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2008

AGRICULTURE ENGINEERING (Optional)

कृषि अभियांत्रिकी (वैकल्पिक)

Time : 3 hours **Maximum Marks : 200**

Note :

(i) *In all attempt <u>Five</u> questions.*

(ii) *Question No. 1 is **compulsory**.*

(iii) *Of the remaining questions, Attempt <u>Any four</u> by selecting <u>One Question</u> from each section.*

(iv) *Numbers of optional questions upto the prescribed number in the order in which questions have been solved, will only be assessed and excess answers of the question/s will not be assessed.*

(v) *Candidate should not write roll number, any names (including his/her own), signature, address or any indication of his/her identity anywhere inside the answer book otherwise he/she will be penalised.*

1. Attempt ***any four*** of the following :

(a) A four cylinder gas engine has a cylinder 25 cms diameter, 50 cms stroke and runs at 154 revolutions per minute. If the engine fires once per two revolution and shows an indicated mean effective pressure of 7.5 kg/cm^2, calculate : **10**

(i) IHP

(ii) BHP

(iii) BMEP

(iv) Stroke bore ratio

Assume the mechanical efficiency of the engine is 84.4%.

(b) Determine the runoff from a catchment area of 100 ha for 15 years return period during which the maximum rainfall was recorded as 10 cm in 6 hr rainfall duration. The catchment area has two parts in which one of 25 ha is under fair pasture and the balance is under good legumes. The soil of catchment is related to group B. The initial abstraction of catchment is rated as $I_a = 0.3$ S. The value of CN for soil group - B for fair pasture cover is 60 and the balance area under good legumes is 69. **10**

(c) (i) Describe two Ground Water Recharge methods. **5**

(ii) Explain about two ground water exploration techniques. **5**

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(d) Explain the following :

(i) HTST pasteurizer. 3

(ii) UHT pasteurizer. 3

(iii) Evaporation in Refrigeration. 4

(e) (i) Explain about USLE and its use. 5

(ii) Explain about curve number method of runoff computation. 5

SECTION - A

2. (a) (i) Write about scope of mechanization in India. 5

(ii) Describe two primary tillage equipments used to prepare seed bed for growing crops. 5

(iii) Explain about mould board plough. 5

(b) (i) Explain about valve operation and Reconditioning in tractor valve mechanism. 5

(ii) Describe the cooling system of Tractor Engine. 5

(c) (i) Write about Wind Energy for electricity production in windmills. 5

(ii) Describe batch type solar drier for vegetable crops like chilly. 5

(iii) Write about two Biofuel crops for energy production. 5

3. (a) (i) Describe two attachments of mould board plough. 5

(ii) Write about sugarcane combine harvester. 5

(iii) Write about cotton mechanical plugger. 5

(b) (i) Write about three point linkage in Tractor. 5

(ii) Describe the lubrication system of crank shaft and crank case. 5

(c) (i) Describe floating type Biogas plant. 5

(ii) Write about solar water heater. 5

(iii) Agricultural residue waste as a fuel - comment. 5

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SECTION - D

8.	(a)	(i)	Write about basic Drying principle.	5
		(ii)	Write about various mechanical drying methods.	10
	(b)	(i)	Describe about various techniques in preservation of fruits.	5
		(ii)	Explain the process parameters for cutting, blanching, slicing, canning and bottling.	10
	(c)	(i)	Write about improved farm house design.	5
		(ii)	Explain about woven mesh type farm fencing.	5
9.	(a)	(i)	Write about principles of milling.	5
		(ii)	Describe about various methods of commercial pulse/Dal milling.	10
	(b)	(i)	Write about various techniques in preservation of vegetables.	5
		(ii)	Describe about various packaging systems.	10
	(c)	(i)	Explain about stanchion barn and the open air barn.	5
		(ii)	Describe about deep litter poultry houses and cage houses.	5

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SECTION - C

6. (a) (i) Describe the procedure for surface water Resources development. 5

(ii) The field capacity of an irrigated soil is 22% and the wilting point is 10%. The root zone depth is 60 cm and the specific gravity is 1.4. Calculate the available moisture holding capacity of soil and the depth of irrigation required at 60% depletion level. 10

(b) (i) Write about the suitability of sprinkler irrigation. 5

(ii) Write about fertigation in drip system. 5

(iii) Explain about use of computer in drip automation. 5

(c) (i) Write about surface drainage system. 5

(ii) Explain about subsurface drainage system. 5

7. (a) (i) Describe the procedure of measurement of Irrigation water in the open channel. 5

(ii) A 12 hectare field is to be irrigated at a maximum rate of 1 cm/hr. with a sprinkler system. The root zone is 90 cm deep. The available moisture holding capacity of the soil is 16.5 cm/m depth. The water application efficiency is 70%. The field is to be irrigated when 45% of the available moisture capacity is depleted. The peak rate of moisture use is 5 mm/day. Determine the net depth of application per irrigation, depth of water to be pumped in centimeters, days to cover the field and the area irrigated per day. 10

(b) (i) Compare the merits and demerits of border strip and check basin method of irrigation. 5

(ii) Write about inflow-outflow method of evaluating furrows. 5

(iii) Write about check basin methods of irrigation. 5

(c) (i) Write about waterlogging and its control. 5

(ii) Write about Reclamation of salt affected soil. 5

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SECTION - B

4. (a) (i) Write about contour trench in afforestation. 5

(ii) Compute the time of concentration T_c for the following data for a terrace channel. 5

L = 435 m

H = 2.45 m

(iii) Explain any two types of Bench terraces. 5

(b) (i) Write about drop inlet spillway. 5

(ii) Describe the Role of check dam in Gully stabilization. 5

(c) (i) Describe classification of watershed management practices. 5

(ii) Write about delineation of watersheds. 5

(iii) Write about role of land capability classification in watershed development programme. 5

5. (a) (i) Explain the Role of contour bund in soil conservation in Arid tracts. 5

(ii) Design a waste weir from the following data : 5

Cumulative catchment area = 35 ha

HFL over the crest = 0.6 m

Intensity of rainfall = 50 mm/hr

Coefficient of Runoff = 0.5

(iii) Write the Role of Graded bund in impervious soil. 5

(b) (i) Explain about chute spillway. 5

(ii) Describe the role of farm pond in water conservation. 5

(c) (i) Explain about morphological characteristics in watershed. 5

(ii) Write about Evaluation procedure for water harvesting structures in watershed development area. 5

(iii) Write about use of Remote sensing in watershed planning. 5

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