

JALPAIGURI GOVERNMENT ENGINEERING COLLEGE
[A GOVERNMENT AUTONOMOUS COLLEGE]
JGEC/B.TECH/ CIVIL/ES-CE401/ 2024-25
2025
SOLID MECHANICS

Full Marks: 70

Times: 3 Hours

The figures in the margin indicate full marks.
Candidates are instructed to write the answers in their own words as far as practicable.
Assume any other suitable data, if required.
Plain graph paper will be supplied for question no- 10(ii)

GROUP-A
[OBJECTIVE TYPE QUESTIONS]

Answer *all* questions

- | | |
|---|--------|
| 1. Define Hoop Stress in a pressure vessel | 5x2=10 |
| 2. Draw sketch of CORE of a short column having circular cross-section of diameter D | 2 |
| 3. What is indeterminacy? Find out degree of indeterminacy of a single span beam with both ends fixed | 2 |
| 4. A circular bar with one end fixed and other end free is subjected to a Torsion T at free end. Write the expression for angle of twist for the bar. | 2 |
| 5. A square column of cross section 300mmx300mm .find its capacity in KN if permissible stress is 25Mpa | 2 |

GROUP-B

[LONG ANSWER TYPE QUESTIONS]

Answer any *five* questions

- | | |
|---|-----------|
| 6. i) An aluminum bar 2.0m long has a 2.0cm-square cross sections over 1.0m of its length and a 2.0cm diameter cross section over the other 1.0m. How much will the bar elongate under a tensile load P=2000kg if E=750000.0 kg/sq.cm | 12x5 = 60 |
| ii) Write short note on the following | 2x3 = 6 |
| a) Poission's ratio b) Complementary stresses c) Static Equilibrium of two dimensional structures | =6 |
| 7. i) A simply supported beam carrying a uniformly distributed transverse load of intensity w. Establish the relationships $dM_x/dx = V_x$ and $dV_x/dx = -w$ where M_x, V_x are bending moment and Shear force at any section x distance from the support . | 4 |
| iii) A simply supported beam with overhang at one end is subjected to a concentrated load of 50KN at 1.0m from left support. The beam is also subjected to a uniformly distributed load 20.0KN/m over the overhang length (cantilèver length) only. Simply supported length of the beam is 4.0m and overhang length is 1.0m. Total length of the beam is 5m. Draw Bending moment and shear force diagram for the beam | 8 |
| 8. i) Derive the relations $\frac{M}{I} = \frac{\sigma}{R} = \frac{E}{y}$ in pure bending. | 6 |
| ii) Calculate maximum bending stress and maximum shear stress for a simply supported beam of span 4.0m and subjected to a uniformly distributed load $w = 35\text{KN/m}$ over the span. Size of the beam is 250mm X 400mm and $E=25000.0 \text{ N/mm}^2$ | 6 |
| 9. For the given truss shown in Fig. A, find member-forces for all the members and prepare a table for the same. Assume S=3.0m, H=2.6m, P=10.0kN, Q=5.0kN, Left support is Hinge support and Right support is roller support. Adopt any method | 12 |
| 10. i) For a thin plate subjected to biaxial tensile stresses, derive equation for normal stress and shear stress | 6 |
| ii) Draw Mohr's circle for a case of biaxial stress if $\sigma_x = 250.0 \text{ kg/cm}^2$ and $\sigma_y = -550.0 \text{ kg/cm}^2$. From this circle find σ_n and τ for on a plane for which $\phi = 40^\circ$. Also from the Mohr's Circle find complementary shear stress and normal stress for the plane. | 6 |

11. i) Calculate safe internal pressure p for spherical pressure vessel made of thin magnesium plate 0.3cm thick 3
 if mean diameter of sphere is $D=500.0\text{cm}$ and allowable stress in tension $=900.0\text{ kg/cm}^2$
 b) For a cylindrical shell of mean diameter 400cm and thickness 0.25cm find Hoop stress and Meridional stress if allowable stress in tension is 1000 kg/cm^2 . 6
 iii) For thin walled pressure vessel derive the relation $\sigma_1/r_1 + \sigma_2/r_2 = p/t$ 7
12. i) Derive Euler's basic formula for critical load for column having both end hinged 7
 ii) Applying the Differential equation, determine slope and deflection at the free end of a cantilever beam 5
 which is subjected to a concentrated load P at the free end. Assume length of the beam L , moment of inertia of the beam I and Modulus of elasticity E .

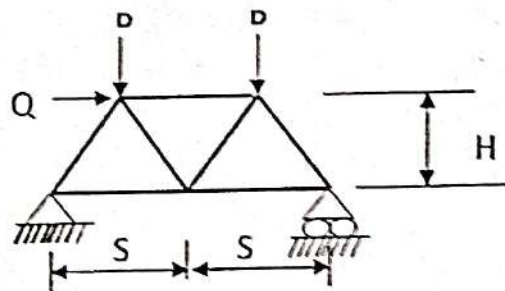


Fig. A

JALPAIGURI GOVERNMENT ENGINEERING COLLEGE
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JGEC/B.TECH/ CE/ PC-CE403/ 2024-25

SOIL MECHANICS I

Times: 3 Hours

Full Marks: 70

The figures in the margin indicate full marks.
Candidates are instructed to write the answers in their own words as far as practicable. Do not carry IS code.
Use a reasonable value if a parameter is not given.

GROUP-A
[OBJECTIVE TYPE QUESTIONS]

5x2=10

Answer *all* questions

- | | | |
|----|---|---|
| 1. | What materials result from chemical and physical weathering of rock? | 2 |
| 2. | A soil has liquid limit, LL = 75% and plasticity index, PI = 45%. Determine the range of water content within which the soil exhibits plastic behavior. | 2 |
| 3. | How does seepage affect the effective stress in soil? | 2 |
| 4. | Between the constant head and variable head methods, which is more appropriate for determining the permeability of granular soils? Explain your answer. | 2 |
| 5. | Define seepage velocity and state how it is related to the discharge velocity. | 2 |

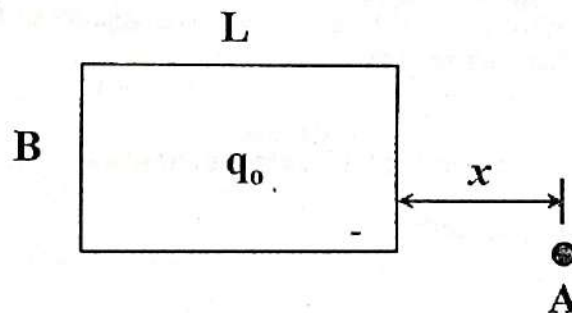
GROUP-B
[LONG ANSWER TYPE QUESTIONS]

12x5 = 60

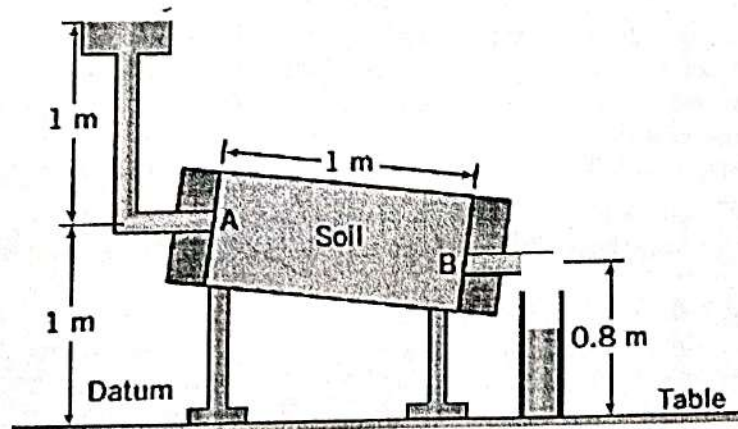
Answer any *five* questions

- | | | |
|----|---|---|
| 6. | (a) What processes create metamorphic rock? | 2 |
| | (b) Explain how residual soil differs from transported soil in terms of its origin and composition. Provide one example of each type. | 2 |
| | (c) What is the origin of organic soil? How can you determine if soil contains organic matter using a liquid limit test? | 2 |
| | (d) Draw structure of Illite clay. | 2 |
| | (e) What is the significance of the diffuse double layer (DDL) for the engineering properties of clay soils? | 2 |
| | (f) What characteristics of montmorillonite clay differentiate it from other types of clay? | 2 |
| 7. | (a) What are the grain properties and aggregate properties of cohesionless soil and cohesive soil? | 2 |
| | (b) State the objective of sieve analysis. | 2 |
| | (c) What is the use of D_{10} , D_{15} , D_{30} , D_{60} and D_{85} in soil mechanics? | 2 |
| | (d) Briefly describe how water affects the engineering behavior of clay and sand. | 3 |
| | (e) A soil sample has a natural water content of 38%. Its plastic limit is 25% and its plasticity index is 15%. Determine the liquidity index and consistency index of the soil. What can you infer about the soil's consistency based on these indices? | 3 |
| 8. | (a) Classify the soil having fines > 50%, LL = 55% and PL = 22% according to Indian Standard. | 2 |
| | (b) What are the potential differences in the engineering behavior and characteristics of Soil A and Soil B, given that they possess the same Plasticity Index (PI) but Soil B exhibits a significantly higher Liquid Limit (LL)? | 2 |
| | (c) Based on the Unified Soil Classification System (USCS), how would you classify a soil sample with the following characteristics: fines content less than 20%, percentage of gravel greater than the percentage of sand, a coefficient of uniformity (C_u) of 5.2, and a coefficient of curvature (C_c) of 1.5? | 3 |
| | (d) State the principle behind pipette analysis used in geotechnical engineering. | 2 |
| | (e) At a certain stage in a hydrometer test, the vertical distance moved by soil particles of a certain size over a period of 1 minute is 0.78 cm. The temperature measured is 20°C. If the specific gravity of the soil particles is 2.7, calculate the diameter of the particles using Stokes's law. Are these silt or clay particles? Given: viscosity = 0.01 gram/(cm.s) at 20°C. | 3 |

9. (a) Explain the difference between a three-phase and a two-phase system in soil, giving an example of when a soil might exist as a two-phase system. 2
 (b) A dry quartz sand sample weighs 15.4 kN/m^3 . What is its density when saturated? 3
 (c) The density of a sand backfill was determined by field measurements to be 17.5 kN/m^3 . The water content at the time of the test was 8.6%, and the specific gravity of solid constituents was 2.60. In the laboratory the void ratios in the loosest and densest states were found to be 0.642 and 0.462, respectively. What were the void ratio and the relative density of the fill? 3
 (d) Calculate the effective stress at a depth of 5 meters below the ground level in a saturated clay deposit, given a water content of 40% and a specific gravity of solids of 2.69, under two scenarios: (i) the water table is at the ground level, and (ii) the water table is lowered to 1.5 meters below the ground level due to pumping (assuming the soil remains saturated due to capillary action). 4
10. (a) A circular footing (radius $R = 1\text{m}$) rests on the surface of a deep deposit of homogeneous clay. It carries a uniformly distributed load of 150 kPa . A sensitive piezometer is installed at a depth of 4m directly below the center of the footing. Calculate stress increase at 4m depth directly below the center and determine piezometric head immediately after application of load and after a very long time. 4
 (b) What is the significance of a pressure bulb in geotechnical engineering, and how can it be determined for a square footing using a 2:1 (2 vertical, 1 horizontal) load dispersion? 3
 (c) Outline the strategy to determine the vertical stress at a depth beneath point A, which lies at a horizontal distance x from the corner of a rectangular area (length L , width B) subjected to a uniform distributed load q_0 (see figure below). 2

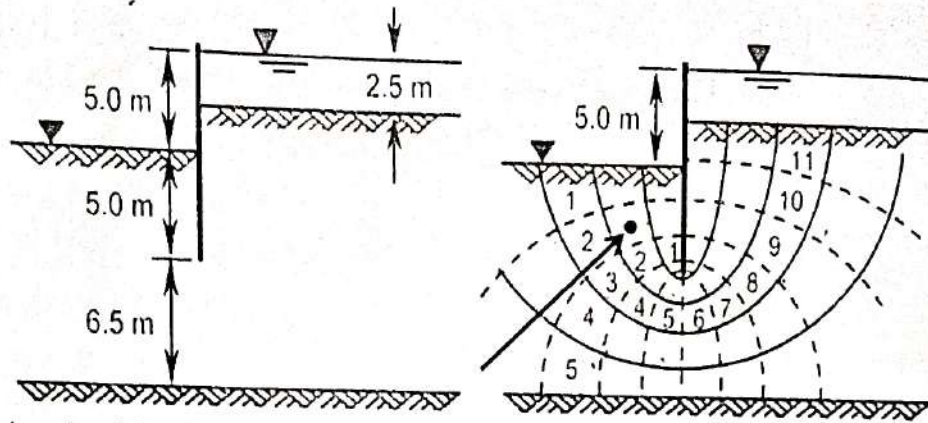


- (d) A uniformly distributed line load of $q = 100 \text{ kN/m}$ acts on the surface of a soil mass. Calculate the vertical stress increase at a depth of $z = 4\text{m}$ directly below the line load and at a horizontal distance of $x = 3\text{m}$ from the line load. 3
11. (a) A soil sample 10 cm in diameter is placed in a tube 1 m long. A constant supply of water is allowed to flow into one end of the soil at A, and the outflow at B is collected by a beaker (Figure). The average amount of water collected is 1 cm^3 for every 10 seconds. The tube is inclined as shown in Figure. Determine the (a) hydraulic gradient, (b) flow rate, (c) average velocity, (d) seepage velocity if $e = 0.6$, and (e) coefficient of permeability. 5



- (b) Demonstrate that the equivalent horizontal permeability of a layered soil system is greater than its equivalent vertical permeability. 4
 (c) An undisturbed sample of soft clay has a void ratio e_0 of 1.62 and a coefficient of permeability k of $2 \times 10^{-9} \text{ m/s}$. Estimate the value of k for the soft clay sample at a void ratio of 1.20. 3

12. (a) For the sheet pile system shown in Fig. below, calculate seepage in m^3/day , water pressure at the point marked with arrow, exit gradient, and factor of safety against piping. Given: k (horizontal) = k (vertical) = $5 \times 10^{-5} \text{ m/s}$, $\gamma_{\text{sat}} = 18.5 \text{ kN/m}^3$. Calculate seepage of the same problem with k (horizontal) = $5 \times 10^{-5} \text{ m/s}$ and k (vertical) = $3 \times 10^{-5} \text{ m/s}$.



- (b) Considering the risk of piping failure of a hydraulic structure, what are some effective engineering strategies and remedial measures that can be implemented to enhance the factor of safety and prevent its occurrence?

23/01/2025

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JGEC/B.TECH/DEPT/PAPERCODE/2024-25
JGEC/B.TECH/CE/ PC-CE401/ 2024-25

2025

CONCRETE TECHNOLOGY AND CONSTRUCTION MATERIALS

Full Marks: 70

Times: 3 Hours

*The figures in the margin indicate full marks. Use of IS 10262:2019 is allowed.
Candidates are instructed to write the answers in their own words as far as practicable.*

GROUP-A
[OBJECTIVE TYPE QUESTIONS]

Answer **all** questions

5x2=10

1. What is a cement? What are the different ingredients of cement?
2. What is a hydraulic lime?
3. Define a superplasticizer. Mention few superplasticizers.
4. What is setting time? What are the specifications of setting time?
5. What is the difference between the tensile strength and the flexural strength of a member?

GROUP-B
[LONG ANSWER TYPE QUESTIONS]

Answer any **four** questions

4x15=60

6. i) List out Bogue's compounds and explain their contribution towards gaining of strength of cement. 9
ii) What are the different types of classification of lime? Explain. 6
7. i) Bring out the detailed classification of aggregates and explain any one of them briefly. 7
ii) What are the characteristics and uses of mortar? 8
8. i) Explain the factors affecting workability of fresh concrete. Explain slump test on concrete. 4+4
ii) What are the different types of segregation exhibited by the concrete? Explain bleeding 3+4
9. i) What are the different methods of curing of concrete. Explain any one. 4+4
ii) Define shrinkage and creep of concrete? Discuss about the factors affecting shrinkage of concrete. 7
10. Determine the mix proportion for concrete mix of grade 40 to suit the following data by IS method 15
 - i) Type of cement – PPC
 - ii) Maximum size of aggregate – 20 mm
 - iii) Maximum water-cement ratio and minimum cement content to be adopted for exposure condition as per Table 3 and Table 5 of IS 456– Severe (RCC)
 - iv) Minimum cement content – 320 kg/m³
 - v) Workability – 75 mm (Slump)
 - vi) Degree of site control – Good
 - vii) Maximum cement content – 450kg/m³
 - viii) Type of aggregate – Crushed angular
 - ix) Chemical admixture type – Superplasticizer (normal)
 - x) Specific gravity of cement – 2.88
 - xi) Specific gravity of coarse aggregates – 2.74
 - xii) Specific gravity of fine aggregates – 2.65
 - xiii) Specific gravity of chemical admixture – 1.145
 - xiv) Water absorption: Coarse aggregate – 0.5%
Fine aggregate – 1.0%

Grading of fine aggregate is conforming to zone II

- | | | |
|-----|--|-------|
| 11. | i) Explain different harmful substances present in brick. | 4 |
| | ii) What is a brick bonding? What are the different types of brick bonding? Explain. | 6 |
| | iii) What are the different types of shallow foundations? | 5 |
| 12. | i) What is paint? Explain the different constituents of an oil paint. | 8 |
| | ii) Explain the different parts of a door, window and staircase. | 2+2+3 |
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JGEC/B.TECH/CE/ PC-CE404/2024-25
2025
ENVIRONMENTAL ENGINEERING-I

Full Marks: 70

Times: 3 Hours

The figures in the margin indicate full marks.
Candidates are instructed to write the answers in their own words as far as practicable.
All the notations have their usual meanings unless specifically mentioned.
[Please supply one mm graph paper]

GROUP-A
[OBJECTIVE TYPE QUESTIONS]

Answer *all* questions

5x2=10

1. What do mean by the term 'unaccounted for water'? 2
2. Differentiate between shallow well and deep well. 2
3. What will be the impact in the environment if solidified water becomes heavier than liquefied water? 2
4. Why alkalinity must be present for effective coagulation? 2
5. Write down the various criteria to be a good disinfectant. 2

GROUP-B
[LONG ANSWER TYPE QUESTIONS]

Answer any *four* questions

4x15=60

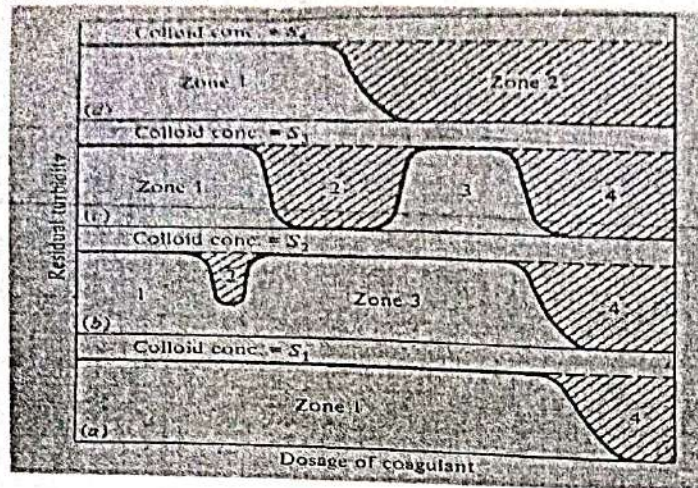
6. i) Write down the factors that affect water demand in a city 4
- ii) A 100 ml sample of water is titrated with 0.02 (N) H_2SO_4 . The initial pH is 9.5 and 6.2 mL of acid is required to reach pH 8.3 end point. An additional 9.8 mL is required to reach the pH 4.5. Determine the species of alkalinity present and concentration of each species. 8
- iii) In a recuperation test water in an open well was depressed by pumping and it recuperated by 1.8 m in 80 minutes. Find the diameter of the well to yield 8 litres /sec under a depression head of 2 meters. ^{2.5m} 3
7. i) Differentiate among groundwater, river water, sea water and wastewater with respect to TSS, TDS and Total Organics. 3
- ii) A settling column is run on a type-1 suspension. The settling column is 2m tall, and the initial concentration is of the well mixed sample is 650 mg/L. Results of the analysis are shown below. 8

| | | | | | | | |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|
| Time, min | 0 | 58 | 77 | 91 | 114 | 154 | 250 |
| Conc. remaining, mg/L | 650 | 560 | 415 | 325 | 215 | 130 | 52 |

What is the theoretical efficiency of the settling basins that receive the suspension if the loading rate is 2.4×10^{-2} m/min?

- iii) Why depth is not a governing factor to determine the efficiency of a sedimentation basin. 2
- iv) What are the objectives of aeration process? 2

8. i) Explain the coagulation phenomenon in the figure as shown below in the sections a, b, c and d in regard with first three coagulation mechanisms. 6



- ii) Enlist the components of a clarifloculator and describe the function of each component. 6
- iii) Find the power requirement in watt in a falsh mixer so as to maintain a relative velocity 70 m/s between two particles which are 10 cm apart. The volume of the mixer is 1.5 m^3 and dynamic viscosity of water is 10^{-3} N-s/m^2 . 3
9. i) Design a R.G. F. along with under drainage system and wash water trough for the following data: 10
- Desired outflow = $600 \text{ m}^3/\text{hr}$
 - Quantity and time lost during back wash are 3% of filter output and 30 min respectively
 - Design rate of filtration = $5 \text{ m}^3/\text{hr/m}^2$
 - Ratio of length to width = 1.3:1
 - Use formula $Q = 1.376 \times b \times H^{1.5}$ for design of wash water trough.
- ii) Why the performance of SSF is better than RGF in removing bacteria? 2
- iii) Write three differences between SSF and RGF. 3
10. i) Explain the break point of chlorination curve with a neat sketch. 5
- ii) Water with a dynamic viscosity of 10^{-3} N-s/m^2 is passed through a filter bed of depth 0.7 m with a velocity 5 m/h. If the media are of 0.4 mm uniform size with a specific gravity 2.65 and porosity 0.4, find the head loss through the filter. Assume density of water 1000 kg/m^3 . 5
- iii) Explain the softening process by lime soda-ash method. 5
11. i) The population of a locality as obtained from census report is as follows 5
- | | | | | | |
|-------------|--------|--------|--------|---------|---------|
| Census year | 1971 | 1981 | 1991 | 2001 | 2011 |
| Population | 350000 | 466000 | 994000 | 1560000 | 1623000 |
- Estimate the population of the locality in the year 2031 by using incremental increase method.
- ii) Laboratory test data shows that 99.9% kill of microbes could be achieved at a chlorine dose of 3 mg/L within a contact time of 28 minutes. Answer the following 6
- What will be the required contact time for 99.99% kill
 - Calculate the chlorine requirement in mg/L to obtain 99.99% kill with a contact time of 35 minutes.
- iv) What are discrete and flocculating particles? 4

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2025

ENGINEERING HYDROLOGY

Full Marks: 70

Times: 3 Hours

The figures in the margin indicate full marks.

Candidates are instructed to write the answers in their own words as far as practicable. Use graph paper where necessary.

GROUP-A
[OBJECTIVE TYPE QUESTIONS]

Answer *all* questions

5x2=10

1. Classify rain according to different intensities. 2
2. Define basin lag and time of concentration. 1+1
3. Write down the basic two assumptions of unit hydrograph. 2
4. Describe linear storage. 2
5. For a catchment area of 400 km² in Western Ghats of Maharashtra, estimate the peak flood discharge empirically. 2

GROUP-B
[LONG ANSWER TYPE QUESTIONS]

Answer any *five* questions

12x5 = 60

6. i) A catchment area has seven raingauge stations. In a year, the annual rainfall recorded by the gauges are as follows: 4+2

| Station | Jalpaiguri | Nagrakata | Dhupguri | Rajganj | Maynaguri | Mal | Matiali |
|---------------|------------|-----------|----------|---------|-----------|-------|---------|
| Rainfall (cm) | 125 | 146.1 | 120.2 | 158.5 | 195.2 | 122.1 | 126.9 |

- a) Determine the standard error in the estimation of mean rainfall in the existing set of raingauges.
- b) For a 20% error in the estimation of the mean rainfall, calculate the number of raingauge stations required to add or remove in that catchment.

- ii) Define drainage density. 1

- iii) The following data were collected during a stream-gauging operation in a river. Compute the discharge. 5

| Distance from left water edge (m) | Depth (m) | Velocity | |
|-----------------------------------|-----------|----------|----------|
| | | at 0.2 d | at 0.8 d |
| 0 | 0 | 0 | 0 |
| 1.5 | 1.1 | 0.5 | 0.3 |
| 3 | 2.4 | 0.8 | 0.6 |
| 4.5 | 1.6 | 0.6 | 0.4 |
| 6 | 1.2 | 0.5 | 0.3 |
| 7.5 | 0.6 | 0.3 | 0.2 |
| 9 | 0 | 0 | 0 |

7. i) For the infiltration data set given below, establish the Philip's equation. Use graph paper. 7

| Time since start (Min.) | 5 | 10 | 15 | 20 | 30 | 40 | 60 | 120 | 150 | 180 |
|------------------------------|----|----|----|----|----|----|----|-----|-----|-----|
| Cumulative Infiltration (mm) | 10 | 19 | 27 | 40 | 56 | 78 | 95 | 110 | 137 | 163 |

- ii) Estimate the PET of an area for the season November to February in which wheat ($K=0.65$) is grown. 5
The area is at a latitude of 25 degree North with mean monthly temperature as below.

| Month | Nov. | Dec. | Jan. | Feb. |
|-------|------|------|------|------|
|-------|------|------|------|------|

| | | | | |
|-------------------------|------|------|------|------|
| Temp.(°C) | 17.5 | 15.6 | 12.3 | 14.2 |
| Monthly daytime hours % | 7.4 | 7.42 | 7.53 | 7.14 |

Use the Blaney-Criddle formula.

8. i) The stage-discharge data of a river are given below. Establish a stage-discharge relationship to predict the stage for a known discharge. Assume the stage value for zero discharge as 20.2 m. Determine the rating curve and its correlation coefficient. Also determine the stage of the river corresponding to a discharge of 1500 m³/s. 8

| Stage (m) | Discharge (m ³ /s) | Stage (m) | Discharge (m ³ /s) |
|-----------|-------------------------------|-----------|-------------------------------|
| 21.95 | 100 | 24.05 | 780 |
| 22.45 | 220 | 24.55 | 1010 |
| 22.8 | 295 | 24.85 | 1220 |
| 23 | 400 | 25.4 | 1300 |
| 23.4 | 490 | 25.15 | 1420 |
| 23.75 | 500 | 25.55 | 1550 |
| 23.65 | 640 | 25.9 | 1760 |

- ii) Write down Meyer's formula.

- iii) If maximum length of travel of water is 15 km; and slope of the catchment is 1 in 4000, find out the magnitude of time of concentration (t_c). 2

9. i) The mass curve of an isolated storm in a 520 ha watershed is as follows: 6

| Time from start (h) | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
|--------------------------|---|-----|-----|-----|-----|-----|------|------|------|------|
| Cumulative rainfall (cm) | 0 | 0.7 | 2.5 | 2.7 | 4.2 | 7.2 | 10.7 | 11.9 | 12.3 | 12.9 |

If the direct runoff produced by the storm is measured at the outlet of the watershed as 0.341 Mm³, estimate the Φ -index of the storm and duration of rainfall excess.

- ii) The coordinates of the IUH of a catchment are given below. 6

| Time (hours) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|----------------------------------|---|---|----|----|----|----|----|----|----|---|----|----|----|
| IUH ordinate (m ³ /s) | 0 | 9 | 32 | 51 | 48 | 39 | 30 | 22 | 14 | 9 | 5 | 2 | 0 |

Derive the direct runoff hydrograph (DRH) for this catchment due to storm of a duration 5 hours and having a rainfall excess of 4 cm.

10. i) Route the following flood hydrograph through a river reach whose Muskingum coefficient K (storage-time constant) = 13 h and $x = 0.25$. At the start of the inflow flood, the outflow discharge is 10 m³/s. 8

| Time (h) | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
|----------------------------|----|----|----|----|----|----|----|----|----|----|
| Inflow (m ³ /s) | 10 | 25 | 45 | 65 | 58 | 50 | 40 | 32 | 24 | 16 |

- ii) What is the property of AMC-I soil? *Black cotton*

- iii) Differentiate between Ephemeral rivers and Intermittent rivers. 2

- iv) Stream of order 2 + Stream of order 3 = ? *Stream* 1

11. i) For a 400 ha watershed in Chennai with predominantly non-black cotton soil, the CN_{II} has been estimated as 65. If the total rainfall in the past five days is 40 mm and the season is dormant season, estimate the runoff volume due to 85 mm rainfall in a day. 6

$$(P - 0.25) \times 0.85$$

- ii) Develop a 15-minute SCS triangular unit hydrograph for a watershed of an area 600 ha and time of concentration 85 min. What would be the peak discharge for the DRH for a 15-minute storm having 6 cm of excess rainfall. Draw both SCS triangular UH and DRH.

42 i) What is virgin flow?

- ii) Flood frequency computations for river Ganga at Farakka barrage, by using Gumble's method, yielded the following results:

| Return period T (years) | Peak flood (cumec) |
|-------------------------|--------------------|
| 50 | 41900 |
| 100 | 45800 |

- a) Estimate the flood magnitude in the river Ganga with a return period of 500 years.
 b) What are the 95% and 80% confidence limits for the estimate if $K_{500} = 4.226$; standard deviation of the annual flood series = 2430 m³/s; and sample size = 75 years.

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ESSENCE OF TRADITIONAL KNOWLEDGE

Full Marks: 70

Time: 3 Hours

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Candidates are instructed to write the answers in their own words as far as practicable.*

GROUP-A
[OBJECTIVE TYPE QUESTIONS]

Answer *all* questions:

5x2=10

- | | |
|--|---|
| 1. Who is known as the Father of Medicine? | 2 |
| 2. Which ancient Indian text is known for its principles of statecraft and governance? | 2 |
| 3. What is the name of the ancient Indian text on grammar written by Panini? | 2 |
| 4. Which ancient Indian text is considered the foundation of Yoga philosophy? | 2 |
| 5. What is the term used for traditional Indian architecture and town planning? | 2 |

GROUP-B
[LONG ANSWER TYPE QUESTIONS]

Answer any *four* questions:

4x15=60

6. Explain the scope and importance of Traditional Knowledge.
 7. Write about the significance of Traditional Knowledge protection.
 8. Discuss the importance of Indian Tradition in the field of Engineering and Technology.
 9. How does the physical aspect of Ashtanga Yoga, particularly asanas and pranayama, support students in maintaining good posture, reducing fatigue, and improving overall health during long study hours?
 10. Examine the role of youth and administrators in promoting Traditional Knowledge protection in India.
 11. Discuss the role of traditional Indian knowledge in environmental conservation and sustainable practices.
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JALPAIGURI GOVERNMENT ENGINEERING COLLEGE
[A GOVERNMENT AUTONOMOUS COLLEGE]
JGEC/B.TECH/ CE/ HU-CE 401/ 2025

VALUES AND ETHICS IN PROFESSION

Full Marks: 70

Time: 3 Hours

The figures in the margin indicate full marks.
Candidates are instructed to write the answers in their own words as far as practicable.

GROUP-A
[OBJECTIVE TYPE QUESTIONS]

Answer *all* questions:

1. What is Justice?
2. What is Law?
3. What is Engineering Ethics?
4. What is Professional Ethics?
5. "In a Democracy, every citizen has equal rights." – Is this statement true or false?

5x2=10

2
2
2
2
2

GROUP-B
[LONG ANSWER TYPE QUESTIONS]

Answer any *four* questions:

6. What is Appropriate Technology? What are the uses of Appropriate Technology? What are the advantages and the disadvantages of Appropriate Technology?
7. Write a short note on the Industrial Revolution and its economic, social, and political aspects.
8. Explain the value crisis in contemporary society.
9. What is Environmental Degradation? What are the different types of Environmental Degradation? As a student of engineering, how can you solve the problem?
10. Write a short note on Secularism.
11. Write a short note on the topic "Good Life."
12. Write a short note on the topic "Problem of Men, Machine Interaction."

4x15= 60

5+5+5
5+5+5
15
4+6+5
15
15
15