

Total No. of Printed Pages:02

**SUBJECT CODE NO:- H-131**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Building Construction & Drawing**  
**(REVISED)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

N.B

- 1) Q. No. 1 And Q. No. 6 is compulsory.
- 2) Solve any two questions from remaining of Section A & B.

**Section A**

- |     |  |    |
|-----|--|----|
| Q.1 | Attempt <u>any five</u> of the following:-   | 10 |
|     | <ol style="list-style-type: none"> <li>1) Enlist the component of building.</li> <li>2) Explain super structure.</li> <li>3) Explain load bearing structure</li> <li>4) Define frame structure</li> <li>5) Explain partition wall.</li> <li>6) Advantages/benefits of cavity wall.</li> <li>7) Define foundation.</li> </ol> |    |
| Q.2 | a) What are the different types of partition walls explain any two in detail.  | 08 |
|     | b) What do you mean by building bye laws explain in detailed?  | 07 |
| Q.3 | a) What do you understand by setting out of foundation? Explain with neat sketch.  | 08 |
|     | b) Write a detailed note on energy efficient building.   | 07 |
| Q.4 | a) Write detailed note on foundation in black cotton soil.   | 08 |
|     | b) State the situation at which underpinning is required. Explain any one method.  | 07 |
| Q.5 | a) With the help of neat sketch, explain different types of spread footings for walls & columns.   | 08 |
|     | b) Enlist the causes of failure of foundation. Explain any two in detail.  | 07 |

Section B

- Q.6 Attempt any five of the following:- 10
- 1) Define riser and tread
  - 2) Define newel post & flight
  - 3) Explain thumb rule for stairs
  - 4) What is purpose of shoring?
  - 5) What is scaffolding?
  - 6) What is shoring give its type?
  - 7) What are different types of doors?
- Q.7 a) Write at length how fire proof construction is executed. 07
- b) Explain the conditions for good acoustics of a hall. 08
- Q.8 a) Discuss the common acoustical defect in auditorium hall. 05
- b) Plan a doglegged stair of building having height 3.8m and stair measures [2.7M×5.2M]. 10
- Q.9 Draw working drawing plan of residential building for a 5 member family in new Aurangabad. 15
- i) Plot size 12m×18m
  - ii) Scale 1:50
  - iii) Plinth Height 0.6m

Requirement: Verandah, Living Hall, Bedroom, Master Bedroom, WC & Bath, Kitchen, Dining room, store, provide doglegged staircase.

Draw:

- i) Working Drawing plan
- ii) Elevation
- iii) Section through Staircase
- iv) Schedule of Opening
- v) Construction Notes.

- Q.10 a) What safety measures are taken for prevention of accidents on construction site? 07
- b) Write a detailed note on repairs and retrofitting in RCC framed building. 08

Total No. of Printed Pages:04

**SUBJECT CODE NO:- H-111**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (All Branches)**  
**Engineering Mathematics - IV**  
**(REVISED)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

N.B

1. Q. No. 1 and 6 are compulsory
2. Solve any two questions from the remaining questions of each section
3. Figures to the right indicate full marks
4. Assume suitable data, if necessary

**Section: A**

Q.1 Attempt any five

10

1. If  $L\{J_0(t)\} = \frac{1}{\sqrt{s^2+1}}$  then find  $L\{J_0(3t)\}$
2. Find Laplace transform of  $\cos t \log t \delta(t - \pi)$
3. Find inverse Laplace transform of  $\frac{e^{-3s}}{s^2-1}$
4. Find inverse Laplace transform of  $\frac{1}{s^2-2s+17}$
5. Find inverse z-transform of  $\frac{z}{(z-1)(z-2)}$  by residue method

**OR**Solve by direct integration method  $\frac{\partial^2 u}{\partial x \partial t} = e^{-t} \cos x$ 

6. Find z-transform of  $\sinh \frac{\pi}{2} k, k \geq 0$

**OR**

Form a partial differential equation by eliminating a and b from the equation

$$z = (x + a)(y + b)$$

7. Find z-transform of  $f(k) = 3^k k, k \geq 0$

**OR**Solve  $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = u, u(0, y) = 3e^{-3y}$ 

8. Find z- transform of  $f(k) = \cos 2k, k \geq 0$

OR

Solve  $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial y}$ , where  $u(x, 0) = 6e^{-3x}$

Q.2 a. Find Z- transform of  $3^k \sin(2k + 5)$  05

OR

Solve  $y^2 zp + x^2 zq = y^2 x$  by Lagrange's method of linear partial differential equations

b. Find Laplace transform of  $e^{-3t} \int_0^t t \sin 3t dt$  05

c. Find inverse Laplace transform of  $\log \left( \frac{s+a}{s+b} \right)$  05

Q.3 a. Find z-transform of  $k^2 f(k)$  if  $f(k) = 3^k, k \geq 1$  05

OR

Solve  $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$ , where  $u(x, 0) = 6 e^{-3x}$

b. Find Laplace transform of  $f(t) \begin{cases} t, & 0 < t < 1 \\ 2 - t, & 1 < t < 2 \text{ and} \\ f(t) = f(t + 2) \end{cases}$  05

c. Find inverse Laplace transform of  $\frac{1}{(s^2+1)(s^2+4)}$  by using convolution theorem 05

Q.4 a. Find inverse z- transform of  $\frac{z}{(z-2)(z-3)}$  by partial fraction 05

OR

Solve the equation  $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$  with boundary conditions

$u(x, 0) = 3 \sin n\pi x, u(0, t) = 0$   
and  $u(1, t) = 0$ , where  $0 < x < 1, t > 0$

b. Evaluate  $\int_0^\infty e^{-2t} \sin^3 t dt$  05

c. Solve  $y'' - 4y' + 3y = 6t - 8, y(0) = 0$   
 $y'(0) = 0$  by Laplace transform 05

- Q.5 a. Solve the difference equation by z-transform  
 $y(k + 2) - 4y(k) = 0$ , given  
 That  $y(0) = 0, y(1) = 2$

05

OR

Solve  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$  subject to conditions

$u(0, y) = 0, \quad u(\pi, y) = 0,$

$u(x, 0) = 100 \quad \text{and} \quad u(x, \infty) = 0$

- b. Express the given function into Heaviside unit step function and hence find its Laplace transform

05

$f(t) = t^2, \quad 0 < t < 1$   
 $= 4t, \quad t > 1$

- c. Find inverse Laplace transform of  $\frac{s e^{-3s}}{s^2 + 8s + 25}$

05

**Section: B**

- Q.6 Attempt any five

10

- a. Find  $f(2)$  for the data

x:	0	1	4
f(x)	4	3	24

- b. Find the first approximate value of the root (i.e.  $x_1$ ) by Newton raphson method for  $\log x = \cos x$

- c. Find the values of x, y, z in the first iteration by Gauss seidal method

$10x + 2y + z = 69$

$x + 8y + 2z = -3$

$2x - y + 20z = 76$

- d. Find the values of  $k_1$  and  $k_2$  while solving the D.E.

$\frac{\partial y}{\partial x} = 3e^x + 2y, \quad y(0) = 0, \quad \text{Take } h = 0.1 \text{ by runge-kutta fourth order method}$

- e. Verify whether  $f(z) = \sin z$  is analytic

- f. Find the image of  $|z| = 2$  under  $w = \frac{1}{z}$

- g. Evaluate  $\int_c (x + y)dx + (2y - x)dy$  where c is the straight line  $y=x$  joining the points  $(0,0)$  to  $(3,3)$

h. Find the residues of  $\frac{z}{(z+3)(z-2)}$  at each of its poles

Q.7 a. Fit a second degree parabola to the following data 05

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

b. Apply the Runge-Kutta fourth order method to find  $y(1.1)$  given that, 05

$$\frac{dy}{dx} = 3x + y^2, \quad Y(1) = 1.2, \quad h = 0.1$$

c. If  $f(z) = u + iv$  is analytic then find  $f(z)$  if  $u + v = e^x(\cos y + \sin y)$  05

Q.8 a. Using Lagrange's formula find  $f(2)$  from the data 05

x	0	1	4	5
f(x)	4	3	24	39

b. Evaluate  $\int_c \frac{e^{-z}}{(z+2)^3} dz$ , where  $c$  is the circle  $|z| = 3$ , by Cauchy's integral formula 05

c. Show that  $u = \log \sqrt{x^2 + y^2}$  is harmonic hence find harmonic conjugate 05

Q.9 a. Find the root of the equation  $2(x - 3) = \log_{10} x$  by Newton Raphson method 05

b. Evaluate  $\int_c \frac{dz}{\sinh z}$ , where  $c$  is  $|z| = 4$  by Cauchy's residue theorem 05

c. Find the bilinear transformation which maps the points  $z=1, i, -1$  into the points  $w=i, 0, -i$  05

Q.10 a. Expand  $f(z) = \frac{1}{z^2 - 4z + 3}$  by Laurent series for  $1 < |z| < 3$  05

b. Solve by using Gauss-Seidel method 05

$$\begin{aligned} 10x + 2y + z &= 9 \\ 2x + 20y - 2z &= -44 \\ -2x + 3y + 10z &= 22 \end{aligned}$$

c. Evaluate  $\int_{(0,0)}^{(1,1)} (3x^2 + 4xy + ix^2) dz$  along  $y=x$  05

Total No. of Printed Pages:04

**SUBJECT CODE NO:- H-112**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (All Branches)**  
**Engineering Mathematics –IV**  
**(OLD)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i. Q.No.1 and 6 are compulsory.
  - ii. Solve any two questions from remaining of each section.
  - iii. Figures to the right indicate full marks.
  - iv. Assume suitable data, if necessary.

**SECTION-A**

Q.1 Solve any five from the following 10

- a) Determine the analytic function whose real part is  $2x(1 - y)$ .
- b) Show that  $u = r^n \cos n\theta$  is harmonic.
- c) Show that the image of the line  $x = 0$  under the transformation  $w = e^z$  is a circle.
- d) Evaluate  $\int_0^{1+i} z^2 dz$  along the line  $y = x$ .
- e) Evaluate  $\int_c \frac{e^z}{(z-1)^2} dz$  where  $c : |z| = 2$ .
- f) State Cauchy's residue theorem.
- g) Solve  $\frac{\partial z}{\partial x} + 4z = \frac{\partial z}{\partial t}$ , where  $z(x, 0) = 4e^{-3x}$

OR

Find Z-transform of  $f(k) = a^k$ .

- h) Solve  $\frac{\partial u}{\partial t} = 4 \frac{\partial^2 u}{\partial x^2}$

OR

Find Z-transform of  $f(k) = \cos 2k$ .

Q.2 a) Determine analytic function  $f(z) = u + iv$  whose imaginary part is  $e^{-x}(x \sin y - y \cos y)$ . 05

- b) Show that  $w = \frac{i-z}{i+z}$  maps the real axis of  $z$ -plane into the circle  $|w| = 1$  and the half plane  $y > 0$  into the interior of the unit circle  $|w| = 1$  in the  $w$ -plane. 05

- c) Solve  $\frac{\partial u}{\partial t} = \beta^2 \frac{\partial^2 u}{\partial x^2}$  subject to the conditions 05
- i.  $u(0, t) = u(l, t) = 0$  for all  $t$
  - ii.  $u(x, 0) = x$  in  $0 < x < l$
  - iii.  $u(x, \infty)$  is finite.

**OR**

Find Z-transform of  $3^k \sin(3k - 2)$ .

- Q.3
- Show that  $v = r^2 \sin 2\theta + r \sin \theta$  is harmonic. Find its harmonic conjugate and hence find corresponding analytic function. 05
  - Evaluate  $\int_{1-i}^{2+i} (2x + iy + 1) dz$  along  $x = t + 1; y = 2t^2 - 1$  05
  - Solve  $\frac{\partial^2 u}{\partial t^2} = C^2 \frac{\partial^2 u}{\partial x^2}$  subject to the conditions 05
    - $u(0, t) = u(l, t) = 0$  for all  $t$ .
    - $\frac{\partial u}{\partial t} = 0$  when  $t = 0$
    - $u(x, 0) = a \sin \frac{\pi x}{l}$

**OR**

Find inverse z-transform of  $\frac{z}{(z^2+7z+10)}$

- Q.4
- Expand  $f(z) = \frac{1}{(z^2-3z+2)}$  for  $1 < |z| < 2$  05
  - Evaluate  $\oint_c \frac{\cos z}{(z-\pi)^3} dz$  where  $c$  is  $|z - 1| = 3$  05
  - Solve  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$  05  
 Subject to the conditions
    - $u = 0$  when  $y \rightarrow \infty$  for all  $x$
    - $u = 0$  when  $x = 0$  for all  $y$
    - $u = 0$  when  $x = 1$  for all  $y$
    - $u = x(1 - x)$  when  $y = 0$  for  $0 < x < 1$

**OR**

Solve the difference equation by z-transform

$$u_{k+2} + 4u_{k+1} + 3u_k = 3^k \text{ with } u_0 = 0, u_1 = 1$$

- Q.5
- Find the bilinear transformation which maps the point  $z = 1, i, -1$  into the points  $w = i, 0, -i$ . 05
  - Evaluate  $\oint_c \frac{z \sec z}{(1-z)^2} dz$  where  $c$  is the circle  $|z| = 2$  by residue theorem 05
  - Evaluate  $\int_0^{2\pi} \frac{d\theta}{1-2a \sin \theta + a^2}, 0 < a < 1$ . 05



SECTION B

- Q.6 Solve any five from the following. 10
- a) Define Laplace Transform and find  $L\{e^t\}$ .
  - b) Find Laplace Transform of  $\sin^2 2t$ .
  - c) Find Laplace Transform of  $f(t) = e^{t-2}, t > 2$   
 $= 0, t < 2$
  - d) Find inverse Laplace transform of  $\frac{2s+1}{s(s+1)}$
  - e) Find inverse Laplace transform of  $\frac{e^{-\pi s}}{s^2+4}$
  - f) Find inverse Laplace transform of  $\frac{s}{(s-3)^5}$
  - g) Find the Fourier sine transform of  $\frac{1}{x}$
  - h) Find the Fourier sine transform of  $f(x) = 1, |x| < a$   
 $= 0, |x| > a$
- Q.7
- a) Find Laplace Transform of  $e^{3t} \int_0^t t \cosh 3t dt$  05
  - b) Find inverse Laplace transform of  $\log \left[ \frac{s+3}{s+2} \right]$  05
  - c) Solve  $\frac{\partial u}{\partial t} = k \frac{\partial^2 u}{\partial x^2}, -\infty < x < \infty$  05  
Subject to the conditions
    - i.  $u$  and  $\frac{\partial u}{\partial x} \rightarrow 0$  as  $x \rightarrow \pm\infty$
    - ii.  $u(x, 0) = \begin{cases} u_0 & |x| \leq a \\ 0 & |x| \geq a \end{cases}$
- Q.8
- a) Evaluate  $\int_0^\infty e^{-3t} \sin^3 t dt$  05
  - b) Find inverse Laplace transform of  $\frac{s}{(s^2+a^2)^2}$  by convolution theorem. 05
  - c) Solve the integral equation  $\int_0^\infty f(x) \cos px dx = \begin{cases} 1-p; & 0 < p < 1 \\ 0; & p > 1 \end{cases}$  05

- Q.9
- a) Find the Laplace Transform of  $f(t) = \begin{cases} 1 & ; 0 \leq t \leq 2 \\ -1 & ; 2 \leq t \leq 4 \end{cases}$  where  $f(t+4) = f(t)$  05
- b) Solve  $\frac{dy}{dt} + 3y + 2 \int_0^t y dt = t, y(0) = 0$  by Laplace Transform. 05
- c) Find Fourier sine transform of  $f(x) = e^{-x}$  and evaluate  $\int_0^{\infty} \frac{x \sin kx}{1+x^2} dx$  05
- Q.10
- a) Express the following function in term of Heaviside unit step function and hence find Laplace Transform  $f(t) = \begin{cases} t^2 & ; 0 < t < 1 \\ 4t & ; t > 1 \end{cases}$  05
- b) Solve by Laplace Transform  $\frac{dx}{dt} - y = e^t; \frac{dy}{dt} + x = \sin t, \text{subject to } x(0) = 1; y(0) = 0.$  05
- c) Find Fourier sine Transform of  $f(x) = \frac{e^{-ax}}{x}$  05

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-166**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Fluid Mechanics – II**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

- N.B Please check whether you have got the right question paper.
- i) Q.No.1 and Q.No.6 are compulsory.
  - ii) Solve any two questions from the remaining questions in each section.
  - iii) Assume suitable data, if necessary.

**Section: A**

- Q.1 Solve any five from following. 10
- i) Define Gradually and Rapidly varied flow in open channel.
  - ii) Define back water curve.
  - iii) What is energy dissipater?
  - iv) Define drag, Aerofoil and Magnus effect.
  - v) What do you mean by fundamental dimension?
  - vi) Enlist the types of forces acting in moving fluid.
  - vii) Find the critical depth of the water flowing through a rectangular channel of width 5m, and discharge is  $15\text{m}^3/\text{sec}$ .
  - viii) Define laminar boundary layer.
  - ix) Find the perimeter for rectangular channel with depth 6.0M and width 8.0M.
  - x) Define velocity defect.
- Q.2 a) Show that minimum specific energy is 1.5 times the critical depth for a rectangular channel. 07
- b) A channel is to be designed to give a constant mean velocity of flow of  $1.8\text{m}/\text{sec}$  at all depth of flow. The lower portion of the channel to carry the minimum discharge is rectangular and the best proportion, the bottom width being 1.5m. Determine the depth of flow when width of water surface is 9m. If Manning's  $N=0.015$ , find the channel bed slope. 08
- Q.3 a) Explain the term hydraulic jump. Derive an expression for the depth of hydraulic jump in terms of upstream Froude Number. 07
- b) The discharge of water through a rectangular channel of width 8.5m is  $16\text{m}^3/\text{s}$ , when depth of flow of water is 1.3m. Determine
- i) Specific energy of flowing water.
  - ii) Critical depth and critical velocity.
  - iii) Value of minimum specific energy.
- Q.4 a) Derive an expression for force exerted by jet of water on Inclined plane surface, body is moving. 07

- b) The head of water from the centre of the orifice which is fitted to one side of the tank is maintained at 3.0M of water. The tank is not allowed to move and the diameter of orifice is 15cm. find the force exerted by the jet of water on the tank. Take  $C_v = 0.97$ . 08

Q.5 Write short notes on following(any three) 15

- i) Current meter.
- ii) Specific energy curve.
- iii) Hydraulic jump in open channel.
- iv) Types of boundary layer theory.
- v) Venturiflume.

**Section: B**

Q.6 Solve any five from the following. 10

- i) Define impact of jet.
- ii) Draw inlet and outlet of velocity triangle for pelton wheel turbine.
- iii) Define jet propulsion of ships.
- iv) State Buckingham's  $\pi$  – Theorem.
- v) State Rayleigh's method.
- vi) Determine the dimension of angular velocity and discharge.
- vii) A turbine develops 9000kw when running at a speed of 140r.p.m. and under a head of 30m. Determine specific speed of the turbine.
- viii) If  $u_2 = 28.0$  m/s &  $u_1 = 14.0$  m/s, Determine manometric head.
- ix) Define jet ratio in case of pelton wheel turbine.
- x) Define centrifugal pump.

Q.7 a) Obtain an expression for jet propulsion of ship when the inlet orifice face the direction of the motion of the ship. 07

b) Explain with neat sketch working of centrifugal pump. 08

Q.8 a) Obtain an expression for unit speed, unit discharge and unit power of a turbine. 07

b) A Pelton wheel has a mean bucket speed of 35m/s with a jet of water flowing at the rate of  $1 \text{ m}^3/\text{sec}$ . under a head of 270m .The buckets deflect the jet through an angle of  $170^\circ$ . Calculate the power delivered to the runner and hydraulic efficiency. Coefficient of velocity at 0.98. 08

Q.9 a) Obtain an expression for work done and power required to drive a double acting pump. 07

b) A centrifugal pump discharging 400lit/sec. against a head of 25M running at 1200r.p.m. If the vane angle at outlet is  $30^\circ$  , and the diameter and width of impeller at outlet are 400 mm and 15mm respectively. Calculate manometric efficiency. 08

Q.10 Write a short notes on following (any three) 15

- i) Governing of turbine.
- ii) Multistage centrifugal pump.
- iii) Dimensional homogeneity & dimensionless number.
- iv) Working of reciprocating pump.
- v) Distorted and un-distorted model.

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**SUBJECT CODE NO: H-301**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (All Branches)**  
**Engineering Mathematics - III**  
**(OLD)**

[Time: Three Hours]

[Max.Marks:80]

N.B

Please check whether you have got the right question paper.

- i) Questions number 1 and 6 are compulsory.
- ii) Attempt any two questions from the remaining each section.
- iii) Figures to the right indicate full marks.
- iv) Assume suitable data if necessary.

**SECTION – A**

Q.1 Solve any five from the following:

10

- a) Solve  $(D^2 - 6D + 25)y = 0$
- b) Solve  $(D^2 - 4D + 5)y = 0$
- c) Find the particular integral of  $(D^2 - 4)y = x^2$
- d) Solve  $(x^2D^2 + xD - 1)y = 0$
- e) If 2lb weight is pulled 6 inches below its equilibrium position and then released. Assuming a spring constant  $k = 16lb/ft$ , damping force  $2 \frac{dx}{dt}$  Set- up the equation of motion.
- f) A circuit consists of an inductance of 0.05 henry, a resistance of 5 ohms and a Condenser of capacitance  $4 \times 10^{-4}$  farad, with constant EMF of 110 volts. Set-up the differential equation.
- g) In a certain manufacturing process 5% of the tools produced turn out to be defective. Find the probability that in a sample of 40 tools, at most 2 will be defective.
- h) The marks of 1000 students in a university are found to be normally distributed with mean 70 and standard deviation 5. Find the number of students whose marks will be less than 68.

- Q.2 a) Solve  $(D^2 - 6D + 13)y = 8e^{3x} \sin 4x$  05
- b) If a weight 6lb hangs from a spring with constant  $k = 12$  and no damping force exists. Find the motion of weight when an external force  $3\cos 18t$  acts. Initially  $x = 0, \frac{dx}{dt} = 0$  at  $t = 0$ . Determine whether the resonance occurs. 05
- c) Calculate the mean deviation from mean of the following data: 05

x	0-6	6-12	12-18	18-24	24-30
f	8	10	12	9	5

- Q.3 a) Solve  $(D^3 - 2D + 4)y = 3x^2 - 5x + 2$  05
- b) A one henry inductance, a 4 microfarad capacitor and EMF of  $180 \cos 40t$  are connected in series. Find the charge  $Q$  and the current  $i$ , if  $i = Q = 0$  at  $t = 0$ . 05
- c) Suppose that life of a gas cylinder is normally distributed with mean of 40 days and a standard deviation of 5 days. If at a time 10,000 cylinders are issued to customer's, how many will need replacement after 35 days? 05

- Q.4 a) Solve  $(D^2 + 5D + 6)y = e^{e^x}$  by using general method. 05
- b) A long column of length  $l$  fixed at one end is completely free at other. If the load  $P$  is axially applied at the free end. Its deflection is given by 05

$$EI \frac{d^2y}{dx^2} = P(a - y)$$

Where the origin is taken at the fixed end and 'a' is the lateral displacement of the free end. Show that the deflection curve is given by

$$y = a \left[ 1 - \cos \left( \sqrt{\frac{P}{EI}} x \right) \right]$$

- c) Compute mean, variance,  $\beta_1$  and  $\beta_2$  if the first four moments about a value 5 of a variable are given as 2, 20, 38 and 52. 05
- Q.5 a) Solve  $(D^2 + 4)y = \frac{1}{1 + \cos 2x}$  by using method of variation of parameter. 05
- b) Solve  $(x - 1)^3 \frac{d^3y}{dx^3} + 2(x - 1)^2 \frac{d^2y}{dx^2} - 4(x - 1) \frac{dy}{dx} + y = 4 \log(x - 1)$  05

- c) Fit a straight line to the following data:

05

x	1	2	3	4
y	3	7	13	21

SECTION – B

Q.6 Solve any five from the following:

10

- If  $\vec{F} = x \cos z i + y \log x j - z^2 k$  find  $\text{curl } \vec{F}$
- Find the unit vector normal to the surface  $xy^3z^2 = 4$  at the point  $(-1, -1, 2)$
- Find the constant 'a' if  $\vec{F} = (x + 3y^2)i + (2y + 2z^2)j + (x^2 + az)k$  is solenoidal.
- Evaluate  $\int_C \vec{F} \cdot d\vec{r}$ , where  $\vec{F} = \cos y i - x \sin y j$  and C is the curve  $y = \sqrt{1 - x^2}$  in xy-plane from  $(1,0)$  to  $(0,1)$
- State Stoke's theorem.
- Find the first approximate root of the equation  $xe^x - \cos x = 0$  using Newton Raphson method.
- Find the first approximate solution of the equation  $8x - 3y + 2z = 20,$   
 $4x + 11y - z = 33,$   
 $2x + y + 4z = 12$   
by Gauss Seidal method.
- Find the missing term in the following:

x	0	1	3	4
f(x)	5	6	--	105

Q.7

- Find the directional derivative of  $\frac{1}{r}$  in the direction of  $\vec{r}$ , where  $\vec{r} = xi + yj + zk$  05
- Find the work done in moving a particle in the force field  $\vec{F} = 3x^2i + (2xz - y)j + zk$  along the straight line joining the points  $(0,0,0)$  and  $(2,1,3)$  05
- Find the real root of the equation  $x + \log x = 2$  by Newton – Raphson method correct to three decimal places. 05

- Q.8 a) Prove that  $\nabla^4 e^r = \left(1 + \frac{4}{r}\right) e^r$  05
- b) Evaluate Green's theorem for  $\int_C (3x + 4y)dx + (2x - 3y)dy$  with  $C: x^2 + y^2 = 4$  05
- c) Given  $\frac{dy}{dx} = x^2 - y, y(0) = 1$ , find  $y(0.1)$  and  $y(0.2)$  using Runge – Kutta fourth order method. 05
- Q.9 a) Prove that the vector field  $\bar{F} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$  is irrotational. Find the scalar potential  $\phi$  such that  $\bar{F} = \nabla\phi$ . 05
- b) Evaluate  $\iint_S \bar{F} \cdot \bar{d}s$  using Gauss divergence theorem, where  $\bar{F} = 2xyi + yz^2j + zxk$  and  $S$  is surface of the region bounded by  $x = 0, y = 0, z = 0, y = 3, x + 2z = 6$ . 05
- c) Solve the equations  $83x + 11y - 4z = 95, 7x + 52y + 13z = 104, 3x + 8y + 29z = 71$  by Gauss Seidal method. 05
- Q.10 a) Verify Stoke's theorem for  $\bar{F} = 4xzi - y^2j + yzk$  over the area in the plane  $z = 0$ , bounded by  $x = 0, y = 0, x^2 + y^2 = 1$  05

- b) From the following table, Obtain the first and second derivative at the point  $x = 0.96$  05

x	0.96	0.98	1.00	1.02	1.04
y	0.7825	0.7739	0.7651	0.7563	0.7473

- c) Taking  $h = 0.05$ , determine the value of  $y$  at  $x = 0.1$  by Euler's modified method, given that  $\frac{dy}{dx} = x^2 + y, y(0) = 1$  05



Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-358**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Fluid Mechanics-I**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

- N.B Please check whether you have got the right question paper.
- i) Q. No. 1 and Q. No.6 are compulsory.  
 ii) Solve any two questions from the remaining questions from each section.

**Section A**

- Q.1 Solve any five 10
- i) Explain the term surface tension
  - ii) Differentiate between liquid and gases
  - iii) What do you mean by the term viscosity?
  - iv) Differentiate between Real fluid and Ideal fluid
  - v) What is Hagen Poiseuille's formula?
  - vi) Define the term buoyancy and centre of buoyancy
  - vii) Calculate the pressure in Pascal when it is measured in terms of Mercury column of 5 cm.
  - viii) Define forced vortex flow.
  - ix) What do you mean by vacuum pressure?
  - x) Give classification of manometers.
- Q.2 (a) State and prove Pascal's law. 07  
 (b) Determine the total pressure on a circular plate of diameter 1.5m which is placed vertically in water in such a way that the centre of plate is 3 m below the free surface of water. Find the position of centre of pressure also. 08
- Q.3 (a) Draw neat diagram of inverted U-tube differential monometer and an expression for pressure heads. 07  
 (b) A solid cylinder of diameter 5 m as a height of 5 m. Find the metacentric height of cylinder if the specific gravity of the material of cylinder is 0.7 and it is floating in water with its axis vertical. State whether the equilibrium is stable or unstable. 08
- Q.4 (a) Derive an expression for the velocity distribution for the viscous flow through a circular pipe. Also sketch the velocity distribution and share stress distribution across a section of the pipe. 08  
 (b) A 30 cm diameter pipe conveying water, branches into two pipes of diameter 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s. 07

- Q.5 a) List out various types of fluid flow and explain any one of it. 05  
 b) Define laminar flow and turbulent flow and give example for each. 05  
 c) Explain stream function and its properties. 05

**Section B**

- Q.6 Solve any five. 10

- (a) State Bernoulli's theorem  
 (b) State the momentum equation.  
 (c) What is pitot-tube?  
 (d) Define an orifice.  
 (e) What do you mean by drowned weir?  
 (f) What is syphon?  
 (g) What is compound pipe?  
 (h) Draw neat diagram of submerged rectangular weir.  
 (i) Give Francis's formula for weir with velocity of approach.  
 (j) Explain the impulse-momentum equation.

- Q.7 (a) Derive Euler's equation of motion along a stream line for an ideal fluid stating clearly the assumptions. 07

- (b) A pitot-tube is inserted in a pipe of 300 mm diameter. The static pressure in pipe is 100 mm of mercury (vacuum). The stagnation pressure at the centre of the pipe, recorded by the pitot tube is  $0.981 \text{ N/cm}^2$ . Calculate the rate of flow of water through pipe, if the mean velocity of flow is 0.85 times the central velocity, take  $C_v=0.98$ . 08

- Q.8 (a) Derive an expression for flow through an external cylindrical mouthpiece. 07

- (b) The head of water over an orifice of diameter 100 mm is 12 m. The water coming out from orifice is collected in a circular tank of diameter 1.5m. The rise of water level in this tank is 1 m in 30 seconds. Also the coordinates of a point on the jet measured from vena – contracta are 4.3 m horizontal and 0.5 m vertical. Find the coefficients insurance  $C_d$ ,  $C_v$  and  $C_c$ . 08

- Q.9 (a) Prove that the head loss due to friction is equal to one third of the total head at inlet for maximum power transmission through pipes or nozzles. 07

- (b) Three pipes of length 800 m, 600 m and 300 m and a diameters 400 mm, 300mm and 200 mm respectively are connected in series. The ends of the compound pipe is connected to two tanks, whose water surface levels are maintained at a difference of 15 m. Determine the rate of flow of water through the pipes if  $f=0.005$ . What will be diameter of a single pipe of length 1700 m and  $f=0.005$ , which replaces the three pipes? 08

- Q.10 Write short note on

- (a) Discharge over broad crested weir. 05  
 (b) Velocity defect. 05  
 (c) Shear stress in turbulent flow. 05

Total No. of Printed Pages:04

**SUBJECT CODE NO: H-273**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Theory of Structure-I**  
**(Revised)**

[Time: Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

N.B

- i. Q.1 and Q.6 are compulsory.
- ii. Attempt any two questions from remaining questions from each section.
- iii. Assume suitable data wherever necessary.

**Section A**

Q.1 Attempt any five.

10

1. What are the different types of Butt joint in welded connection?
2. Assumption made in the theory of riveted joints.
3. State Castiglione's theorem.
4. Advantages of welded connection.
5. What are the different types of riveted connections?
6. How to determine the strength of rivet in single and double shearing?
7. What are the advantages of fixed beams?

Q.2 a) The welded lap joint is provided to connect two tie bar  $12\text{cm} \times 1\text{cm}$  as shown in figure (1). The working stress in the bar is  $150\text{ N/mm}^2$ . Investigate the design, if the size of the fillet is  $8\text{mm}$ . The safe stress for the end fillet weld and diagonal fillet weld may be taken as  $102.5\text{ N/mm}^2$  and  $80\text{ N/mm}^2$  respectively.

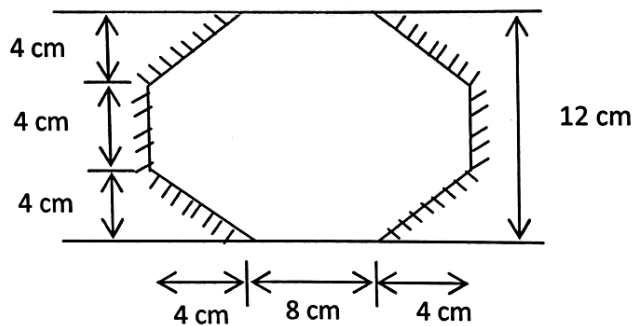


Fig. 1

- b) Two plates of 10 mm thickness are joined by double riveted lap joint, pitch of rivet is 75mm and diameter of rivet is 16mm. determine the strength of rivet and efficiency of joints. Take permissible shear stress  $90 \text{ N/mm}^2$ , permissible bearing  $160 \text{ N/mm}^2$  and permissible tearing stress  $120 \text{ N/mm}^2$ .

- Q.3 Find fixed end moments and support reactions for the beam shown in figure (2). Also draw SFD and BMD.

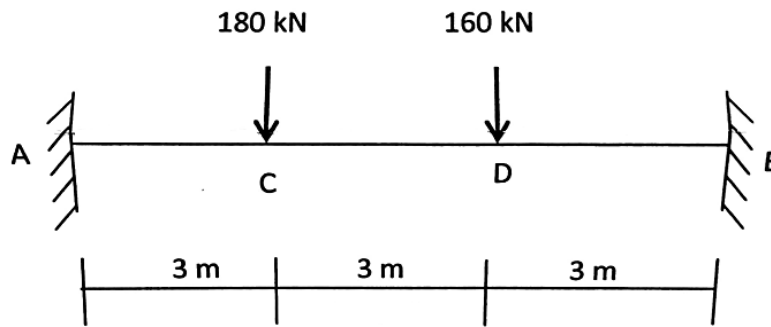


Fig.2

- Q.4 Determine the deflection of the simply supported beam as shown in figure (3) at its midpoint and also the position of maximum deflection. Take  $E = 200 \times 10^3 \text{ N/mm}^2$  and  $I = 4.3 \times 10^8 \text{ mm}^4$ .

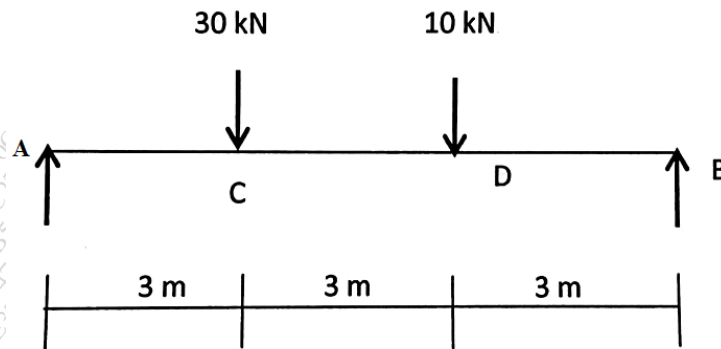


Fig.3

- Q.5 Find the vertical deflection of the joint "C" of the truss shown in figure (4). The cross sectional area of CD and DE each  $1000 \text{ mm}^2$  and for others  $1500 \text{ mm}^2$ . Take  $E = 200 \text{ GPa}$ .

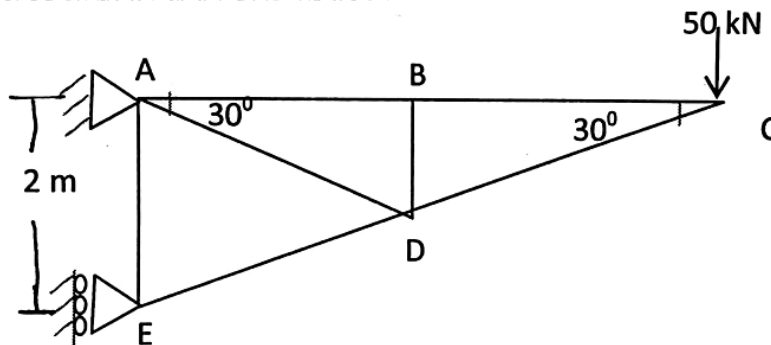


Fig. 4

Section B

Q.6 Attempt any five.

10

1. What are the stiffening girders?
2. Explain influence line diagram method.
3. State and explain Clapeyron's theorem.
4. Define radial shear and normal thrust.
5. Outline the advantages of continuous beams.
6. Draw neat sketch of three hinged arches
7. What is the radial shear?

Q.7 Draw SFD and BMD for a continuous beam as shown in figure (5).

15

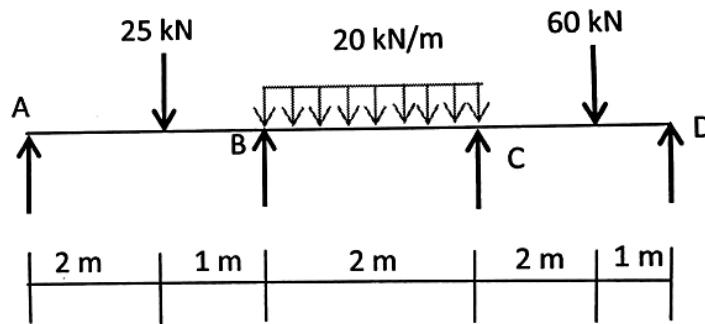


Fig. 5

Q.8 A train of a wheel load as shown (6) in figure cross a simply supported beam of span 25m from left to right with 25kN load loading using ILD, determine maximum BM under central loading.

15

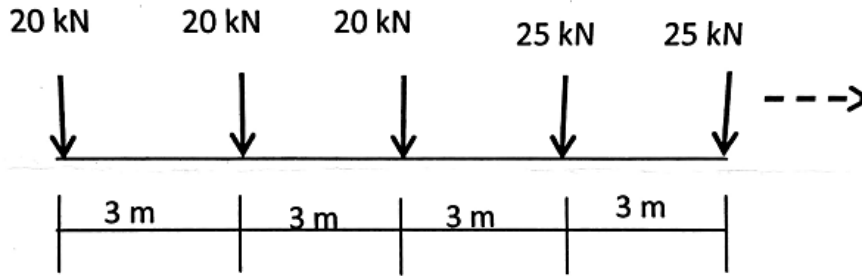


Fig. 6

Q.9 A parabolic three hinged arch has a span of 25m and central rise of 4.5m. it is loaded with UDL of 4kN/m over the left half of the span. Determine support reaction, horizontal thrust, normal thrust and radial shear at left quarter span.

15

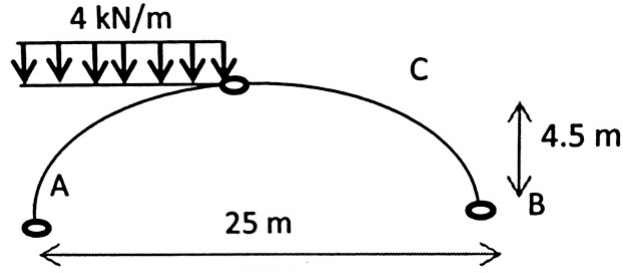


Fig. 7

Q.10 A three hinged stiffening girder of a suspension bridge 120m span and 10m deep is subjected to two 15 point loads of 250kN each at a distance of 25m from both ends. Find the BM & SF at distance of 40m from left support and also find the maximum tension in cable.

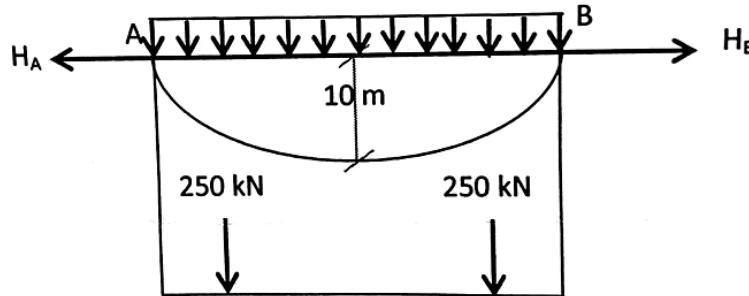


Fig.8

Total No. of Printed Pages:3

**SUBJECT CODE NO:- H-302**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (All)**  
**Engineering Mathematics – III**  
**(Revised)**

[Time: ThreeHours]

[Max.Marks: 80]

N.B Please check whether you have got the right question paper.

- 1) Q. No. 1 and Q. No. 6 are compulsory.  
 2) Solve any two questions from remaining questions of each section.  
 3) Figures to the right indicate full marks.  
 4) Assume suitable data, if necessary.

## Section – A

- Q.1 Solve any five from the following. 10
- Solve  $(D^2 - 13D + 36)y = 0$
  - Solve  $(D^3 - 7D - 6)y = 0$
  - Find particular integral (P.I.) of  $(D^3 + 1)y = 2^x$
  - Find Particular integral (P.I.) of  $(D^2 + 4)y = \sin 3x$
  - Write Kirchhoff's voltage law to electrical ckt.
  - Set – up the equation of motion of a body of weight 10kg attached to a spring given that 20 kg weight will stretch the spring to 10cm.
  - Find the Fourier cosine transform of  $f(x) = e^{-2x}$
  - Find the Fourier transform of  $f(x) = 1; \quad 0 < x < a$   
 $= 0 \quad \text{otherwise}$
- Q.2 05
- Solve  $(D^2 + 6D + 10)y = 50x$  05
  - An emf of 200v is in series with a 10 ohm resistance, a 1 henry inductor and 0.02 farad capacitor. At t=0 the charge Q and current I are zero. Find Q & I at any time t. 05
  - Solve  $(D^2 + 9)y = x \cos x$ . 05
- Q.3 05
- Solve  $(D^2 - 1)y = xe^x \sin x$  05
  - A body executive damped forced vibrations given by the equation 05  

$$\frac{d^2x}{dt^2} + 2k \frac{dx}{dt} + b^2x = e^{-kt} \sin wt$$
 Solve the equation for both the cases when  $w^2 \neq b^2 - k^2$  and  $w^2 = b^2 - k^2$ .
  - Find  $f(x)$  if  $Fs(\lambda) = \frac{e^{-a\lambda}}{\lambda}$  05

- Q.4
- a)  $(x + 1)^2 \frac{d^2y}{dx^2} + (x + 1) \frac{dy}{dx} + y = 2 \sin \log(x + 1)$  05
- b) The differential equation satisfied by beam uniformly loaded with one end fixed & second end subjected to a compressive force is given by  $EI \frac{d^2y}{dx^2} = py - \frac{1}{2}wx^2$  show that the elastic curve for the beam With condition  $y = 0, \frac{dy}{dx} = 0$  at  $x = 0$  given by  $y = \frac{w}{pn^2} (1 - \cos nx) + \frac{wx^2}{2p}$ , where  $n^2 = \frac{p}{EI}$  05

- c) Express  $f(x) = 1, 0 \leq x \leq \pi$  as a Fourier sine integral and hence evaluate  $\int_0^\infty \frac{(1 - \cos \pi \lambda) \sin \lambda x}{\lambda} d\lambda$ ,  $x > \pi$  05

- Q.5
- a) Solve by using the method of variation of parameters.  $(D^2 + 4)y = \sec 2x$  05
- b) Solve the integral equation  $\int_0^\infty f(x) \cos \lambda x dx = e^{-\lambda}$  05
- c) Solve  $x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} - 4y = x + 2 \log x$  05

Section – B

- Q.6 Solve any five from the following. 10

- a) Find the mean of the following data

Class	0-10	10-20	20-30	30-40	40-50
Frequency	14	17	22	26	23

- b)  $\nabla \cdot \vec{r} \text{ if } \vec{r} = xi + yj + zk$
- c) State Green's Theorem.
- d) Find  $\nabla \phi$  at  $(1,1,1)$  if  $\phi = x^2 + y^2 + z^2$ .
- e) Find the area under the normal curve between  $z = 0$  to  $z = 2$ .
- f) Find the Karl Pearson's coefficient of skewness if mean =3, mode = 5.2 and Standard Deviation = 2.5
- g) Show that  $\vec{A} = 3y^4z^2i + 4x^3z^2j - 3x^2y^2k$  is solenoidal.
- h) The probability of certain college students will pass is 0.8 Determine the probability that out of 10 students exactly 6 will pass.



Q.7 a) Evaluate  $\int_C [(x^2 + 2y)dx + (4x + y^2)dy]$  by Green's theorem, where c is the boundary of the region bounded by  $y = 0$ ,  $y = 2x$  and  $x + y = 3$ . 05

b) Show that  $\vec{F} = (y^2 - z^2 + 3yz - 2x)i + (3xz + 2xy)j + (3xy - 2xz + 2z)k$  is both solenoidal and irrotational. 05

c) Find the Karl Pearson's coefficient of skewness for the following data. 05

Marks	0-5	5-10	10-15	15-20	20-25	25-30
No. of Students	4	6	8	12	7	2

Q.8 a) Find the directional derivative of  $\phi = xy^2 + yz^2$  at the point  $(2, -1, 1)$  in the direction of the vector  $i + 2j + 2k$ . 05

b) Determine the equation for the regression line of the force on time for the following data 05

Force	11.4	18.7	11.7	12.3	14.7	18.8	19.6
Time	0.56	0.35	0.55	0.52	0.43	0.34	0.31

c) Evaluate by Stokes theorem  $\iint_S \nabla \times \vec{F} \cdot \hat{n} ds$  for the vector field  $\vec{F} = 4yi - 4xj + 3k$ , where S is a disk of radius one lying on the plane  $z = 1$ . 05

Q.9 a) The mean I.Q. of large number of children of age 14 is 100 with standard deviation 16. Assuming the distribution of I.Q. is normal, find the percentage of children having I.Q. between 70 to 120. 05

b) Evaluate  $div(\vec{r} \times \vec{a})$ , where  $\vec{a}$  is a constant vector and  $\vec{r} = xi + yj + zk$ . 05

c) Find the work done in moving a particle in the force field given by  $\vec{F} = yi + zj + xk$  along the parabola  $y^2 = x$  from the origin to the point  $4i + 2j$ . 05

Q.10 a) Find the standard deviation of the following data 05

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	10	15	25	25	10	10	5

b) Express  $\iiint (y^2z^2i + z^2x^2j + z^2y^2k) \vec{ds}$  as a volume integral. Evaluate it by Gauss divergence theorem over the upper part of the sphere  $x^2 + y^2 + z^2 = 1$  above the XY plane. 05

c) Show that vector field  $\vec{A}$  is irrotational. Find scalar potential function  $\phi$  such that  $\vec{A} = \nabla\phi$  if  $\vec{A} = y^2i + 2xyj - z^2k$ . 05

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-202**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Surveying-II**  
**(OLD)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B.
- i. Solve any two questions from question no. 2 to 5 any two question no. 7 to 10.
  - ii. Question no.1 and question no. 6 are compulsory.
  - iii. Figures to the right indicate the maximum marks.
  - iv. Assume suitable data. If any.
  - v. Non – programmable Calculator is allowed.

**SECTION – A**

- Q.1 Answer the following questions (Any five) 10
- a) Mention various kinds of errors in surveying?
  - b) Give the formulae for the correction to be applied to cylindrical signals?
  - c) What is the principle of Triangulation?
  - d) What is meant by eccentricity of signal?
  - e) Enlist various types of signals?
  - f) How strength of figure is determined?
  - g) Enlist different types of Engineering Survey?
- Q.2 a) What is meant by a satellite station and reduction to center? Derive expression for reducing the angles measured at the satellite station to center. 08
- b) The following values were recorded for a triangle ABC the individual measurement being 07
- A* = 62° 29' 18" : 6 observations  
*B* = 56° 45' 38" : 8 observations  
*C* = 60° 46' 52" : 6 observations
- Find the correct values of the angles?
- Q.3 a) What is figure adjustment in case triangulation survey? Explain in detail? 08
- b) Explain in details about the route surveys for highway projects? 07
- Q.4 a) Find the most probable values of the angles A and B from the following observation of station 08
- o.
- A* = 9° 50' 38" weight 2  
*B* = 54° 39' 50" weight 3  
*A* + *B* = 104° 4' 130" weight 4
- b) Write step by step procedure of setting out of building? 07

- Q.5 Write a short notes on (Any Three) 15
- Independent quantity and Conditioned quantity.
  - City surveying
  - Kind of errors.
  - Instruments used in geodetic surveying.

SECTION – B

- Q.6 Answer the following questions (Any five) 10
- What are different types of curves?
  - What is trigonometrical leveling?
  - Define super elevation? Why is it provided?
  - Differentiate between EDN and total station?
  - Enlist different types of electronic distance measurement instrument?
  - Explain the principle of EDM?
  - What is meant by shift curve?

- Q.7 a) Two tangents AB and BC intersect at B, another line DE interest AB & BC at D and E such that  $\angle ADE = 150^\circ$  &  $DEC = 140^\circ$  the radius of the first curve is 200m and that of second is 300m. Calculate all the data necessary for setting out the compound curve. 08
- b) Write step by step procedure of Setting out of curves by using the method of offsets from the long chord? 07

- Q.8 a) State the properties of electromagnetic waves? 08
- b) Enlist different types of Electronic distance measurement instruments? Explain any one? 07

- Q.9 a) What is single plane and double plane methods of trigonometrical leveling? Explain in brief? 08
- b) An instrument was set up at P and the angle of elevation to a vane 4m above the foot of the staff held at Q was  $9^\circ 30'$ . The horizontal distance between P & Q known to be 2000 meters. Determine the R.L. of the staff station Q? (Given that the R.L of the instrument axis was 2650.4m.) 07

- Q.10 Write a short notes on (any Three) 15
- Vertical curve
  - Indirect leveling
  - Difference in between transition curve and compound curve.
  - Total Station.

Total No. of Printed Pages: 02

**SUBJECT CODE NO:- H-132**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Building Construction & Drawing**  
**(OLD)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N. B
1. Q. No. 1 and Q. No. 6 are compulsory.
  2. Solve any two questions from remaining questions from section A and section B.
  3. Assume suitable data, if necessary
  4. Use separate drawing sheet for solving Q. No. 7 of section B.

## Section A

- |      |   |          |
|------|---|----------|
| Q. 1 | Attempt any five  | 10       |
|      | <ol style="list-style-type: none"> <li>a) Enlist the different types of building as per the National Building Code of India.</li> <li>b) What are the benefits of cavity wall construction?</li> <li>c) What is setback line?</li> <li>d) What is FSI?</li> <li>e) Enlist the types of loads acting on foundation.</li> <li>f) Enlist the different components of a framed building in order of construction.</li> <li>g) What is the difference between floor area and carpet area?</li> </ol> |          |
| Q. 2 | <ol style="list-style-type: none"> <li>a) Classify the building as per the National Building code-2005. Explain any two building in details.</li> <li>b) Differentiate between load bearing structure and framed structure.</li> </ol>  | 08<br>07 |
| Q. 3 | <ol style="list-style-type: none"> <li>a) Enlist the various principles of planning of building. Explain any two in detail.</li> <li>b) Write a note on building bye-laws.</li> </ol>   | 08<br>07 |
| Q. 4 | <ol style="list-style-type: none"> <li>a) What are the causes of failure of foundation? Explain any two in detail.</li> <li>b) Explain Underpinning in detail with suitable sketch.</li> </ol>  | 08<br>07 |
| Q. 5 | <ol style="list-style-type: none"> <li>a) Write a note on- Foundation in black cotton soil.</li> <li>b) Draw a template of submission drawing showing all the details required along with construction notes and area statement.</li> </ol>   | 08<br>07 |

Section B

- Q. 6 Attempt any five 10
- a) Who is soffit?
  - b) Define reverberation of sound.
  - c) Define foundation and mention its objects.
  - d) What is the purpose of scaffolding?
  - e) Enlist the safety gear which is essential for working on construction site.
  - f) What is a threshold?
  - g) What is the purpose of landing?
- Q. 7 Draw a plan of residential bungalow for a family in new Aurangabad township 15  
 Plot size-13 m × 17m.  
 Scale – 1:50  
 Plinth Height – 0.9 m  
 Required Components – Drawing hall, kitchen, Master bedroom- 1 No, Bedroom – 1 No,  
 Dog –legged staircase, WC and bath. Draw-
- 1) Working drawing plan
  - 2) Elevation
  - 3) Section through WC/ bath and staircase
  - 4) Schedule of opening
  - 5) Construction notes
- Q. 8 a) Write a note on Escalators. 08  
 b) With the help of neat sketches discuss the various types of stairs and their suitability. 07
- Q. 9 a) Enlist the various methods of damp proofing. Explain any one. 08  
 b) Write a note on wall cladding. 07
- Q. 10 a) Write a short note on Raking Shoring. 08  
 b) Write a detailed note on fire safety requirements for buildings. 07

Total No. of Printed Pages:3

**SUBJECT CODE NO:- H-322**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Strength of Materials**  
**(Old)**

[Time: Three Hours]

[Max.Marks: 80]

Please check whether you have got the right question paper.

- N.B
1. Q.No.1 and Q.No.6 are compulsory and Attempt any two questions from remaining questions from each section.
  2. Non-programmable calculator is allowed.
  3. Figure to right indicate full marks.

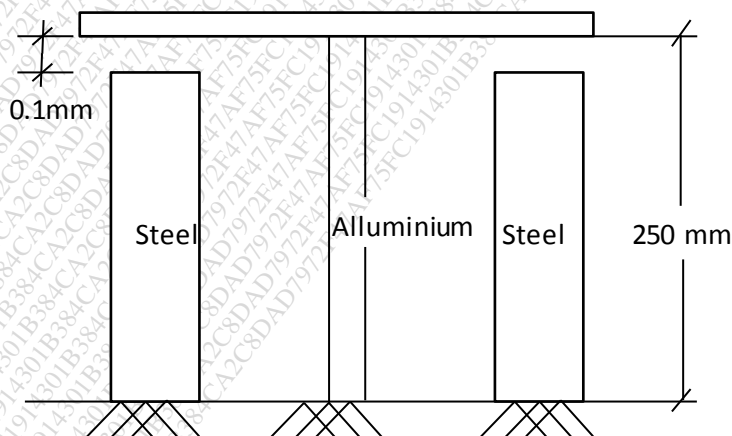
**Section A**

Q.1 Attempt any five of the following.

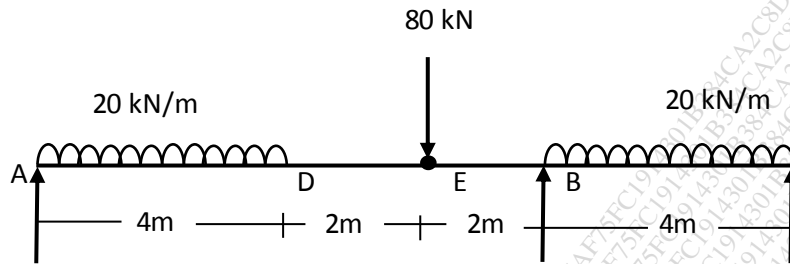
10

- a) Explain what composite member is?
- b) Define Neutral Axis.
- c) Define Modulus of Elasticity.
- d) Define Bulk Modulus.
- e) Write the Shear formula and meaning of each word.
- f) Show the Uniaxial, Biaxial and Triaxial loading with the help of diagram.
- g) Define the Moment of Resistance.
- h) What are the assumptions in shear stress?
- i) Define deformation and write the formula of it.
- j) What do you mean by section modulus?

Q.2 A rigid platform having negligible mass rests on Aluminium bar as shown in figure. The Aluminium bar is 250mm long & 800mm<sup>2</sup> in area. The steel bars are 249.9mm long having area 1600mm<sup>2</sup>. Find the stresses in the rods after a load of 50N is applied. Take  $E_s = 200GPa$ ,  $E_{Al} = 70GPa$ .

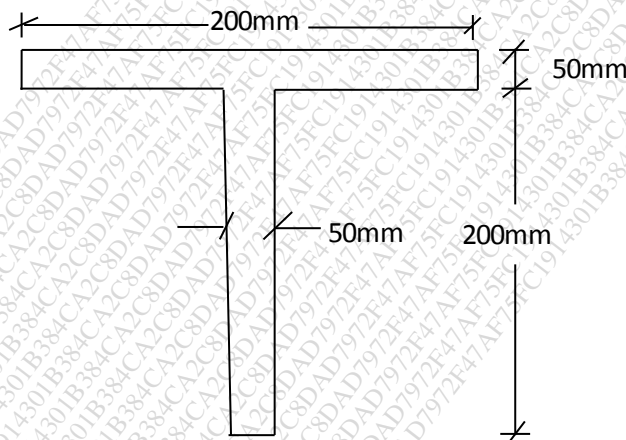


Q.3 Draw Shear Force and Bending Moment diagram for beam as shown. 15



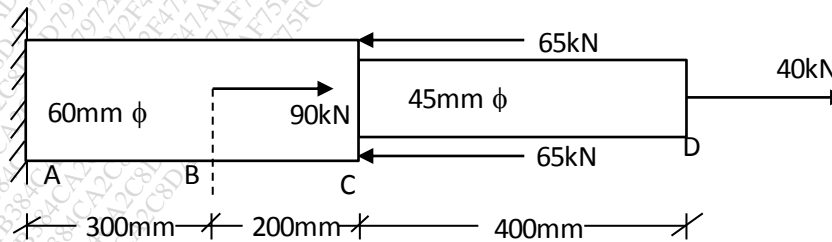
Q.4 a) If in bending, the tensile stress not to exceed 143MPa. Determine the moment of resistance of 07 the section. If the length of the bracket is 1.2m, determine the maximum value of a vertical downward point load that it can carry at its free end. Neglect self-weight.

b) A T shaped cross section of a beam in following figure, is subjected to a vertical shear force 08 of 100kN. Calculate the shear stress at the neutral axis and at the junction of the web and flange.



Q.5 Two solid cylindrical rods AC & CD both of the same alloy ( $E = 70 \text{ GPa}$ ) are welded together at 15 'C' & subject for loading as shown in figure. Determine

- i) Total deformation of the rod ACD
- ii) Displacement of point C



## Section B

- Q.6 Attempt any five of the following. 10
- Define direct and bending stresses.
  - Enlist types of stresses in thin cylindrical shell and write the formula of it.
  - Explain core or kernel of section.
  - State torsion formula and write the meaning of each word.
  - What are the limitations in Euler's theory?
  - What is mean by Short column and Long column?
  - Define strain energy.
  - Write down the formulas for stresses under different types of load in strain energy.
  - Define direct and bending stresses and write their formulas.
- Q.7
- A solid shaft is 100mm in diameter is transmitting 120kw at 200rpm. Find maximum intensity of shear stress induced and angle of twist for a length of 6m. Take  $G = 8 \times 10^4 N/mm^2$  08
  - A wagon weighting 42kN is attached to the wire rope and moving down an inclined plane at speed of 4.6kmph. The wire rope diameter is 45mm and its length is 65m. When the rope jams and the wagon is suddenly brought to rest. Calculate the maximum instantaneous stress and maximum instantaneous elongation produced in it. Assume value of E. 07
- Q.8 A masonry chimney 22m high, of uniform cross section, 4m external diameter and 2m internal diameter is subjected to the horizontal wind pressure of  $1.4kN/m^2$  of projected area. Find the maximum and minimum stress intensities at the base, if the specific weight of masonry is  $22kN/m^3$ . 15
- Q.9 A column 6m long has both ends fixed; cross section of column is solid circular. It has to support an axial load of 700kN. Use Rankin formula to determine suitable diameter of column. Take  $\sigma_c = 330MPa$ ,  $\alpha = 1/7500$ , Use Factor of Safety = 3.0 15
- Q.10
- A shell 6.50m long, 1m in diameter is subjected to an internal pressure of 2N. If the thickness of shell is 20mm. find circumferential & longitudinal stresses and change in dimensions. 08
  - A rod 12.5mm in diameter is stretched 3.2mm under a steady load of 10KN what stress would be produced in the bar by a weight of 700N falling through 75mm before commencing to stretch, the rod being initially in stressed. Take  $E = 2 \times 10^5 mpa$ . 07



Total No. of Printed Pages:03

**SUBJECT CODE NO:- H-323**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Strength of Materials**  
**(Revised)**

[Time: Three Hours]

[Max. Marks: 80]

- N.B
- Please check whether you have got the right question paper.
- 1) Question no. 01 and 06 are compulsory and attempt any two questions from remaining questions from each Section.
  - 2) Non-Programmable calculator is allowed.
  - 3) Figure to right indicates full marks.

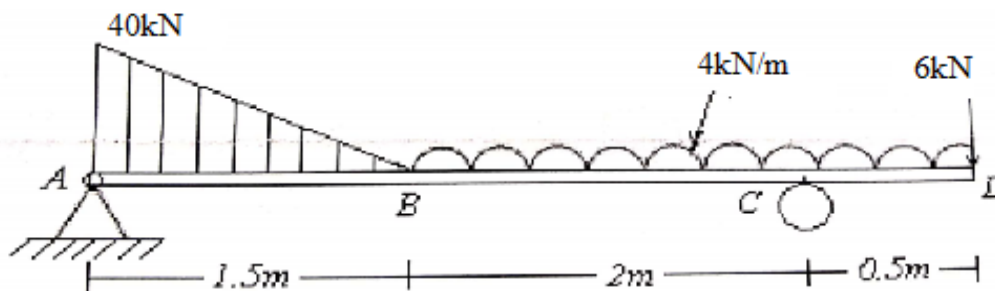
## Section A

Q.1 Attempt any five of the following:- 10

- a) What do you mean by point of contra flexure?
- b) Explain thermal stress & thermal strain.
- c) Show the Uniaxial, Biaxial and Triaxial loading with the help of diagram.
- d) Define the Moment of Resistance.
- e) Define Bulk Modulus.
- f) Define deformation and write the formula of it.
- g) What is Complimentary Shear Stress?
- h) Draw Stress-Strain Curve for Mild Steel. Show important points on the graph.
- i) Enlist the types of loadings that may act on beam.

Q.2 A load of 415kN is applied on short RC column  $230mm \times 350mm$ . The column is reinforced by 15 steel bars of area  $2320mm^2$ . Find the stresses in concrete and steel, if modulus of elasticity for steel is 15 times that of concrete. Also find the area of steel required so that the column may support a load of 600kN, if the stress in concrete should not exceed  $5N/mm^2$ .

Q.3 Draw Shear Force and Bending Moment diagram of a beam given in figure. Also find Point of Contra flexure & point of maximum Bending Moment. 15



Q.4 Derive the relation for Shear Stress

15

$$(q) = \frac{S.A. \bar{Y}}{I.b}$$

Q.5 a) A rod of steel is 18 m long at a temperature of 24°C. Find the free expansion of the rod when the temperature is raised by 55°C. Find the temperature stress produced:

08

- 1) When the expansion of rod is prevented.
- 2) When the rod is permitted to expand by 5.78 mm.  
Take  $E=200 \text{ GPa}$  and  $\alpha = 11.5 \times 10^{-6}/^\circ\text{C}$ .

b) A simply supported beam  $180 \times 290 \text{ mm}$  carries a central concentrated load  $W$ . The permissible stress, in bending and shear, are  $25 \text{ N/mm}^2$  and  $1.9 \text{ N/mm}^2$  respectively. Determine the safe load  $W$ , if the span of the beam is 3.2m.

07

Section B

Q.6 Attempt any five of the following:-

10

- a) Define the term Torsional Moment and What is angle of twist?
- b) Define direct and bending stresses.
- c) Explain core or Kernal of section.
- d) What are limitations in Euler's theory?
- e) Write down the formulas for stresses under different types of load in strain energy.
- f) Enlist types of stresses in thin Spherical shell and write the formula of it.
- g) What is mean by Short column and Long column?
- h) What are the limitations in Euler's theory?
- i) Define struts.

Q.7 a) Two shaft, one hollow circular steel shaft with outside diameter 90mm and inside diameter 30mm. other a solid steel shaft with 90mm diameter are to transmit 50kW power each. Compare shearing stresses in the two shafts if both operate at 3 rev/sec.

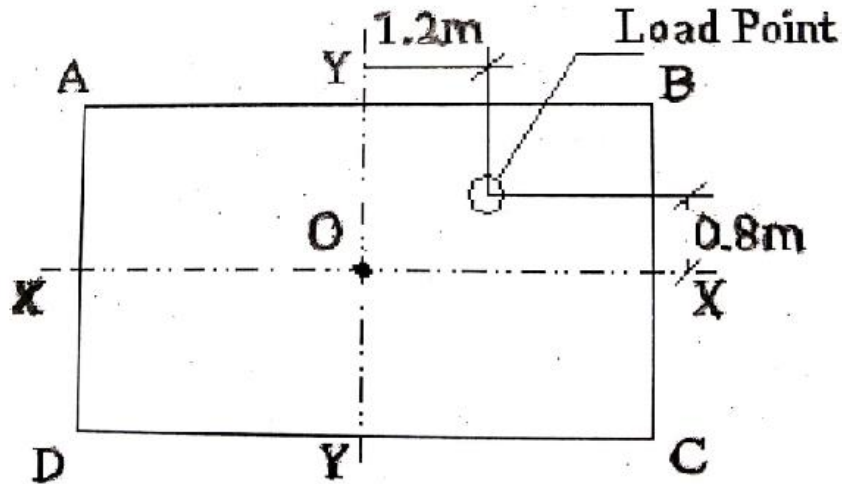
08

b) A rod of 10mm is stretched by 2.5mm under a steady load of 8000N. What would be the stress produced in the rod by a weight of 550N falling through a height of 50mm on the rod which is initially in the unstressed condition.

07

Q.8 A rectangular column  $5 \text{ m} \times 4 \text{ m}$  supports a load of 200kN as shown in figure. Determine the stresses developed at each corner. What additional load should be placed at the centre of the column in order to eliminate tensile stress from every in the section of the column. What stresses will be set up at the corner with the additional load at the centre?

15



- Q.9 Determine the Buckling load for a strut of T-section of flange width 110 mm and overall depth 85 mm. The thickness of both flange and web is 12mm. the strut is 2.8m long and hinged at both ends. Take  $E = 200 \text{ GN/m}^2$ .
- Q.10 A shell 3 m long, 0.9m in diameter is subjected to an internal pressure of  $1.2 \text{ N/mm}^2$ , if thickness of shell is 8 mm, find circumferential and longitudinal stress. Find also maximum shear stress and change in dimension of shell. Take  $E = 2 \times 10^5 \text{ N/mm}^2$  &  $\mu = 0.25$ .

Total No. of Printed Pages: 2

**SUBJECT CODE NO:- H-391**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Surveying – I**  
**(OLD)**

[Time: Three Hours]

[Max. Marks: 80 ]

Please check whether you have got the right question paper.

- N.B
1. Questions No. 1 and Q. no. 6 are compulsory.
  2. Solve any two questions from the remaining questions for each section
  3. Figures to the right indicate full marks
  4. Assume suitable data if necessary

Section - A

- Q. 1 Solve any five 10
- 1) What are objectives of surveying?
  - 2) Explain a well conditional triangle.
  - 3) Explain the uses of cross shaft.
  - 4) What is the necessity of levelling?
  - 5) Explain the classification of levelling.
  - 6) What are contours?
  - 7) Explain G.T.S Bench marks
  - 8) Explain mean sea level
  - 9) List the accessories of plane table surveying.
  - 10) Statement of “Two point problem”.
- Q. 2 a) Explain the procedure for reciprocal ranging. 07
- b) The chain line xy was measured by a 20m chain Its length was 250m find the true length of line xy if : 08
- i) The chain used was lcm too long
  - ii) The chain used was 2cm too short
- Q. 3 a) Explain the procedure for profile leveling. 07
- b) The following consecutive readings were taken with a dumpy level :3.330, 3.150, 2.675, 1.625, 0.875, 3.470, 2.800, 1.260, 1.780, 0.890, 0.880. The level was shifted after the fifth and eight readings. The 1<sup>st</sup> reading is taken on Bench marks of RL=500m. find the R.L of all the points. 08
- Q. 4 a) Explain the methods of contouring. 07
- b) Reciprocal levels were taken with a dumpy level and following data was obtained. 08

Inst at	Staff reading on	
	P	Q
P	1.830	3.100
Q	1.475	2.890

- 1) If R.L of P is 500m. find the RL of Q
- 2) Find combined correction for curvature and refraction if the distance between P and Q is 500m.

- Q.5 a) Describe temporary adjustment of a plane table. 07
- b) Enumerate the different methods of plane table surveying describe any one in detail . 08

Section –B

- Q.6 Attempt any five 10
- 1) What is meant by zero circle
  - 2) List out the various methods of computation of areas.
  - 3) State the uses of theodolite
  - 4) Explain i) Latitude ii) departure
  - 5) What is the necessity of changing the face of a theodolite.
  - 6) What are deflection angles
  - 7) Define Transiting
  - 8) What is an anallatic lens
  - 9) Explain the advantages of tacheometry
  - 10) Enlist the sources of errors in theodolite surveying .

- Q.7 a) Explain the procedure for measurement of horizontal angle by repetition method . 08
- b) Enlist the fundamental lines of a theodolite also explain the relationship between them. 07

- Q.8 a) Explain the procedure of extending a straight line by double sighting method. 07
- b) Following are the lengths and Bearings of the sides order of a closed traverse ABCD 08

Line	Length (m)	Bearing
AB	76.8	140°12'
BC	195	36°30'
CD	38	339°30'
DA	?	?

Compute the length and bearing of line DA.

- Q.9 a) State the trapezoidal and simpson's rule 07
- b) An embankment of width 11m and side slopes 1.5:1 is required to be made on a ground which is level in a direction transverse to the centre line. The central height at 40m intervals are as follows : 08
- 1.00, 1.25, 2.15, 2.50, 1.85 , 1.35 and 0.90 calculate the volume of earth work according to trapezoidal formula .

- Q.10 a) Explain the procedure for determination of tachometric constants. 07
- b) What is an anallatic lens? Give the theory of anallatic lens. 08

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-167**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Fluid Mechanics –II**  
**(OLD)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

1. Q.no.1 and Q.no.6 are compulsory
2. Solve any two questions from each section
3. Assume suitable data if necessary.

## Section -A

- Q.1 Solve any five from following. 10
- a) What do you mean by branch pipe?
  - b) Define hydrodynamically smooth and rough boundaries
  - c) Subcritical , critical and supercritical flow
  - d) Draw neat sketch of venturiflume
  - e) Define dynamic similarity
  - f) Define uniform flow and non – uniform flow in open channels
  - g) Find the perimeter for channel rectangular is shape with depth 5.0M and width 7.0M
- Q.2 07
- a) Show that the loss of head due to sudden expansion in pipe line is a function of velocity head.
- Q.3 08
- b) Water is flowing through a pipe of 40cm diameter and 60 m length with a velocity of 4m/sec. find the head loss using Darcy's and Chezy's formula, where  $C = 60$ , take  $\rho = 0.012$  stokes for water.
- Q.4 07
- a) Show that the minimum specific energy is 1.5 times the critical depth for a rectangular channel.
- Q.5 08
- b) Find the specific energy of flowing water through a rectangular channel of width 6.5m when the discharge is  $20\text{m}^3/\text{sec}$  and depth of water is 4.0m.
- Q.6 07
- a) Outline the procedure of dimensional analysis by Buckingham's –  $\pi$  method.
- Q.7 08
- b) A 6.2 m high and 15m long spillway discharges  $68\text{ m}^3/\text{sec}$  discharge under a head of 2.0m If 1:8 scale model of this spillway is to be constructed , determine model dimensions and head over spillway model and the model discharge.
- Q.8 Write short notes on following (Any three) 15
- i) Dimensional homogeneity
  - ii) Distorted and non- distorted model
  - iii) Specific energy curve
  - iv) Current meter

## Section – B

- Q.6 Solve any five from following 10
- What do you mean by impact of jet?
  - List the functions of guide vanes in the case of Francis turbines
  - What is the function of the casing in the pelton turbines
  - List the functions of draft tube
  - Define reciprocating pump
  - Define jet ratio in case of pelton wheel turbine
  - Give the range of specific speed values of the Kaplan, Francis turbines and pelton wheels.
- Q.7
- With a neat sketch, explain the working of Pelton wheel 07
  - A Kaplan turbine produces 60,000kw under a net head of 25m with an overall efficiency of 90% Taking the value of speed ratio  $k_u$  as 1.6 flow ratio  $\psi$  as 0.5 and the hub diameter as 0.35 times the outer diameter, find the diameter and speed of turbine 08
- Q.8
- Obtain an expression for the work done by impeller of a centrifugal pump on water per second per unit weight of water. 07
  - Find power required to drive a centrifugal pump which delivers 0.04m<sup>3</sup>/sec. of water to a height of 20 m through a 15 cm diameter pipe and 100m long. Their overall efficiency of the pump is 70% and coefficient of friction 'f' = 0.15 in the formula:  $h_f = \frac{4flv^2}{gd}$  08
- Q.9
- Find an expression for the head lost due to friction in suction and delivery pipes 07
  - The diameter and stroke of a single acting reciprocating pump are 15 cm and 30cm . it delivers 0.3 m<sup>3</sup>/ min. when running at 60 r.p.m find the slip and percentage slip of the pump. Also find the Cd. 08
- Q.10 Write short notes on following (Any three) 15
- Hydraulic Accumulator
  - Hydraulic crane
  - Hydraulic ram
  - Hydraulic press

Total No. of Printed Pages:04

**SUBJECT CODE NO:- H-274**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E (Civil)**  
**Theory of Structure – I**  
**(Old)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Question No.1 and Question No.6 are compulsory.
  2. Answer any two questions from the remaining four questions of each section.
  3. Assume suitable data if necessary.

Section -A

Q.1 Attempt any five of following

10

- i) Define
  - a) Rivet value
  - b) Efficiency of rivetted joint
- ii) Explain different types of riveted joint.
- iii) Explain advantages of fixed beam.
- iv) Write note on wilot diagram.
- v) State the first theorem of ceustigliqno's
- vi) Explain strain energy method.
- vii) Explain radius of curvature.

Q.2 A lower chord of truss has a vertical member AB, diagonal members AC, meeting at a point 'A' as shown in fig.1. Design the joint. Assuming hand driven field rivet. Take  $f_y = 250\text{MPa}$ .

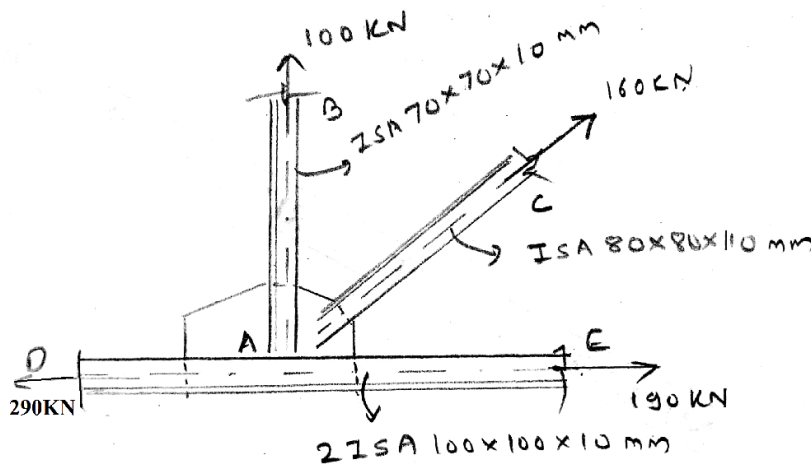


Fig.1



Q.3 a) For a beam shown in fig.2 calculate the deflection of a beam under A & B using Macaulay's method. 15

Take  $E = 200 \times 10^3 \text{ N/mm}^2$   
 $I = 150 \times 10^6 \text{ mm}^4$

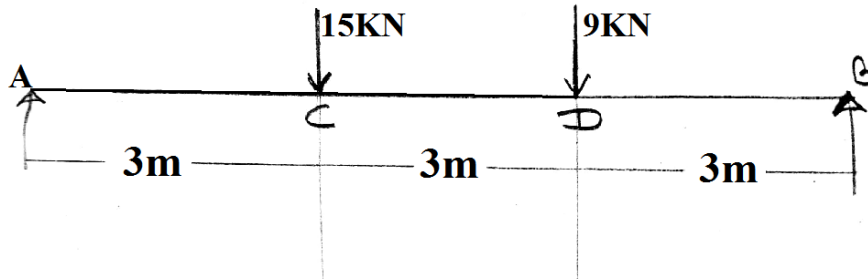


Fig. 2

Q.4 Find the vertical and horizontal deflection of joint C of the truss shown in fig-3. 15

If Area of TOP chord =  $1000 \text{ mm}^2$   
 Area of Bottom chord =  $1200 \text{ mm}^2$   
 Area of remaining member =  $700 \text{ mm}^2$   
 $E = 200 \text{ KN/mm}^2$

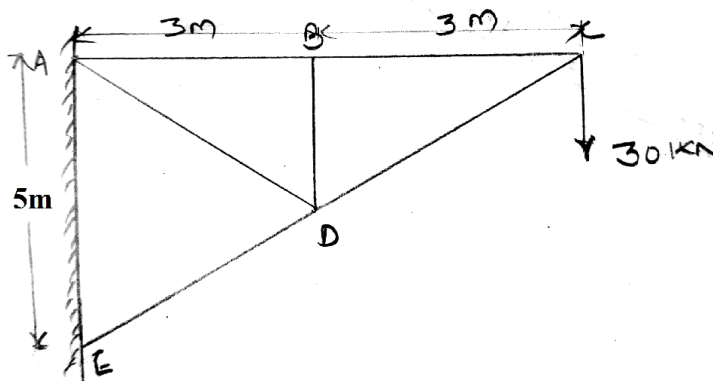


Fig. 3

Q.5 Find fixing moments at ends of fixed beam as shown in fig.4 also draw SFD and BMD. 15

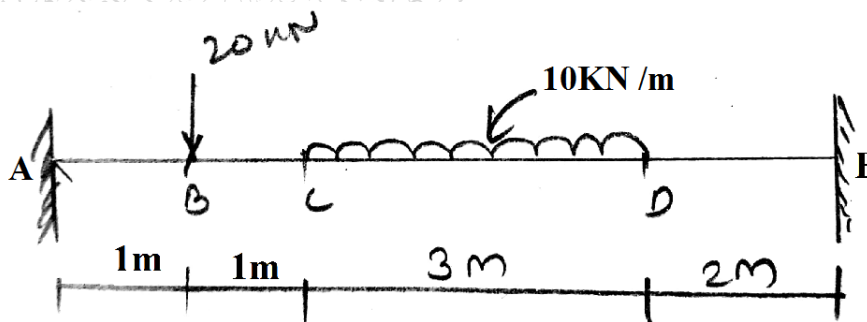


Fig. 4

Section B

Q.6 Attempt any five questions.

10

- i) If a continuous beam is fixed at its both ends. Then imaginary support is
  - a) Not taken
  - b) Taken on left side only
  - c) Taken on both the ends
  - d) Taken on right side only
- ii) Define the term 'Line Of thrust'
- iii) Explain the term sinking of support.
- iv) Explain the term
  - i) Normal thrust
  - ii) Radial shear.
- v) Uses of suspension bridge.
- vi) Explain the term.
  - i. Anchor cable
  - ii. Suspension cable

Q.7 A continuous beam ABCD 16m long is loaded as shown in fig-5 during the loading support B sinks by 10mm find the support moment and plot SFD and BMD.

$E = 2 \times 10^5 N/mm^2$   
 $I = 8 \times 10^6 mm^4$

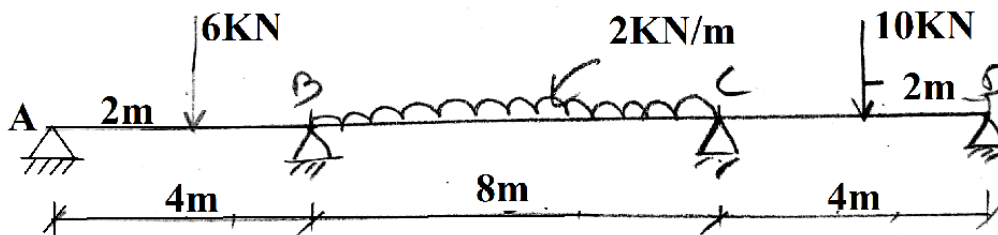


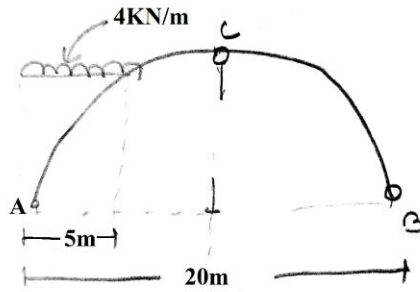
Fig.5

Q.8 Construct I.L.D for BM, normal thrust and shear force for a three hinge arch of span  $l$  and central rise  $n$  at any section at a distance  $x$  from left support.

15

Q.9 A three hinged parabolic arch of span 20m and a central rise of 4m carries U.D.L of 4kN/m from a length 5m from the left end support. Draw the bending moment diagram and find the reaction at A&B.

15



- Q.10
- a) What are the stiffening girder? Explain their uses and types. 05
  - b) Describe the effect of a couple acting in one of the span of a continuous beam. 05
  - c) Explain use of influence line diagram. 05

Total No. of Printed Pages: 2

**SUBJECT CODE NO:- H-357**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Fluid Mechanics –I**  
**(OLD)**

[Time: Three Hours]

[Max. Marks: 80 ]

Please check whether you have got the right question paper.

N.B

1. Q.no.1 and Q.no.6 are compulsory
2. Solve any two questions from each section.
3. Non-Programmable calculator is allowed.
4. Assume suitable data if necessary.

Section - A

- Q. 1 Answer the following ( any five ) 10
- a) Define the fluid properties i) Specific volume ii) Specific gravity of a fluid
  - b) Define the term kinematic viscosity along with its dimension.
  - c) Differentiate between absolute and gauge pressure
  - d) What do you mean by differential manometer . state its types.
  - e) Differentiate between uniform flow and non- uniform flow.
  - f) What are the conditions of equilibrium of a sub- merged body.
  - g) Differentiate between steady flow and unsteady flow.
  - h) Define the term i) Velocity potential function and ii) stream function
- Q. 2 Answer the following 15
- a) Derive an expression for the pressure variation in a fluid at rest. 07
  - b) If the velocity profile of a fluid over a plate is parabolic with the vertex 20 cm from the 08  
plate, where the velocity is 120 cm/sec. calculate the velocity gradients and shear stresses at  
a distance of 0,10 and 20cm from the plate. If the viscosity of the fluid is 8.5 poise.
- Q. 3 Answer the following 15
- a) What are the conditions of equilibrium of a floating and submerged body. 09
  - b) Determine the total pressure and centre of pressure on an isosceles triangular plate of base 06  
4m and altitude 4 m when it is immersed vertically in an oil of sp.gr.09 .The base of the  
plate coincides with the free surface of oil.
- Q. 4 Answer the following 15
- a) Derive an expression for Hagen poiseuille's formula. 07
  - b) In a two-dimensional incompressible flow, the fluid velocity components are given by 08  
 $u = x - 4y$  and  $v = -y - 4x$ .show that velocity potential exists and determine its form  
Find also the stream function.

- Q. 5 Answer the following 15
- Define the term viscosity and explain in brief Newton's law of viscosity 05
  - The diameters of a pipe at the sections 1 and 2 are 10cm and 15cm respectively . Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5m/s. Determine also the velocity at section 2 05
  - Write a short note on laminar flow through inclined pipes. 05

Section –B

- Q. 6 Answer the following.(Any Five) 10
- State the Bernoulli's expression along with its units
  - Enlist the applications of Bernoulli's equation.
  - State the expression for the calculation of discharge through venturimeter
  - State the statement of momentum equation.
  - Define coefficient of contraction
  - Enlist the types of weirs
  - State the boundary conditions for the velocity profiles in boundary layer theory
  - Define drag force and lift force.

- Q.7 Answer the following 15
- Derive Bernoulli's equation from Euler's equation. 09
  - Define kinetic and momentum correction factor. 06

- Q.8 Answer the following 15
- How will you determine the velocity at any point with the help of pitot tube. 07
  - Water discharge at the rate of 98.2 liters/s through a 120 mm diameter vertical sharp-edged orifice placed under a constant head of 10 meters. A point , on the jet, measured from the vena- contracta of the jet has co-ordinates 4.5 meter horizontal and 0.54 meters vertical. Find the coefficient  $C_v$ ,  $C_c$  and  $C_d$  of the orifice. 08

- Q.9 Answer the following 15
- What do you mean by boundary layer separation. What is the effect of pressure gradient on boundary layer separation. 09
  - A thin plate is moving in still atmospheric air at a velocity of 5m/s. The length of the plate is 0.6m and width 0.5m. Calculate i) The thickness of the boundary layer at the end of the plate and ii) drag force on one side of the plate .Take density of air as  $1.24\text{kg/m}^3$  and kinematic viscosity 0.15 stokes. 06

- Q.10 Answer the following 15
- A pipe of diameter 400mm carries water at a velocity of 25m/s The pressures at the points A and B are given as  $29.43\text{N/cm}^2$  and  $22.563\text{N/cm}^2$  respectively while the datum head at A and B are 28 m and 30m. 05
  - Explain in brief the classification of notches 05
  - Define the terms i) Local coefficient of Drag and ii) Average coefficient of Drag. 05

Total No. of Printed Pages: 03

**SUBJECT CODE NO:- H-392**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Surveying- I**  
**(Revised)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N. B
- i) Question No. 1 and Question No. 6 are compulsory.
  - ii) Attempt any two questions from the remaining questions of SECTION A and SECTION B respectively.
  - iii) Draw neat sketches wherever necessary.
  - iv) Figures to the right indicate full marks.

**SECTION A**

- Q. 1 Answer the following (Any Five) 10
- a) Give two disadvantages of plane table surveying.
  - b) What is the two – point problem?
  - c) Define check line and base line.
  - d) What is the principle of chain surveying?
  - e) What are the offsets?
  - f) Enlist the instruments used for setting out right angles.
  - g) Give the classification of surveying.
  - h) What is the transit theodolite?
  - i) What is the direct angle?
  - j) What are the consecutive coordinate?
- Q. 2 A) Give the list of instruments used for setting out right angles. Explain the construction procedure and function of optical square. 07
- B) The following bearings are observed while traversing with compass and tape. Check the bearings for local attraction. Correct the bearings by the method of included angles. 08

Line	FB	BB
AB	188° 45'	7° 45'
BC	118° 15'	298° 15'
CD	346° 35'	166° 30'
DE	337° 05'	158° 10'
EA	293° 30'	113° 00'

- Q. 3 A) Explain the procedure for measurement of magnetic bearing by using theodolite. 07
- B) The Traverse data given in the following table contains the lengths and interior angles of the traverse. The bearing of line PQ was measured as S36° 12'30" E. check the traverse for angles and closing errors, if any. Find the correct latitudes and departure by the Bowditch rule. 08

Line	Length	Station	Included angle
PQ	102.8	P	131° 14' 30 "
QR	98.4	Q	84° 19' 25 "
RS	110.8	R	116° 35' 25 "
ST	82.8	S	119° 58' 05 "
TP	113.29	T	87° 54' 05 "

- Q. 4 A) Explain the solution of three – point problem by graphical method. 07  
 B) Define Ranging. Explain the types of ranging in details. 08
- Q. 5 Write short notes on. (Any three) 15  
 1) Orientation  
 2) Resection method  
 3) Chain and tape correction  
 4) GALE’S traverse table

SECTION B

- Q. 6 Answer the following (Any Five) 10  
 a) Define tachometry?  
 b) State the trapezoidal rule.  
 c) State the different types of cross sections.  
 d) What are the function of clamp screw and tangent screw?  
 e) What is the difference between a theodolite and tacheometer?  
 f) Define contour interval and horizontal equivalent.  
 g) Define levelling and give types of levelling.  
 h) Give the expressions for curvature and refractions corrections.  
 i) What is trigonometric levelling?  
 j) Which are the tacheometric constant?

- Q. 7 a) The area enclosed by contour lines at 5m intervals for a reservoir up to the face of a proposed dam, are shown below. 07

Value of contour(m)	1005	1010	1015	1020	1025	1030	1035
Area (m)	400	1500	3000	8000	18000	25000	40000

Taking 1005 and 1035 m as the bottom most and highest water levels respectively. Determine the capacity of reservoir by using i) Trapezoidal Rule ii) prismoidal Rule.

- b) The following observation were taken with a tachometer fitted an anallatic lens, the staff being held vertical. The constant of tachometer is 100. Calculate the RL of station B and the distance between A and B. 08

Inst. Station	HI	Staff Station	Vertical angle	Staff Readings	Remark
P	1.255	BM	-4°20'	1.325, 1.825, 2.325,	
P	1.255	A	+6° 30'	0.850, 1.600, 2.350,	RL OF BM= 255.750m
B	1.450	A	-7°24'	1.715, 2.315, 2.915	

- Q. 8 a) Describe the method of reciprocal levelling along with neat sketch. 07  
 b) The following reciprocal observations were made during the testing of a dumpy level. 08  
 Distance between A and B = 200m. find out,  
 The collimation error  
 The true RL of B  
 Whether the line of collimation is inclined upwards or downwards.

Instrument at	Staff reading at		REMARK
	A	B	
A	1.725	2.245	RL OF
B	2.145	3.045	A=450. 000m

- Q. 9 a) Explain the constructional details of planimeter. 07  
 b) An embankment of width 10m and side slope 1.5:1 is required to be made on a ground which is level in a direction transverse to the Centre line. The central heights at 40m intervals are as follows. 08  
 0.90, 1.25, 2.15, 2.50, 1.85, 1.35, 0.85. Calculate the volume of earthwork according to i) The Trapezoidal rule. ii) The Prismoidal rule.

- Q. 10 Write short notes on (Any three) 15
- 1) Auto reduction tacheometer
  - 2) Principle of techeomerty
  - 3) Area of Multi – level section
  - 4) GTS and temporary benchmark



Total No. of Printed Pages: 02

**SUBJECT CODE NO:- H-426**  
**FACULTY OF SCIENCE & TECHNOLOGY**  
**S.E. (Civil)**  
**Concrete Technology**  
**(OLD)**

[Time: Three Hours]

[Max. Marks: 80]

- N. B Please check whether you have got the right question paper.
- 1) Question no. 1 and 6 are compulsory. Attempt any two questions from remaining questions of each section.
  - 2) Non – Programmable calculator is allowed.
  - 3) Figure to right indicates full marks.

## SECTION – A

- |      |   |                |
|------|---|----------------|
| Q. 1 | Answer the following questions (Any five)   | 10             |
|      | <ol style="list-style-type: none"> <li>a) What is hydration of cement? Explain in short.</li> <li>b) Define Standard Consistency of cement.</li> <li>c) What is mean by workability of concrete?</li> <li>d) What is bulking of aggregate?</li> <li>e) Define flakiness index and elongation index of an aggregate.</li> <li>f) What are the major ingredients of cement? Give their percentages?</li> <li>g) Give the Bogue's Compound for Cement with chemical name.</li> <li>h) What is difference between air entrained and air entrapped?</li> <li>i) Fine aggregate used in the production of concrete should be of which Zone? Why?</li> <li>j) What are different grades of concrete &amp; ho they are designated?</li> </ol> |                |
| Q. 2 | <ol style="list-style-type: none"> <li>a) Why compaction of concrete essential? Explain the method of compaction.</li> <li>b) How mix proportioning of concrete ingredient are done explain in details.</li> </ol>  | 08<br>07       |
| Q. 3 | <ol style="list-style-type: none"> <li>a) Explain dry process of manufacturing of Portland cement. Also draw a flow chart of this method.</li> <li>b) What is curing &amp; its significances. Explain various methods of curing.</li> </ol>   | 08<br>07       |
| Q. 4 | <ol style="list-style-type: none"> <li>a) Find gel / space ratio and theoretical strength of sample of concrete with 600gm of cement with 0.45 w/c ratio, on full hydration and at 6.5% hydration.</li> <li>b) Describe the types of vibrators used for compaction of concrete.</li> <li>c) What are various types of batching of materials example?</li> </ol>   | 06<br>05<br>04 |
| Q. 5 | Write a short note on   |                |
|      | <ol style="list-style-type: none"> <li>a) Impact strength of concrete</li> <li>b) Water proofing materials and their functions</li> <li>c) Setting times of cement.</li> </ol>  | 05<br>05<br>05 |

SECTION – B

- Q. 6 Answer the following questions (Any five) 10
- a) What are factors affecting high strength concrete.
  - b) What do you mean by repair? What are the common types of repair?
  - c) What is the concept of mix design?
  - d) What is self-compacting concrete?
  - e) What are steel fibers? Enlist three types.
  - f) What is bleeding & laitance in concrete?
  - g) What does it mean by polymer concrete?
  - h) What are factors affecting freezing & thawing.
  - i) What is meant by batching?
  - j) What is sulphate attack?
- Q. 7 08
- a) What is IS method of mix design; explain in detail.
  - b) Explain sulphate attack by sea water and chloride attack. 07
- Q. 8 08
- a) What does it mean by light weight concrete? Write its uses & advantages.
  - b) What is mean strength, variance, standard deviation & coefficient of variance in mix design? 07
- Q. 9 06
- a) How the evaluation of cracks are done on concrete.
  - b) Write a note on corrosion of reinforcement and its remedial measures. 05
  - c) What is carbonation & explain its significance. 04
- Q. 10 Write a short note on 05
- a) Pumping of concrete. 05
  - b) Hot weathered concreting 05
  - c) Special concretes and special concreting equipment's. 05

Total No. of Printed Pages:02

**SUBJECT CODE NO:- H-427**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E. (Civil)**  
**Concrete Technology**  
**(Revised)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
- 1) Q.1 and Q.6 are compulsory.
  - 2) Attempt any two questions from each section from remaining.
  - 3) Draw neat sketches wherever necessary.
  - 4) Figures to right indicate full marks.

## Section A

- |     |  |                |
|-----|--|----------------|
| Q.1 | Answer the following questions(any five)   | 10             |
|     | <ol style="list-style-type: none"> <li>a) What is fineness of cement? Explain its significance.</li> <li>b) Explain the classification of aggregates?</li> <li>c) What is curing? What are its various methods?</li> <li>d) What is microcracking? How does they occur?</li> <li>e) What is high strength concrete?</li> <li>f) What is bleeding and Laitance in concrete?</li> <li>g) What are the different types of pozzolanic material?</li> <li>h) What is soundness of aggregate?</li> </ol> |                |
| Q.2 | <ol style="list-style-type: none"> <li>a) Find gel/space ratio and theoretical strength of sample of concrete with 600gm of cement with 0.45 w/c ratio, on full hydration and at 6.5% hydration.</li> <li>b) Explain the terms Normal Consistency, Initial and Final setting time, soundness of cement and grade of cement.</li> </ol>   | 08<br>07       |
| Q.3 | <ol style="list-style-type: none"> <li>a) What is workability? Explain slump test with neat sketch to determine the workability of concrete.</li> <li>b) Explain importance of size, shape &amp; texture of aggregate in strength of cement.</li> </ol>  | 08<br>07       |
| Q.4 | <ol style="list-style-type: none"> <li>a) What are the dangers of using sea water as mixing water?</li> <li>b) How is consistency of cement paste measured?</li> <li>c) Write short note on compaction factor test on concrete.</li> </ol>   | 05<br>05<br>05 |
| Q.5 | Write short note on (Any three)  | 15             |
|     | <ol style="list-style-type: none"> <li>a) Principle of design for formwork.</li> <li>b) Alkali-aggregate reaction</li> <li>c) Flow Table Test</li> <li>d) Water/cement ratio</li> <li>e) Transit mixer</li> </ol>  |                |

Section B

- Q.6 Answer the following (any 5) 10
- What is high density concrete? Where it can be used?
  - Define permeability and durability.
  - How chemical attack and acid attack will occur on concrete structure?
  - What is freezing & thawing of concrete?
  - What are the two stages considered in the repairing of cracks?
  - What are steel fibres? Enlist three types.
  - What is aerated concrete?
- Q.7 a) What is light weight concrete? Explain with its types and application. 08  
 b) Explain pumping of concrete with neat sketch. 07
- Q.8 Design a concrete mix of grade M40 to suit following data as per IS 10262. 15
- Type of cement DPC 43 grade as for 158112
  - Max nominal size of aggregate: 20 mm
  - Water cement ratio: 0.45
  - Workability : 100mm slump
  - Method of Concrete placing: Pumping
  - Max. cement content: 450 kg/m<sup>3</sup>
  - Chemical admixture: superplasticizer
  - Sp. Gravity cement: 3.15
  - Sp. Gravity of C.A.: 2.74
  - Sp. Gravity of F.A.: 2.74
  - Water absorption: coarse agg-0.5%  
 Fine agg- 1.0%
- Q.9 a) Explain the procedure to determine flexural strength of concrete. 06  
 b) What is carbonation of concrete & how it is determined? 05  
 c) What are the different techniques of measuring Pulse Velocity through concrete? 04
- Q.10 Write short note: [Any three] 15
- Symptoms and diagnosis of distress
  - Mechanism in corrosion of reinforcement
  - Self compacting concrete
  - Hauling of concrete
  - Pumping of concrete

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-201**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**S.E (Civil)**  
**Surveying -II**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Q.No.1 and Q.No.6 are compulsory.
  2. Solve any two questions from remaining questions from each section.
  3. Figure to right indicates full marks.

## Section A

- |     |  |          |
|-----|--|----------|
| Q.1 | Attempt the following: (any five)  | 10       |
|     | <ol style="list-style-type: none"> <li>a) Give the classification of signals.</li> <li>b) Define simple and compound curve with neat sketch.</li> <li>c) Differentiate between dependent and independent quantity.</li> <li>d) What is a relation between degree and radius of curve?</li> <li>e) What are the errors occurred in surveying?</li> <li>f) Define Reverse curve with neat sketch.</li> <li>g) What are the criteria to select triangulation stations?</li> </ol>   |          |
| Q.2 | <ol style="list-style-type: none"> <li>a) Explain the field procedure for setting out curve by Rankine's deflection angle method.</li> <li>b) Two tangents meeting with a chainage of 800m and deflection angle between them is <math>45^{\circ} 48'</math>. Calculate all the necessary data for setting up a curve radius 90m (take peg interval 20m).</li> </ol>  | 08<br>07 |
| Q.3 | <ol style="list-style-type: none"> <li>a) What is figure adjustment in case of triangulation?</li> <li>b) Explain laws of weights with examples.</li> </ol>  | 07<br>08 |
| Q.4 | <ol style="list-style-type: none"> <li>a) Explain principles of least square</li> <li>b) The following values were observed values of an angle<br/> <math>A = 60^{\circ} 20' 45''</math>: 6 observations<br/> <math>A = 60^{\circ} 20' 42''</math>: 8 observations<br/> <math>C = 60^{\circ} 20' 47''</math>: 6 observations, calculate               <ol style="list-style-type: none"> <li>i. Probable error of single observation of unit weight</li> <li>ii. Probable error of weighted arithmetic mean</li> </ol> </li> </ol> | 07<br>08 |

- Q.5 Write a short note on: (any three) 15
- a) Signals and towers
  - b) Law of accidental error
  - c) Topographical Survey
  - d) Laminscate curve

Section B

- Q.6 Solve (any five) 10
- a) What is difference between EDM and total station?
  - b) Enlist the key component of GIS.
  - c) Enlist equipment used for locating sounding
  - d) What is shoreline survey?
  - e) What are the uses of aerial photograph?
  - f) What do you mean by Remote sensing?
  - g) What is terrestrial Photogrammetry?
- Q.7 07
- a) Define hydrological survey. Give its importance.
  - b) Explain phase comparison of EDM in detail. 08
- Q.8 08
- a) Explain remote sensing observations platform.
  - b) Application of GIS in Civil Engineering. 07
- Q.9 07
- a) Explain vector and Raster data used in GIS.
  - b) Explain scale of photograph. 08
- Q.10 Write a short note on: (any three) 15
- a) Applications of EDM
  - b) Digital image processing
  - c) Stereoscopes
  - d) Electromagnetic Spectrum
  - e) Aerial Photogrammetry