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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2012

AGRICULTURAL AND IRRIGATION ENGINEERING

Seventh Semester

AI 9402 – Soil and Water Conservation Engineering
(Regulation 2008)

Time : 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Compare and contrast Thiessen polygon method with isohyetal method.
2. A moist sand sample has a volume of 420 m^3 and a wet mass of 780 gm. The dry particle density is 2.64 g/cm^3 and dry mass is 713 gm. Determine the porosity.
3. State how soil compaction varies with the magnitude and nature of the compacting force.
4. How the non-erosive velocity of a structure is determined?
5. Sketch the temporary structure one should provide for the following condition: Depth of gully -2m; Height of the dam 80cm.
6. Depict the effect of land roughness on the velocity profile of wind.
7. State the principle behind water harvesting.
8. How the yield from a catchment is estimated?
9. Give the definition sketch of static water head.
10. Define cavitation and state how one can overcome this.

Part – B (5 x 16 = 80 marks)

11. (i) State the criteria that need to be considered for the construction of a percolation tank. (6)
(ii) Design an earthen embankment type percolation tank with the following available data: Catchment area – 20 ha; Intensity of rainfall – 15 cm/hr; RL of ground surface – 130 m; RL of HFL – 136 m; Runoff coefficient – 0.3; Soil type – sandy loam; Slope of saturation line – 4:1; Fetch – 500 m; U/S and D/S slopes are 3:1 and 2.5:1 respectively. Assume suitable head over the spillway crest. (10)
12. A) The data obtained during a stream gauging using the moving boat method is given below. The rating of the current meter is $V = 0.08 + 0.85 N$. Estimate the discharge through the stream. (16)

Sl. No.	Time from the start (s)	Cumulative number of revolutions	Angle of the resultant velocity to the boat velocity (degrees)	Depth of flow from the sonic sounder (m)
1	0	0	0	3.1
2	30	28	19	3.4
3	60	65	22	4.2
4	90	125	26	5.3
5	110	183	36	6.6
6	130	245	30	6.9
7	150	298	28	6.2
8	180	345	24	4.9
9	210	386	20	3.8
10	240	410	15	2.7

OR

- B) A series of undrained triaxial tests on samples of saturated soil gave the following results:

Lateral pressure (KN/m ²)	100	200	300
Pore water pressure (KN/m ²)	30	80	146
Pressure stress difference at failure (KN/m ²)	310	420	554

Find the values of the parameters C and ϕ with respect to (i) total stress and (ii) effective stress (graph sheet will be provided). (16)

13. A) (i) The following data tabulated below pertains to an isolated storm. Calculate the erosivity factor for the same. (6)

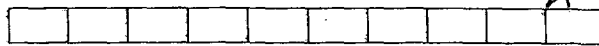
Increment section No.	Time (min)	Depth (cm)
1	5	0.05
2	10	0.40
3	20	0.85
4	30	1.45
5	40	1.60
6	50	1.65
7	70	1.67

(ii) Elaborate on the different types of spillways used as structural measures for managing soil erosion. (10)

OR

- B) Design an inward sloping bench terrace 100 m long. The land slope is 15%. The soil is sandy loam. Assume a uniform grade of 0.4% for the terrace channel. The maximum intensity of rainfall in the region is 8.5 cm/hr. Assume suitable data wherever needed. (Tables are attached at the end of the question paper) (16)

- 14c. What are the various methods of water well construction? Explain it with neat sketch. (8)
- 14.d What is the objective of well development and explain some of the methods of well development. (8)
- 15a. By making conductivity measurements in a well in a coastal aquifer extending 3 km along the shore, the seawater freshwater interface was detected at a depth of 25 m below mean sea level and at 120 m from the shore, inland. The depth of homogeneous aquifer is 30 m below the mean sea level and was found to have a permeability of 40 m/day.
- Compute the rate of fresh water flow into the sea and the width of gap at the shore bottom through which it escapes into the sea?
 - What will be position of the toe of the salt water wedge?
 - If due to groundwater exploitation, the freshwater outflow into the sea is reduced 75 percent of its original value, how far the toe will eventually move?
- (or)
- 15b. Why do groundwater legislation needed. What are various aspects of the bill of legislation? (8)
- 15c. How confined aquifers are recharged? Explain. Write the approximate steady state equations for recharge rates in to a completely penetrating well in a confined and unconfined aquifer. (8)



B.E. / B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2012

AGRICULTURAL AND IRRIGATION ENGINEERING BRANCH

SEVENTH SEMESTER

AI 9403 – FOOD PROCESSING ENGINEERING

(REGULATION 2008)

Time: 3 hours

Answer ALL Questions

Max Marks: 100

Part – A (10 x 2 = 20 Marks)

- 1) What are the different types of blanching?
- 2) How does the transformation of energy take place in the body metabolism?
- 3) Write the BET isotherm equation.
- 4) Following data were obtained from a thermal resistance experiment conducted on a spore suspension at 112°C. Find the D value.

Time (minutes)	0	4	8	12
Number of survivors	10^6	1.1×10^5	1.2×10^4	1.2×10^3

- 5) How do the particle size and its distribution affect the brewing time and turbidity in coffee?
- 6) List out the driving forces and membranes in membrane separation process
- 7) Differentiate a) Saponification value and Iodine value b) MUFA and PUFA
- 8) Define *radurization* with suitable example.
- 9) What are edible films?
- 10) List out any 8 details found in a food packaging material.

Part – B (5 x 16 = 80 Marks)

- 11) a) Two food powders A and B are mixed in the ratio 80% and 20% respectively. After mixing, they are stored in sealed containers. The moisture sorption isotherm for these materials is approximated to straight lines as $M_A = 9 + 3 a_w$ and $M_B = 6 + 5 a_w$ where M_A and M_B are moisture contents on dry basis and a_w is the water activity. The initial moisture content of the powder A is 12 g of water / 100 g of dry matter and powder B is 7 g of water / 100 g of dry matter. Find out the equilibrium water activity. (8)
- b) Write a note on thermal process time and the factors affecting it. (8)
- 12) a) i) Discuss in detail the various constituents of food. (8)
- ii) What are the objectives of food processing? (8)

(or)

b) i) How is sorting and grading done in processing of fruits and vegetables? (10)

ii) Enumerate the various causes of food spoilage with examples. (6)

13) a) i) Cut and blanched pieces of cauliflower are dehydrated in a cabinet dryer. The initial moisture content of cauliflower was 80% wb and it is to be dried to 4% moisture content wb. The critical moisture content is 25% wb. Constant rate drying continues for 6 minutes. Estimate the total drying time for the product. (7)

ii) Explain the process of Spray drying with a neat sketch. (9)

(or)

b) i) Explain the 2 stage freeze concentration process with a neat sketch. (7)

ii) Tabulate the applications of various dryers in food processing with suitable examples. (9)

14) a) i) Discuss extrusion cooking with suitable examples. What are the basic elements required for the same? (8)

ii) Discuss the various steps in the manufacture of margarine in detail. (8)

(or)

b) i) Explain the process of microwave heating and its applications to food industry along with a neat sketch of a microwave oven. (9)

ii) What are the basic principles of food preservation? Discuss various methods available for the same. (7)

15) a) i) Write short notes on Controlled Atmosphere Storage and Modified Atmosphere Packaging (11)

ii) It is proposed to establish a fruit processing unit in a potential fruit producing region. The capacity and locations of the godowns of that region are as follows.

Godown	Capacity (T)	Co-ordinates (km)
1	43	(101,115)
2	33	(112,157)
3	62	(127,98)
4	55	(133,76)
5	54	(89,102)

Find out the location of the proposed fruit processing unit for minimising the transportation cost. (5)

(or)

b) i) What are the requirements of packaging materials? (10)

ii) Discuss in detail the factors affecting food quality. (6)
