PAPER ID-410559

Roll No: | | | | | | | | | | | | | |

**B.TECH.**
**(SEM VII) THEORY EXAMINATION 2021-22**
**OPEN CHANNEL FLOW**

***Time: 3 Hours*** ***Total Marks: 100***

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

## SECTION A

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

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|---|---|
| a. | Define varied flow with neat sketches. |
| b. | Discuss velocity distribution for rectangular a rectangular open channel. |
| c. | What do you mean by specific force? |
| d. | Explain the term wetted perimeter . |
| e. | Define hydraulic jump. |
| f. | Define critical flow. |
| g. | Classify surface profiles. |
| h. | Write the application of hydraulic jump. |
| i. | Define deep waves. |
| j. | What do you understand by Steep slope profiles? |

## SECTION B

**2. Attempt any *three* of the following: 10x3=30**

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|---|---|
| a. | Water is flowing at critical depth at a section in a triangular shaped channel, with side slope of 0.5H: 1V with its apex pointing upwards. If the critical depth is I.6 m and base with is 3m, estimate the discharge in the channel and the specific energy at the critical depth section. |
| b. | Giving a sketch derive the governing equation of water surface profile in a non-uniform flow . Explain with neat sketches. |
| c. | Derive the differential equation of SVF with increasing discharge with its assumptions. |
| d. | Explain bottom racks. Classify different types of flows over bottom racks with neat sketch. |
| e. | What are the main components of culvert ? Explain with neat sketch. |

## SECTION C

**3. Attempt any *one* part of the following: 10x1=10**

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|---|---|
| a. | Sketch the possible water surface profile in case of flow from steep slope to a wild slope. |
| b. | A rectangular channel 5.0 m wide carries water at a depth of 1.5 m . The channel ends in an abrupt drop. Find using Chow's method , how far upstream of the fall the depth of flow be 1.4m Given First hydraulic exponent 'M"=3.0 and second hydraulic exponent also 'M'= 3.0 |

**4. Attempt any *one* part of the following: 10x1=10**

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|---|---|
| a. | Derive the differential equation of spatially varied flow (S.V.F.) with discharge. Clearly state the assumption made. |

| | |
|---|---|
| b. | In a hydraulic jump taking place in a horizontal apron below an Ogee shaped weir the discharge per unit width is 0.25 $m^3/s$ in a gradually varied flow n this channel, the depth at a certain location is found to be 0.3m. Assuming n=0.016, determine the type of GVF profile. |

**5. Attempt any *one* part of the following: 10x1=10**

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|---|---|
| a. | Explain the graphical integration method for solving G.V.F. equations for prismatic channels of irregular shape. |
| b. | A river 100 m wide and 3m deep has an average bed slope of 0.0005. Estimate the length of GVF profile produced by a low dam which raises the water surface just upstream of it by 1.5m. Assume n -0.035 |

**6. Attempt any *one* part of the following: 10x1=10**

| | |
|---|---|
| a. | Explain specific energy curve with a neat sketch and also derive critical flow condition for constant discharge. |
| b. | Design a trapezoidal most economical channel section having side slope of 2V:3H. It discharges water at rate of 20 cumec with bed slope 1 : 2000 ( Take Manning's constant 0.01) |

**7. Attempt any *one* part of the following: 10x1=10**

| | |
|---|---|
| a. | Write short notes (i) Characteristic of flow through channel junction (ii) Flow through an obstruction in open channel flow. |
| b. | What are the factors affecting culvert flow and also give in brief steps for design of culverts. |