1. Explain in detail the different types of soil erosion on the basis of its origin and agents respectively. Describe the mechanics of soil erosion. (10)

2. Write short notes on: (5×2 = 10)
   (a) Hydraulic radius  (b) Angle of repose
   (c) Discharge capacity of channel (d) Water requirement of crops
   (e) Effective rainfall

3. Using Rational formula determine the peak flow expected to occur once in 5 years for a catchment area of 24.3 hectares, having a 30 minute time of concentration, a value of 0.40 for constant, C, and a maximum rainfall of 6.25 cm in a storm of 30 minutes duration expected to occur once in 5 years. (10)

4. Classify in detail the different types of irrigation methods, mentioning their merits and demerits. (10)

5. Choose the correct answer from the multiple choices (a,b,c and d) (5×2 = 10)
   (i) The centrifugal pumps are used for pumping water when:
       (a) Both head and discharge are high  (b) Discharge is high and head is low
       (c) Both discharge and head are low  (d) Discharge is low and head is high
   (ii) Hydrograph is a plot of
       (a) Rainfall intensity against time  (b) Discharge against time
       (c) Cumulative against time (d) Cumulative run-off against time
   (iii) Total depth of irrigation to a crop is known as:
       (a) Duty  (b) Delta
       (c) Base (d) Evapotranspiration
   (iv) Piezometer is used to measure:
       (a) Static pressure of a flowing fluid  (b) Dynamic pressure of a flowing fluid
       (c) Total pressure of a flowing fluid (d) Surface tension of a flowing fluid
5. The total water lost from a cropped (or irrigated) land due to evaporation from the soil and transpiration by the plants or used by the plants is building up of plant tissue is called
(a) Consumptive use 
(b) Transpiration 
(c) Total evaporation 
(d) Infiltration indice

6. What are the basic characteristics or elements that are useful for Image interpretation. Give an example to show how the element ‘Association’ play a role in image interpretation. (10)

7. Design a bag storage structure for storing 250 tonnes of wheat. (Assume reasonable data wherever required) (10)

SECTION - B

8. Choose the correct answer from the multiple choices (a,b,c and d) (5×2 = 10)
   i. BHP of an engine indicate :
      (a) Power in cylinder 
      (b) Power in flywheel 
      (c) Frictional power 
      (d) Power at PTO pulley 
   ii. A cylinder block is normally made of :
      (a) Cast Iron 
      (b) Heat treated steel alloy 
      (c) Spring steel. 
   iii. Psychrometric chart is  a graphical representation of which properties of air :
      (a) Chemical 
      (b) Aerodynamic 
      (c) Hygroscopic 
      (d) Thermodynamic 
   iv. Quantity of heat required to raise the temperature of a unit mass of a material by one degree is known as :
      (a) Specific Heat 
      (b) Volume thermal conductivity 
      (c) Heat capacity 
      (d) None of the above 
   v. The foll instrument is not used for tillage operation.
      (a) Harrows 
      (b) Cultivators 
      (c) Levellers 
      (d) Sub-soilers 

9. What are the different conventional and non-conventional energy sources? Describe their merits and demerits. (10)

10. Describe the different sources of farm power listing their merits and demerits. (10)

11. Diameter and stroke length of the piston of a diesel engine are 10 and 12 cm respectively. If the clearance volume is 56 cm$^3$, determine the temperature of air at the end of compression stroke. Assume the temperature of ambient air as 10 °C and the ratio of specific heats is 1.38. (10)

12. With schematic diagram describe in detail the different parts of Mould Board plough and Disc explaining its working function. (10)

13. Why the cooling system is provided in the IC engine? What are the two main requirements of an efficient cooling system? (8+2=10)

14. Explain different parts of a computer. Describe one application software useful for agricultural engineering. (10)

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