MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Tech. (Agril. Engg.)

Semester	: **IV (New)**	**Term**	: **II**	**Academic Year**	: **2016-17**
Course No.	: IDE 242	**Title**	: **Irrigation Engineering**		
Credits	: 3 (2+1)				
Day & Date	: Thursday, 04.05.2017	**Time**	: 14.00 to 17.00	**Total Marks**	: **80**

Note :
1. Solve **ANY EIGHT** questions from **SECTION "A".**
2. All questions from **SECTION "B"** are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION "A"

Q.1 a) Explain the concept of field capacity and permanent wilting point.

b) Describe advantages and limitations of check basin method of irrigation.

Q.2 a) Define land grading, rough grading and land smoothing. What are the advantages of land grading?

b) Wheat crop requires 45 cm of irrigation water during 120 days irrigating period. How much land can be irrigated with a flow of 20 liters per second for 22 hours a day?

Q.3 An area of 20 hectares is to be irrigated by a pump working for 12 hours a day. The available moisture holding capacity of the soil is 16 cm/m and the depth of the root zone is 1m. Irrigation is to be done when 50 per cent of the available moisture in the root zone is depleted. Water application efficiency is 70 per cent. Peak rate of moisture used by the crops is 4 mm (weighted average). Losses in water conveyance are negligible. Determine the irrigation period, net depth of water application, depth of water pumped per application, and the required capacity of irrigation system in hectare-cm/day and liters per second.

Q.4 a) Determine the discharge capacity of an underground concrete pipe line from the following data; diameter of pipe 15 cm, length of pipeline 150 m, difference in elevation between water levels at pump stand and discharge point is 2 m. Assume value of 'f' as 0.009.

b) Enlist in detail various methods of water measurement and explain Parshall flume.

Q.5 Write short notes (Any Two):

1) Irrigation efficiency

2) Blaney-Criddle method of evapotransportation estimation.

3) Border irrigation

Q.6 a) What is adhesion and cohesion? Explain in brief kinds of soil water.

b) Using Franci's formula, compute the discharge of a rectangular weir 45 cm long with a head of 12 cm under (i) with no end contraction, (ii) with one end contraction, (iii) with two end contraction, conditions.

(P.T.O.)

Q.7 Assume an earth channel on a grade of 0.10 per cent, depth of water 40 cm, bottom width 40 cm and side slopes 1.5:1. Calculate the velocity of flow and carrying capacity of the channel. Assume Manning's roughness coefficient as 0.025.

Q.8 a) Explain soil wetness indices.

b) Enlist the factors affecting the rate of infiltration.

Q.9 The following data was obtained in determining the soil moisture content at successive depths in the root zone prior to applying irrigation water:

Depth of sampling (cm)	Weight of moist sample (gm)	Oven dry weight of soil sample (gm)
0-25	134.60	126.82
25-50	136.28	127.95
50-75	122.95	115.32
75-100	110.92	102.64

The bulk density of the soil in the root zone was 1.5 gm/cc. The available moisture holding capacity of the soil was 17.8 cm/m depth. Determine (i) the moisture content at different depths in the root zone, (ii) moisture content in the root zone at the time of irrigation. (iii) net depth of water to be applied to bring the moisture content to field capacity, and (iv) gross irrigation requirement at estimated field irrigation efficiency of 70 per cent.

Q.10 a) Explain soil moisture extraction curves.

b) An irrigation stream of 27 litres per second is diverted to a check basin of size 12m x 10m. The water holding capacity of the soil is 14 per cent. The average soil moisture content in the crop root zone prior to applying water is 6.5 per cent. How long should the irrigation stream be applied to the basin to replenish the root zone moisture to its field capacity assuming no loss through deep percolation. The average depth of crop root zone is 1.2m. The apparent specific gravity of the root zone soil is 1.50.

SECTION "B"

Q.11 Fill in the blanks.

1) The _____ pond is created during measurement of infiltration rate of soil.

2) _____ is the downward movement of water through saturated or nearly saturated soil in response to the force of gravity.

3) Irrigation _____ is a function of crop, soil and climate.

4) Furrow irrigation requires proper land _____.

5) _____ is the range in soil moisture content through which plants undergo progressive degrees of permanent or irreversible wilting, from wilting of the oldest leaves to complete wilting of all leaves.

6) _____ of advance and recession curves ensures uniform distribution of water throughout the border.

7) _____ irrigation requirement is the amount of irrigation water required to bring the soil moisture level in the effective rootzone to the field capacity.

8) _____is the process by which water vapour leaves the living plant body and enters the atmosphere.

(Contd..)

Q.12 State True or False.

1) Capillary water is held between tensions of about 31 atm to 1/3 atm.
2) The vertical distance from the weir crest to the bottom of the weir pond is known as bottom contraction.
3) Piche evaporimeter is a device used for measurement of evaporation.
4) Soil structure cannot be changed with tillage practices.
5) One hectare-cm = 100000 litres.
6) When water is to be taken from lateral channel into a field distribution channel or from channel into a field, turnout is used.
7) Soil texture refers to size distribution of particles making up the soil i.e. sand, silt and clay.
8) The useful limit of most tensiometer is at about 0.85 atm.

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