony-brake dynamometer
 - (b) Solar still
 - (c) Ignition coil in spark-ignition type of engines
 - (d) Smokeless 'Chulha'
 - (e) Air cleaners used in tractors
2. (a) Discuss the different ways of utilizing solar energy in processing agricultural produce. 8
- (b) Describe the factors limiting use of power tillers in Indian agriculture and why they are more popular in wet land cultivation. 12
- (c) Describe the constructional details of a lead-acid storage cell and battery. Explain its utility in a tractor. State the precautions to be observed in using and caring for proper maintenance. 12
- (d) Differentiate between a Rocker sprayer and a Knapsack-type sprayer. 8
3. (a) List the crop, machine and field parameters to be considered for harvesting rice using a self-propelled combine harvester. Describe the significance of listed parameters in minimizing grain loss and maximizing machine operating efficiency. 15

- (b) What are the precautions to be followed during selection, installation, operation and repair of an electric motor on the farm ? 15
- (c) Describe the reasons for the popularization of threshers among the farmers. Describe the nature of accidents occurring in thresher operation and how to prevent them. 10
4. (a) Discuss the difference in construction and operation of mould board plow and disc plow. 12
- (b) Describe the safety arrangements for the operator in the following machines : 8
- (i) Hand operated chaff cutter
- (ii) Sugarcane crusher
- (c) Draw a neat figure showing process of anaerobic digestion for production of biogas. Discuss the various parameters affecting the process. 12
- (d) List the parameters considered for estimation of energy requirement of a hammer mill and burr mill and briefly explain their significance. 8

SECTION B

5. Answer the following, keeping your answers brief and to the point :

10×4=40

- (a) Differentiate between the following :
 - (i) Groundnut diggers and Potato diggers
 - (ii) Grain Combines and Reapers
- (b) Differentiate between the following :
 - (i) Seed drills and Planters
 - (ii) Spray drying and Vacuum drying
- (c) Write short notes on the following :
 - (i) Hydro-electric power and Nuclear power
 - (ii) Solar concentrators
 - (iii) Renewable sources of energy
 - (iv) Basic concept of parboiling
- (d) Write in brief on :
 - (i) Social consideration in farm mechanization.
 - (ii) Size of flywheel requirement in multi-cylinder and single-cylinder engines.
 - (iii) Importance of hydraulic system in a tractor.
 - (iv) Velocity ratio and Horse power transmitted by flat belts.

6. (a) (i) Find out the horse power developed by a pair of bullocks in pulling U.P. No. 2 plow at the forward speed of 3 km/h. The plow makes a furrow 20 cm wide and 11 cm deep. The dynamometer indicates an average draft of 85 kgf. 15
- (ii) Also find unit draft.
- (b) (i) What are through-put and axial flow threshing processes ?
- (ii) What do you understand by Registration and Alignments of mower cutter-bar ?
- (iii) Describe briefly Mist Blower-cum-duster.
- (iv) What are the heating and cooling methods in pasteurization of milk ? 10
- (c) Explain what is meant by seasoning of timber. What kinds of wood are commonly used in India for superstructures of permanent buildings ? 10
- (d) Distinguish between a dot matrix and a laser printer. 5

7. (a) Explain the working of a bucket elevator. List its merits, demerits and limitations as compared to traditional methods. 8
- (b) Describe the role of microprocessors and computers in data acquisition and control of processes in a dairy industry. 12
- (c) Describe the working principle, mounting and measuring procedure of a resistance type strain gauge. 12
- (d) Recommend the depth of grain necessary for a structure for 6 hp engine unit consisting of a fan with 80 m^3 per minute capacity, about 10 m^3 area and a drying bin. 8
8. (a) Write short notes on the following : 10
- (i) Pressure measuring instruments
- (ii) Sprayer nozzles for pesticide applications
- (iii) Different types of solar cells
- (iv) Septic tank
- (b) Describe methods for determining moisture content of grains. 8
- (c) Enumerate the power requirement of a screw conveyor. List assumptions made. 8

(d) Differentiate between : 10

- (i) Working of a screw conveyor and bucket elevator
- (ii) Drying and dehydration
- (iii) Deep bin drying and thin layer drying
- (iv) Cleaning and separation

(e) What are the different packaging materials used for packaging of fruits ? 4