Sub Code:NAG703

Paper Id: 180732 Roll No: | | | | | | | | | | | | | |

B. TECH.
(SEM-VII) THEORY EXAMINATION 2019-20
SOIL AND WATER CONSERVATION STRUCTURES

Time: 3 Hours *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. What are the functional requirements of soil erosion?
b. Define energy and momentum principles.
c. How to measuring runoff?
d. Define spillway.
e. Write the variables affecting equivalent fluid pressure.
f. What are the various flow condition?
g. What do you understand energy dissipaters?
h. What are the functional uses of drop inlet spillway?
i. Define reservoirs.
j. What do you understand farm ponds?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. What are the causes of soil erosion? Enumerate the control measure in brief.
b. What is Froude number? Explain its significance in the design of hydraulic structures
c. With a neat diagram, explain different structural parts of chute spillway.
d. Briefly explain about different types of farm ponds.
e. What do you understand by surface runoff? Step by step explain the methods, to conserve the water.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) Enumerate the factors that affect runoff from a water shed.
(b) A 3mtr rectangular channel conveys 7.5 m3/s of water with velocity of 5m/s .is there a condition for hydraulic jhump to occur? If so, calculate the height , length and strength of the jump . Also determine the loss of energy per kg of water.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) A weir 36 mtr long is divided into 12 equals bays by vertical posts, each 60 cm wide. Determine the discharge over the weir if the head over the crest is 1.2 mtr and the velocity of approach is 2m/s.
(b) Differentiate between a weir and barrage with their location examples.

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are the advantages of wind break and shelter belt? How will you calculate the protection archived by shelter belt?
(b) Explain about runoff flow measurement using Parshall Flume along with the advantages.

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6. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are the components parts of a spillway provided in the rive ogee? Explain in brief their function.

(b) Determine the number of siphon spillway units required for passing the flood safely , with the following data: HFL=375.50 m , FRL=374.80, Level of centre of siphon outlet =368.30m , HFD=580 cumecs, width of siphon throat =4.5m , Height of siphon throat =2.0m , The siphon of the spillway discharge freely in the air.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Design the structure of a straight inlet drop spillway with a straight apron outlet, to be installed for gully control. The expected peak flow rate through the gully is 4 m^3/s, which is 3 m wide. Assume the height of weir crest to be 2 m from the surface. The engineering properties of the construction materials and the soil are as given below. Assume no fill condition for the design. Soil- Angle of internal friction = 25^0 , Cohesion resistance = 500 kg/m^2. Brick - Unit weight of masonry =1900 kg/m^3 , Foundation - Made of firm clay. Its creep ratio, C_W = 2.3, Water - Unit weight of water = 1000kg/m^3 .

(b) What are different rural grain storage structures? Explain in detail with example.