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S.Y. B.Tech. (Civil Engineering) (CBCS) (Semester - III)
Examination, March - 2023

BUILDING CONSTRUCTION AND MATERIALS (PCC - CV 305)

Sub. Code : 73201

Day and Date : Tuesday, 20 - 06 - 2023

Total Marks : 70

Time : 02.30 p.m. to 05.30 p.m.

- Instructions :**
- 1) Section I : Solve any three questions.
 - 2) Section II : Q.5 and Q.6 compulsory. Solve any one question from Q.7 and Q.8.
 - 3) Figures to the right indicate full marks.
 - 4) Assume data wherever necessary and mention it neatly.

SECTION - I

- Q1) a) What are the requirements of good building stone? [5]**
b) Explain the manufacturing process of bricks in detail. [6]
- Q2) a) Mention the situations in which the pile foundations are adopted and also list and explain the classification of pile foundations. [6]**
b) Explain sub structure and their components with neat sketch. [6]
- Q3) a) Differentiate between ashlar masonry and rubble masonry. [6]**
b) Show with the help of sketches various types of brick bats [5]
- Q4) Write short note on : [12]**
a) Different standard steel sections and their use in building construction.
b) Characteristics of good fromwork.
c) Types of stone masonry.

P.T.O.

SECTION - II

- Q5)** Draw sectional plan and Elevation of a T.W. Framed 3 paneled door with following data: [12]
- a) Clear opening : 750×2100 mm
 - b) Frame Size: 75×125 mm;
 - c) No. of Shutter : 01
- Assume suitable data.
- Q6)** Design and draw the plan and sectional elevation of R.C.C. Quarter Turn stair case for residential building for following data - [18]
- a) Story height – 3.20m;
 - b) Width of stair – 1.0m
- Q7)** Discuss the various factors which require to consider while selecting a roof covering for a building. [5]
- Q8)** Explain any three Technical terms in staircase with neat labeled sketch. [5]

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Total No. of Pages : 2

S.Y. B.Tech. (Civil Engineering) (CBCS) (Semester - III)
Examination, March - 2023
FLUID MECHANICS - I
Sub. Code : 73200

Day and Date : Monday, 19 - 06 - 2023

Total Marks : 70

Time : 02.30 p.m. to 5.00 p.m.

- Instructions :
- 1) Out of 4 Questions of EACH SECTION attempt ANY THREE.
 - 2) Figures to the right indicate full marks.
 - 3) Assume suitable data if necessary and state them clearly.
 - 4) Answer shall be supported by adequate sketches.

SECTION - I

Q1) Attempt all questions.

- a) Define Concept of fluid Mechanics. Enlist all the properties of Fluid. [6]
- b) Explain about capillarity. Give the expression for capillary rise of liquid. [5]

Q2) Attempt any Two.

- a) Enlist and write note on pressure measuring devices with proper diagrams. [6]
- b) Explain In brief about determination of metacentric height. [6]
- c) Give expression for Resultant force "F" on Gates. [6]

Q3) Attempt any Two.

- a) Enlist and explain all types of flows. [6]
- b) Explain with diagram. [5]
 - i) Laminar and Turbulent flow
 - ii) Rotational flow and Irrotational flow
- c) Derive expression for velocity and acceleration of the fluid. [5]

P.T.O.

Q4) Write Short Notes on [Any 3]

[12]

- a) Capillarity
- b) Total pressure on Inclined plane surface submerged into the liquid
- c) Continuity equation [3D Cartesian Equation].
- d) Derive expression for Pressure at point A for Vertical Single column manometer.

SECTION - II

Q5) Attempt all questions.

- a) Give expression for rate of flow through Venturimeter. **[6]**
- a) Enlist and explain the forces acting on fluid in motion. **[5]**

Q6) Attempt any Two.

- a) Explain effect of pressure gradient on separation of boundary Layer theory. **[6]**
- b) Write about Introduction to Moody's chart. **[6]**
- c) Derive expression for momentum Thickness. **[6]**

Q7) Attempt any Two.

- a) Give the expression for Flow through pipes In Parallel. **[5]**
- b) Derive expression for Dupit's Equation. **[6]**
- c) Explain Flow through syphon. **[5]**

Q8) Write short notes on (Any three)

[12]

- a) Write about Bernoulli's Equation. Theorem and assumptions.
- b) Write Methods of preventing separation of boundary layer.
- c) Flow through Pipes in Series.
- d) Water Hammer In pipes.



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S.Y. B.Tech. (Civil Engineering) (CBCS) (Semester - IV)

Examination, March - 2023

ESE-CV 401 STRUCTURAL MECHANICS

Sub. Code: 79112

Day and Date : Thursday, 15 - 06 - 2023

Total Marks : 70

Time : 10.30 a.m. to 1.00 p.m.

- Instructions :**
- 1) Question one and five are compulsory and solve any two questions from Each section.
 - 2) Figures to the right indicate full marks.
 - 3) Assume suitable data if necessary and state them clearly.
 - 4) Use of non programmable calculator allowed.

SECTION- I

- Q1) a)** Define Major principal planes and stresses also Minor principal planes and stresses. [3]
- b)** Establish the condition of no tension for Hollow Rectangular section.[3]
- c)** Draw Influence line diagram for Reaction of Simply supported Beam.[3]
- Q2)** An element in a stressed material has a tensile stress of 400 MPa and compressive stress of 250 MPa acting on two mutually perpendicular planes and equal shear stress of 80 MPa on these planes. Find principal stresses and the position of the principal planes. Find also maximum shear stresses. [13]
- Q3)** A masonry Chimney 20 m high, of uniform circular section 4.5 m external diameter and 2m internal diameter is subjected to a horizontal wind pressure of 1.5KN/m² of projected area. Find the maximum and minimum stress intensities at the base, if the specific weight of masonry is 24KN/m³. Take $K = 2/3$. [13]

P.T.O.

Q4) A beam ACB 10 m long is fixed at A and is simply supported at B and is provided with an internal hinge at C 5 m from A. Draw the ILD for the following. [13]

- a) B.M. at A
- b) Reaction at B
- c) Reaction at A

SECTION- II

- Q5) a)** Define equivalent length and buckling load. [3]
b) Explain Macaulay's Method. [3]
c) Derive the formula of Power transmitted through shaft. [3]

Q6) A hollow column 200mm external diameter and 25mm internal diameter 8m long has both ends fixed. It is subjected to an axial compressive load. Taking Factor of safety as 6. $\sigma_c = 560\text{N/mm}^2$ and $a = 1/1600$. Determine the safe Rankine's load. [13]

Q7) Using moment area method, derive the expression for the slope and deflection of simply supported beam loaded with UDL over whole span. Assume uniform flexural rigidity EI. [13]

Q8) Calculate the diameter of the shaft required to transmit 100 KW at 190 r.p.m, if the maximum torque is likely to exceed the mean by 40% for maximum permissible shear stress of 75 MPa. [13]



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S.Y. B.Tech. (Civil Engineering) (Semester - IV) (CBCS)
Examination, March - 2023
PCC-CV-402 : SURVEYING - II
Sub. Code : 79113

Day and Date : Saturday, 17 - 06 - 2023

Total Marks : 70

Time : 10.30 a.m. to 01.30 p.m.

- Instructions :
- 1) Attempt Any Three questions from each section.
 - 2) Figures to the right indicate full marks.
 - 3) Assume suitable data if necessary and state them clearly.
 - 4) Use of non-programmable calculator is allowed.

SECTION - I

- Q1) a)** Explain the procedure of measurement of horizontal distance by Subtense Bar. [6]
- b)** Two horizontal distances of 50 m and 80 m were accurately measured and the intercepts on the staff between the outer stadia wires were 0.496 m and 0.796 m respectively. Calculate the tacheometric constants. [6]
- Q2) a)** Explain principle of Triangulation. [5]
- b)** Explain with neat sketch procedure of reduction to center. [6]
- Q3) a)** Explain reconnaissance, preliminary surveys for road project. [5]
- b)** Explain Principle of EDM. [6]
- Q4) Attempt any Three :** [12]
- a) Auto reduction tacheometer.
 - b) Radial contouring.
 - c) Classification of Triangulation.
 - d) Criteria's for base line selection.
 - e) Stadia method

SECTION - II

- Q5) a)** Explain the field procedure for setting out simple circular curve by Two theodolite method. [5]
- b)** Two tangents AB & BC intersects at a point B at a chainage of 200.500m. Calculate all the necessary data for setting out a circular curve of a radius 120 m & deflection angle 36° by the method of offsets from the long chord. Take offsets at 10 in interval. [7]
- Q6) a)** Differentiate between Terrestrial Photogrammetry and Aerial Photogrammetry. [5]
- b)** Calculate the number of aerial photographs required to cover an area of 160sq.km. of ground area if scale of photograph is 1/10,000, format size is 230mm \times 230mm, longitudinal overlap is 55% and side-lap is 33%. [6]
- Q7) a)** Explain GIS in detail. [6]
- b)** Explain applications of GPS in civil engineering. [5]
- Q8) Attempt any Three :** [12]
- a) Vertical curve
 - b) Necessity of overlap
 - c) Characteristics of transition curve
 - d) Remote sensing.
 - e) Problems in setting out the curve.

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QP Code: 5604QP
Total No. of Pages: 2

Summer Examination March - 2023

Subject Name: B.Tech. CBCS_80763_80763_81000 - Water Resource Engineering-I_23.06.2023_02.30 PM To 05.00 PM

Subject Code: 80763

Day and Date: - Friday, 23-06-2023
Time: - 02:30 pm to 05:00 pm

Total Marks: 76

Instructions.:

- 1) Use of Scientific calculator is allowed

Special Instruction.:

1) Q4 and Q8 are compulsory. In section I Attempt any two questions from Q1, Q2 and Q3 and in section II attempt any two questions from Q5, Q6 & Q7 2) Figures to the right indicate full marks. 3) Assume suitable data if necessary and state them clearly. 4) Answer shall be supported by adequate sketches

- Q.1. a) Explain "Hydrological cycle" with neat sketch.(5) [11]
b) Determine optimum number of rain gauges in catchment area from following data.(6)
• No. of existing rain gauge = 5
• the annual rain fall at the gauges are 78.8cm, 90.2cm, 98.6cm, 102.4cm and 70.4cm
• Permissible error = 6 %
- Q.2. a) What is Infiltration? Explain factors affecting infiltration.?(6) [12]
b) A 12 hours storm rainfall has the following depth in cm for each hour occurring over a basin:(6)
1.8, 2.6, 7.8, 3.9, 10.6, 5.4, 7.8, 9.2, 6.5, 4.4, 1.8 and 1.6
The surface runoff resulting from the above storm is found to be 24.4cm depth over the basin. Determine W index and ϕ index of basin.
- Q.3. a) What is Unit Hydrograph ? State assumptions in unit Hydrograph theory. [12]
Explain the procedure to construct unit hydrograph of unit duration from given Flood Hydrograph.(5)
b) The ordinates of 6 H unit hydrograph are given, calculate ordinates of 3 hours unit hydrograph (7)

Time(h)	0	03	06	09	12	15	18	21	24	27	30	33	36	39	42
Ordinates (Cumecs)	0	9	20	35	49	43	35	28	22	17	12	9	6	3	0

- Q.4. Write Notes On:(Solve any two) [12]
a). Types of Precipitation (6)
b) Measurement of Infiltration (6)
c) S curve Hydrograph (6)

- Q.5. a) Explain with neat sketch Occurrence, Distribution, and classification of ground water (5) [11]
b) Derive the equation for discharge well penetrating through a confined aquifer.(6)
- Q.6. a) What is mean by irrigation? Explain benefits and ill effects of irrigation (6) [12]
b) Explain in detail general layout, main components & functioning of Percolation tanks (6)
- Q.7. a) Explain in detail methods of improving duty.(6) [12]
b) What do you understand by Crop rotation ? What are its advantages ? (6)
- Q.8. Write detail Note on:(Solve any Two) [12]
a) Soil Moisture Constants (6)
b) Drip Irrigation (6)
c) Lift Irrigation (6)

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S.Y. B.Tech. (Civil Engineering) (Part - II) (Semester - IV)
Examination, March - 2023
BUILDING DESIGN AND DRAWING
Sub. Code : 79116

Day and Date : Saturday, 24 - 06 - 2023

Total Marks : 70

Time : 10.30 a.m. to 01.30 p.m.

- Instructions :
- 1) Attempt any two question from Q.1, Q.3, Q.4 and Q. No. 2 is compulsory.
 - 2) Attempt any three questions from Q. No. 5, Q.6, Q.7 and Q. No. 8.
 - 3) Figures to the right indicate full marks.
 - 4) Assume suitable data if necessary and state them clearly.

Q1) Attempt all questions :

- a) List the various points to be considered in selection of good site bungalow project. [3]
- b) Explain 'Privacy' as a principle of planning a building. [4]

Q2) Attempt compulsory : [21]

A residential bungalow (G+1) is to be planned for a Consulting Civil Engineer with the following requirements :

- a) Living - 15 to 20m²
- b) Office with independent entrance - Min. 25 m²
- c) Kitchen - 10 to 12m²
- d) Dinning - 10 to 12m²
- e) Master Bed - 14 to 16m² + Attached Toilet
- f) Children Bed - 12 to 14m²
- g) Guest Bed - 12 m² + Attached Toilet

P.T.O.

- h) Entrance and a space for uncovered or partially covered for car parking
- i) Suitable size of verandah and circulation spaces
- j) Sanitary Block as per requirement
- k) Staircase

Note : A deviation of +/- 15% area is allowable.

Size of the plot is 18m x 24m. A 9m side road is parallel to the shorter side of the plot on East side. Draw with the scale 1 : 100 detailed developed Ground floor and First floor plan of any one bungalow with suitable wall thickness.

Q3) Attempt all questions :

- a) Describe various methods of Low-Cost Housing. [3]
- b) Enlist various building maintenance techniques. [4]

Q4) Attempt all questions :

- a) Give significance of Wind diagram for building planning. [3]
- b) Explain concept of Green Building rating. [4]

OR

- b) Explain Repair and Rehabilitation of structure. [4]

Q5) Attempt any two questions :

- a) State the characteristics of traps and explain 'Intercepting Trap' with a sketch. [6]
- b) Explain with neat sketch the importance of rain water harvesting. [6]
- c) Explain the factors for deciding wiring systems. [6]

Q6) Attempt all questions :

- a) What are the systems of ventilation? Explain artificial ventilation. [6]
- b) State the necessity of air conditioning. Explain the components of A.C. [5]

OR

- b) What do you mean by sound insulation? What are the advantages of sound insulation? [5]

Q7) Attempt all questions :

- a) Explain method of application of paint on old surface. [5]
- b) Explain defects in plastering. [6]

OR

- b) Enlist the various types of Pointing with sketches. [6]

Q8) Write short notes on any three :

[12]

- a) Objective of plastering
- b) Materials and methods used for thermal Insulation
- c) Classification of Fire hazards buildings
- d) Good acoustics
- e) Function of Septic Tank

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S.Y. B.Tech. (Civil Engineering) (CBCS) (Semester - IV)

Examination, March - 2023

FLUID MECHANICS - II

Sub. Code : 79115

Day and Date : Wednesday, 21 - 06 - 2023

Total Marks : 70

Time : 10.30 a.m. to 01.00 p.m.

- Instructions :**
- 1) Attempt any three questions from each section.
 - 2) Q.4 and Q.8 are compulsory.
 - 3) Figures to the right indicate full marks.
 - 4) Assume suitable data if necessary and state them clearly.
 - 5) Answer shall be supported by adequate sketches.

SECTION - I

Q1) Solve the following.

- a) State and explain factors affecting Manning's roughness coefficient 'n'. [5]
- b) What do you mean by most economical channel section of an open channel? What are the conditions for the rectangular channel of best section? [6]

OR

- c) A Wide rectangular channel carries discharge $2 \text{ m}^3/\text{s}$ per meter width on bed slope 1 in 1800 find normal depth and Critical Depth of flow. [6]

Q2) Solve the following.

- a) Compare gradually varied flow and rapidly varied flow. [6]
- b) A wide rectangular channel carries discharge 2 cumecs per meter width, if due to weir constructed water level rises from 2.5 to 3.5, find length of GVF profile also classify profile. Take $n = 0.03$, $S_0 = 1$ in 3600. Use single step. [6]

OR

P.T.O.

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- c) A wide rectangular channel with bed slope 1 in 900 and $n = 0.02$, carries a discharge $5 \text{ m}^3/\text{s}/\text{m}$. Find the slope of water surface at the section where the depth of the flow is 0.7 m . Classify the GVF profile. [6]

Q3) Solve the following.

- a) Give the classification of hydraulic jump and their Froude number. [5]

- b) Show that : $y_1 + y_2 = \frac{2q^2}{g y_1 y_2}$. [6]

OR

- c) In a rectangular channel a discharge of $2 \text{ m}^3/\text{s}/\text{m}$ flows with a Froude number 6. If the hydraulic jump takes place. Calculate the energy lost per meter width of channel due to jump. [6]

Q4) Write a short note on (Attempt any three).

- a) Construction and working of Pitot tube. [4]
 b) M1 and C3 Curves with example. [4]
 c) Specific energy curve with neat sketch. [4]
 d) Hydraulic jump and state its applications. [4]
 e) Spatially varied flow. [4]

SECTION - II

Q5) Solve the following.

- a) Write advantages of triangular notch over rectangular notch. [5]
 b) Derive an expression for discharge over a rectangular notch considering end contraction and velocity of approach. [6]

OR

- c) Reservoir has a uniform cross-sectional area of 0.15 Km^2 and is provided with a narrow crested rectangular weir 5 m long, how long will it take for. Water level at the sill to fall from 90 cm to 50 cm , Take $c_d = 0.6$ for the weir. [6]

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Q6) Solve the following.

- a) Derive the equation for force exerted on Flat Moving Plate, Jet impacting normal to plate. [6]
 b) Derive the equation for force exerted by Jet on series of flat plates mounted on periphery of wheel. [6]

OR

- c) A jet of water 5 cm in diameter having velocity of 25 m/s strikes normally a smooth plate. Determine the thrust when : [6]
 i) The plate is stationary
 ii) Moving with velocity of 5 m/s in the direction of jet.
 What is the work done per second by the jet?

Q7) Solve the following.

- a) Give the Classification of Turbines. [5]
 b) What are the major components of Hydro-Power plant? Draw typical layout of Hydroelectric power plant. [6]
 c) Write a short note on cavitation in pump and turbines. [6]

Q8) Write a short note on (Attempt any three)

- a) Sharp crested and Broad crested weir. [4]
 b) Ventilation of weir. [4]
 c) Priming of a centrifugal pump. [4]
 d) Draft tube. [4]
 e) NPSH. [4]

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**S.Y. B.Tech. (Civil Engineering) (CBCS) (Semester - III)**  
**Examination, March - 2023**

**PCC-CV 302 : SURVEYING - I**

**Sub. Code : 73198**

**Day and Date : Friday, 16 - 06 - 2023**

**Total Marks : 70**

**Time : 02.30 p.m. to 05.00 p.m.**

- Instructions :**
- 1) Attempt Any Three questions from each section.
  - 2) Figures to the right indicate full marks.
  - 3) Assume suitable data if necessary and state them clearly.
  - 4) Answer shall be supported by adequate sketches.
  - 5) Use of non - programmable calculator is allowed.

**SECTION - I**

**Q1) Attempt all questions.**

- a) Describe in detail two method of permanent adjustment of dumpy level. [6]
- b) In an operation involving Reciprocal Leveling two points A and B are taken on opposite banks of river. When the level was set up near A, the staff readings on A and B were 2.245 and 3.375 respectively. When the level was set up near B, the respective staff readings were 1.955 and 3.055. find the true difference of level between A and B .What is the RL of B, if that of A is 125.550. [6]

**Q2) Attempt any Two.**

- a) What are uses of contour map. [5]
- b) Describe trapezoidal rule for volume calculation. [5]
- c) The following offsets were taken from a chain line to an irregular boundary line at an interval of 10m [6]  
0, 2.5, 3.5, 5.00, 4.60, 3.20, 0

**P.T.O.**

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Compute area between the chain line, the irregular boundary line and the end offsets by

- i) The mid ordinate rule
- ii) The average ordinate rule
- iii) The trapezoidal rule
- iv) Simpsons rule

**Q3) Attempt any Two.**

- a) Explain principal of plane table and accessories in plane table survey. [5]
- b) Describe orientation by back sighting. [5]
- c) Explain temporary adjustments in plane table survey. [6]

**Q4) Attempt any Four**

- a) Explain Factors affecting sensitivity of bubble. [4]
- b) Explain characteristics of contour. [4]
- c) Explain methods of interpolation of contours. [4]
- d) Explain mid ordinate rule with neat sketch. [4]
- e) Explain Traversing Method of plane table survey. [4]

## SECTION - II

**Q5) Attempt all questions**

- a) What are temporary adjustments of Vernier Theodolite. [6]
- b) Explain repetition method to measure horizontal angle with theodolite. [6]

**Q6) Attempt any Two.**

- a) What do you understand by omitted measurements? Name the different possible cases. [5]
- b) Describe case in trigonometrical levelling when the base of the object is accessible. [5]
- c) Explain procedure of balancing traverse with Bowditch rule. [6]

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**Q7) Attempt any Two.**

- a) What are the uses of abney level and ghat tracer. [5]
- b) Describe procedure of Hydrographic Survey in detail. [5]
- c) Draw neat sketch of ghat tracer and explain its applications. [6]

**Q8) Attempt any Four**

- a) What are uses of Vernier Thodolite. [4]
- b) Explain various sources of errors in theodolite. [4]
- c) Explain latitude and departure with neat sketch. [4]
- d) What are applications of box sextant. [4]
- e) What are various usage of abney level. [4]

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**S.Y.B.Tech. (Civil) (Semester - III) (CBCS) Examination, March - 2023**  
**ENGINEERING MATHEMATICS - III**

Sub. Code: 73197

Day and Date : Thursday, 15 - 06 - 2023

Total Marks : 70

Time : 2.30 p.m. to 5.00 p.m.

- Instructions :
- 1) Attempt any three questions from each section.
  - 2) Figures to the right indicate full marks.
  - 3) Use of non-programmable calculator is allowed.

**SECTION - I****Q1) Solve the following.**

a) Solve  $\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + 4y = e^{2x}$  [6]

b) Solve  $(D^3 - D^2 + 3D + 5)y = e^x \cos 3x$  [6]

**Q2) Solve the following.**

a) Show that  $\vec{F} = (z^2 + 2x + 3y)i + (3x + 2y + z)j + (y + 2xz)k$  is irrotational but not solenoidal, Also obtain it's scalar potential. [6]

b) Find the angle between the normals to the surface  $x^2y + 2xz = 4$  at  $(2, -2, 3)$  and to  $x^3 + y^3 + 3xyz = 3$  at  $(1, 2, -1)$ . [5]

**Q3) Solve the following.**

a) Fit a second degree curve to the following data. [6]

|   |    |   |   |   |    |    |    |
|---|----|---|---|---|----|----|----|
| x | 3  | 2 | 1 | 0 | -1 | -2 | -3 |
| y | 10 | 8 | 3 | 1 | 2  | 6  | 8  |

b) Fit a curve of the form  $y = ab^x$  [5]

|   |   |     |     |     |     |     |     |     |
|---|---|-----|-----|-----|-----|-----|-----|-----|
| x | 1 | 2   | 3   | 4   | 5   | 6   | 7   | 8   |
| y | 1 | 1.2 | 1.8 | 2.5 | 3.6 | 4.7 | 6.6 | 9.1 |

**P.T.O.**

Q4) Attempt any two from the following.

- a) Solve  $x^2 \frac{d^2y}{dx^2} - x \frac{dy}{dx} + 4y = \cos(\log x) + x \sin(\log x)$ . [6]
- b) Find the directional derivative of  $\phi = 2x^3y - 3y^2z$  at  $p(1, 2, -1)$  in the direction of  $Q(3, -1, 5)$ . In what direction from P is the directional derivative maximum? [6]
- c) Find the coefficient of correlation for the following data. [6]

|   |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|
| x | 19 | 22 | 24 | 27 | 29 | 33 | 37 |
| y | 10 | 12 | 13 | 16 | 17 | 20 | 25 |

### SECTION- II

Q5) Solve the following.

- a) A company produces condensers and supply them in the packs of 5 condensers each. If 1.5% of the condensers produced by the company are defective, using Binomial probability distribution find: [6]
- Probability that a pack selected at random from the production line is free from defective condensers.
  - A pack selected at random from the production line contain atmost one defective condenser.
- b) If the mean life and standard deviation of battery cells are 12 hours and 3 hours what % of batteries will have life [6]
- between 10 & 14 hours,
  - more than 15 hours,
  - less than 6 hours

Given : For S. N. V. z area from  $z = 0$  to  $z = 0.67$  is 0.2486, that from  $z = 0$  to  $z = 1$  is 0.3413, that from  $z = 0$  to  $z = 2$  is 0.4772

Q6) Solve the following:

- a) Find the laplace transform of  $e^{4t} \sin 4t$ . [5]
- b) Find inverse laplace transform of  $\frac{2s+3}{(s+1)^2(s+2)}$  [6]

Q7) Solve the following.

- a) Evaluate  $\int_4^{5.2} \log_e x dx$  using Trapezoidal rule by dividing the interval [4, 5.2] into 6 equal parts. [5]
- b) Using Simpson's  $\left(\frac{1}{3}\right)^{rd}$  rule to obtain value of the  $\int_1^2 \frac{dx}{x}$  taking 10 equal intervals. [6]

Q8) Attempt any two from the following.

- a) Fit a Poisson distribution to the following data. [6]

|   |     |     |    |   |   |       |
|---|-----|-----|----|---|---|-------|
| x | 0   | 1   | 2  | 3 | 4 | Total |
| f | 192 | 100 | 24 | 3 | 1 | 320   |

- b) Use Laplace transform method to solve  $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = 4e^{2t}$ , when  $y(0) = -3$  and  $y'(0) = 5$  at  $t = 0$ . [6]
- c) Evaluate  $\int_0^{\pi/2} \frac{\sin x}{x} dx$  using Weddle's rule by dividing the interval into 6 equal sub intervals. [6]





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**S.E. (Civil) (Revised) (Part - II) (Semester - III)**

**Examination, March - 2023**

**STRENGTH OF MATERIALS**

**Sub. Code : 73199**

**Day and Date : Saturday, 17 - 06 - 2023**

**Total Marks : 100**

**Time : 02:30 p.m. to 05:00 p.m.**

- Instructions :**
- 1) Attempt any three questions of each section.
  - 2) Figures to the right indicate full marks.
  - 3) Assume suitable data if necessary and state them clearly.
  - 4) Answer shall be supported by adequate sketches.

**SECTION - I**

**Q1) Attempt all questions.**

**[17]**

- a) A rod of 120cm long and of diameter 1cm is subjected to an axial pull of 15 kN. If the modulus of elasticity of the material of the rod is  $2 \times 10^5$  MPa. determine stress developed in the rod and strain in the rod and elongation of the rod.

**[10]**

**OR**

A steel rod of 50mm diameter and 6m long is connected to two grips and rod is maintained at a temperature of  $100^\circ\text{C}$ . Determine the stress and pull exerted when temperature falls to  $20^\circ\text{C}$ . If ends are do not yield and ends are yields by 1.5mm take  $E = 2 \times 10^5 \text{ N/mm}^2$  and  $\alpha = 12 \times 10^{-6}/^\circ\text{C}$ .

- b) A reinforced concrete column  $500\text{mm} \times 500\text{mm}$  in section is reinforced with 4 steel bars of 25mm diameter one each corner. The column is carrying a load of 1000kN. Find stresses in concrete and steel bars. Take  $E_s = 210\text{Gpa}$  and  $E_c = 14\text{Gpa}$ .

**[7]**

**Q2) Attempt all questions.**

**[17]**

- a) A beam ABCDEF is supported at B and F. There are two point loads of 40 kN at A and E. There is a load of 50 kN at D. Portion BCD carries Uniformly distributed load of 30kN/m.  $AB = 2 \text{ m}$ ,  $BC = 3 \text{ m}$ ,  $CD = 1.5 \text{ m}$ ,  $DE = 2.5 \text{ m}$ ,  $EF = 2 \text{ m}$ . Construct SFD and BMD for the beam and find the point of contraflexure.

**[10]**

- b) A simply supported beam AB of span 5 m carries a point load of 60 kN at 3 m from support A. Calculate the bending moment under point load using virtual work.

**[7]**

**P.T.O.**



**Q3) Attempt all questions.**

[17]

- Calculate the maximum intensity of shear stress induced and the angle of twist produced in degree in solid shaft of 120 mm diameter, 8 m long, transmitting 120 kW at 140 rpm, Take  $C = 82 \text{ kN/mm}^2$ . [9]
- A hollow circular steel shaft has external and internal diameter as 75 mm and 30 mm respectively. While the shaft rotates at 120 rpm, its twist is observed as  $2^\circ$  in 4m length. Using  $C = 77 \text{ GPa}$ , determine the power being transmitted. [8]

OR

Find the external diameter of hollow shaft of internal diameter equal to 60% of external diameter, to transmit 150 kW at 250 rpm if shearing stress not to exceed  $70 \text{ N/mm}^2$ .

**Q4) Attempt any Four :**

[16]

- Explain point of zero shear force and point of contra flexure.
- Define stress, strain and Modulus of Elasticity.
- State and Explain Hooks Law.
- Draw SFD and BMD for cantilever beam subjected to point load at the end.
- Find the maximum shear stress induced in a solid circular shaft of 200 mm diameter if the shaft transmits 200 kW power at 180 rpm.

**SECTION - II****Q5) Attempt all questions.**

[17]

- An unsymmetrical cast iron beam has overall depth 300 mm, top flange  $150 \text{ mm} \times 25 \text{ mm}$ , bottom flange  $250 \text{ mm} \times 50 \text{ mm}$  and web thickness 25 mm. The beam is 5 m long and simply supported at ends. If permissible stresses are  $100 \text{ N/mm}^2$  in compression and  $25 \text{ N/mm}^2$  tension. What uniformly distributed load will beam can carry safely. [10]
- A cast iron beam is of T Section having top flange  $100 \text{ mm} \times 20 \text{ mm}$  and web  $80 \text{ mm} \times 20 \text{ mm}$ . The beam carries a uniformly distributed load of  $1.5 \text{ kN/m}$  on the entire 8m simply supported span. Determine the maximum tensile and maximum compressive stresses due to bending. [7]

**Q6) Attempt all questions.**

[17]

- A Symmetrical beam having I Section has flanges  $150 \text{ mm} \times 20 \text{ mm}$  and web  $300 \text{ mm} \times 10 \text{ mm}$ . If it is subjected to shear force 80 kN. Find maximum shear stress induced in the beam. [7]
- A Simply supported beam of unsymmetrical I section has span of 4m subjected to uniformly distributed load of  $50 \text{ kN/m}$ . The top flange is  $200 \text{ mm} \times 20 \text{ mm}$ , bottom flange is  $100 \text{ mm} \times 10 \text{ mm}$  and web 200mm deep and thickness 10mm. Draw shear stress distribution diagram. [10]

**Q7) Attempt all questions.**

[17]

- A metal rod has uniform cross-sectional area of  $800 \text{ mm}^2$  and a length of 1.8 m. If the stress at elastic limit is  $180 \text{ N/mm}^2$ , determine proof resilience. Also determine maximum value of suddenly applied load without exceeding the elastic limit. Take  $E = 2 \times 10^5 \text{ N/mm}^2$ . [10]
- A load of 500 N falls through a height of 150 mm on to a collar attached to the end of a vertical rod of 50 mm diameter and 2 m long, the upper end of the rod is fixed to the ceiling. Calculate the maximum instantaneous extension of the rod and the maximum stress induced in the rod. Take  $E = 2 \times 10^5 \text{ N/mm}^2$ . [7]

OR

Determine the instantaneous stress and deformation of a rod of length 1 m and diameter 6 mm. If a mass of 50 kg falls through a height of 10 cm and strikes the bottom of the rod. The rod is freely suspended and fixed at the top. Assume  $E = 210 \text{ GPa}$ .

**Q8) Attempt any Four :**

[16]

- Define resilience and proof resilience.
- Draw shear stress distribution of rectangular, I and T section.
- State assumption made in simple bending theory.
- Calculate section modulus for rectangular and circular section.
- Explain moment of resistance.

▽▽▽▽



SE-85

Q6) Attempt any two.

- a) Write short note on :
- Light weight concrete
  - Fibre reinforced concrete
- b) Explain the effect of permeability on concrete.
- c) Explain in detail sulphate attack on concrete.

[6]

[6]

[6]

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SE-85

Total No. of Pages : 4

Seat No.

**S.Y. B.Tech. (Civil Engineering) (CBCS) (Semester - IV)**  
**Examination, March - 2023**  
**CONCRETE TECHNOLOGY**  
**Sub. Code : 79114**

Day and Date : Monday, 19 - 06 - 2023

Total Marks : 70

Time : 10.30 a.m. to 01.00 p.m.

- Instructions :
- All questions are compulsory.
  - Figures to the right indicate full marks.
  - Assume suitable data if necessary and state them clearly.
  - Answer shall be supported by adequate sketches.

**SECTION - I**

Q1) Attempt all questions.

- Enlist the types of cement. Explain any two in detail.
- Explain the classification of aggregates.

[6]

[6]

Q2) Attempt the following.

[11]

- Enlist the test for measurement of workability and explain compaction factor test.
- Explain in brief different methods of curing of concrete.

[6]

[5]

OR

- Explain segregation and bleeding of fresh concrete.

[5]

Q3) Attempt any two.

- What is creep and shrinkage of concrete?
- Explain the techniques of measuring and factors affecting measurement of Ultrasonic Pulse Velocity.
- Explain the effect of w/c ratio and gel space ratio on strength of concrete.

[6]

[6]

[6]

P.T.O.



**SECTION - II****Q4)** Attempt all questions.

- a) What are the factors affecting design of concrete mix? [5]
- b) Design of M30 concrete mix as per 18:10262:2009 [10]
- Grade Designation : M30
  - Type of cement - O.P.C. 43 Grade
  - Maximum nominal size of aggregate - 20 mm
  - Workability - 100 mm slump
  - Exposure - Severe for R.C.C.
  - Specific gravity of cement - 3.15
  - Specific gravity of coarse aggregate- 2.8
  - Specific gravity of fine aggregate- 2.7
  - Sieve analysis of Fine aggregate: Conforming to Zone I of IS: 3 83

**Table 1 : Assumed Standard Deviation**

| Sr. No. | Nominal size of Aggregate | Assumed standard deviation in N/mm <sup>2</sup> |
|---------|---------------------------|-------------------------------------------------|
| 1.      | M10                       | 3.50                                            |
| 2.      | M15                       |                                                 |
| 3.      | M20                       | 4.00                                            |
| 4.      | M25                       |                                                 |
| 5.      | M30                       | 5.00                                            |
| 6.      | M35                       |                                                 |
| 7.      | M40                       |                                                 |
| 8.      | M45                       |                                                 |
| 9.      | M40                       |                                                 |

**Table 2 : Maximum Water Content per Cubic Meter of Concrete for Nominal Maximum Size of Aggregate**

| Sr. No. | Nominal Maximum Size of Aggregate | Maximum Water Content Kg |
|---------|-----------------------------------|--------------------------|
| 1.      | 10                                | 208                      |
| 2.      | 20                                | 186                      |
| 3.      | 40                                | 165                      |

**Table 3 : Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate**

| Sr. No. | Nominal Maximum Size of Aggregate | Zone IV | Zone III | Zone II | Zone I |
|---------|-----------------------------------|---------|----------|---------|--------|
| 1.      | 10                                | 0.50    | 0.48     | 0.46    | 0.44   |
| 2.      | 20                                | 0.66    | 0.64     | 0.62    | 0.60   |
| 3.      | 40                                | 0.75    | 0.73     | 0.71    | 0.69   |

**Table 5 : Minimum cement content, Maximum Water cement ratio and Minimum grade of concrete for Different exposures with Normal Weight aggregates of 20 mm Nominal Maximum size**

| Sr. No. | Exposure    | Plain concrete                           |                                 |                           | Reinforced concrete                      |                                 |                           |
|---------|-------------|------------------------------------------|---------------------------------|---------------------------|------------------------------------------|---------------------------------|---------------------------|
|         |             | Minimum Cement content Kg/m <sup>3</sup> | Maximum free water-cement ratio | Minimum grade of concrete | Minimum Cement content Kg/m <sup>3</sup> | Maximum free water-cement ratio | Minimum grade of concrete |
| i.      | Mild        | 220                                      | 0.60                            | -                         | 300                                      | 0.55                            | M20                       |
| ii.     | Moderate    | 240                                      | 0.60                            | M15                       | 300                                      | 0.50                            | M25                       |
| iii.    | Severe      | 250                                      | 0.50                            | M20                       | 320                                      | 0.45                            | M30                       |
| iv.     | Very severe | 260                                      | 0.45                            | M20                       | 340                                      | 0.45                            | M35                       |
| v.      | Extreme     | 280                                      | 0.40                            | M25                       | 360                                      | 0.40                            | M40                       |

**Q5)** Attempt any two.

- a) Explain in detail effect of super-plasticizer on concrete. [4]
- b) Explain the role of retarders on workability of fresh concrete. [4]
- c) Write a short note on use of fly ash as admixture in concrete. [4]