B.Tech. (Civil Engineering) Third Semester (C.B.C.S.)

Fluid Mechanics

P. Pages : 2 **PSM/KW/23/2548**

Time : Three Hours * 2 7 3 9 * Max. Marks : 70

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Assume suitable data whenever necessary.
8. Illustrate your answers whenever necessary with the help of neat sketches.
9. Use of non programmable calculator is permitted.

1. a) State Newton's law of viscosity and Draw a Rheological diagram and show thereon: **7**

i) Ideal fluid ii) Non- Newtonian fluid

iii) Thixotropic Fluid iv) Ideal plastic

v) Dilatant fluid vi) Ideal solid

b) A body weighing 350N with a flat surface area of $0.065m^2$ slides down a lubricated inclined plane making an angle 35º with the horizontal for the viscosity of 0.1 Pa-S and body speed of 4m/sec. Determine the lubricant film thickness. **7**

OR

2. a) Determine specific gravity of a fluid having density 3000 kg/m^3. Also find its kinematic viscosity when at a certain point in the fluid, the force acting on body is 0.75 N at unit area and velocity gradient is 0.9/sec. **6**

b) Explain in details different types of manometers. **8**

3. a) Derive expressions for total pressure and center of pressure for an inclined immersed surface. **7**

b) A rectangular barge is 20m long, 6m wide and 3m deep. When fully loaded, the depth of immersion of the barge is 2m. The CG of the barge is on the axis of symmetry at the water surface. Determine the stability conditions of the barge & metacentric height. **7**

OR

4. a) Discuss metacenter and metacentric height of a floating body. State the position of metacenter, center of gravity. **6**

b) The vertices A, B, and C of triangular lamina lie 0.5m, 0.75m and 1.75m below the free water surface. If AB=3.5m, BC= 2.5m and CA = 3m. Find the thrust on one face of lamina. **8**

5. a) Define stream function and velocity potential. Show that equipotential and streamlines intersect each other orthogonally. **6**

b) For a flow field, the stream function is given by $\Psi = 3x^3y + 8xy - 3xy^3$ **8**
Show that, the flow is irrotational. Also determine expression for potential function φ.

OR

6. a) Write the assumptions made while deriving Bernoulli's equation. Also state and prove Bernoulli's equation. **7**

b) A two dimensional flow is described by the velocity components **7**
$u = 5x^3$ and $v = 15x^2y$
Determine the stream function, velocity and acceleration at point p (x=1m and y=2m).

7. a) Explain hydraulic coefficients of an orifice. **7**

b) A vertical cylindrical tank of diameter 800mm & length 2000mm is provided with an orifice of diameter 110mm. Find the time taken to reduce the head of water from 1500mm to 500mm. Take $C_d = 0.63$. **7**

OR

8. a) Derive an expression for the discharge over a rectangular Notch or weir in terms of head of water over the crest of the notch or weir. **6**

b) A venturimeter is used for measuring the flow of petrol in a pipeline inclined at 35º to horizontal. The Sp. gr. of petrol is 0.81 and throat area ratio is 1:0.4 If the difference in mercury level in the gauge is 50mm Calculate the flow in m^3/s, if the pipe diameter is 300mm. Take venturimeter constant = 0.975. **8**

9. a) Explain Buckingham – π theorem. **7**

b) Explain Distorted and Undistorted model. **7**

OR

10. a) Derive an expression for force exerted by flowing fluid on pipe bend. **6**

b) The size of droplets 'd' produced by a liquid spray nozzle depends upon the nozzle diameter 'D', Jet velocity 'v', liquid density 'ρ' and viscosity 'μ', and surface tension 'σ' using Buckingham's π theorem, obtain the dimensionless parameters. **8**

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B.Tech. (Civil Engineering) Third Semester (C.B.C.S.)

Solid Mechanics

P. Pages : 2 **PSM/KW/23/2549**

Time : Three Hours * 2 7 4 0 * Max. Marks : 70

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Due credit will be given to neatness and adequate dimensions.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

1. a) Define the terms: **7**

i) Ultimate strength.

ii) Factor of safety.

iii) Young's modulus.

iv) Modulus of rigidity.

b) A load of 270 kN is carried by a short concrete column 250 mm × 250 mm. The column is reinforced with 8 bars of 16mm diameter. Find the stresses in concrete and steel, if modulus of elasticity for the steel is 18 times that of concrete. **7**

OR

2. a) Draw stress strain curve for mild steel under tension and explain the salient points. **7**

b) A steel bar of 600 mm long is 28 mm in diameter for 240 mm its length, 20 mm in diameter for next 200 mm of its length and 16 mm in diameter for the remaining 160 mm of its length. It is subjected to an axial pull of 20 kN. If E = 210 GN/m^2 calculate the extension of the bar. **7**

3. a) Derive the relationship between load, Shear force and bending moment. **7**

b) Draw SFD and BMD for the loaded beam shown in fig. 1. **7**

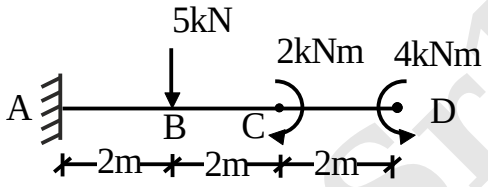

Fig. 1

OR

4. Draw SFD and BMD also indicate the numerical values at all important sections for the loaded beam shown in fig. 2. **14**

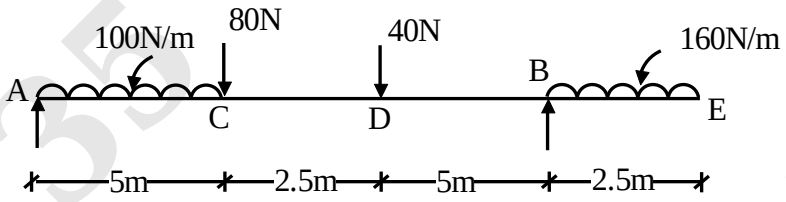

Fig. (2)

5. a) A rectangular beam 200 mm deep and 300 mm wide is simply supported over a span of 8m. What uniformly distributed load per meter may carry the beam, if the bending stress is not to exceed 120 N/mm^2. **7**

b) Derive the bending equation and state the assumptions in the theory of simple bending. **7**

OR

6. A beam of 'I' section 400 x 200 has a web and flange thickness 20mm Calculate the maximum intensity of shear stress across the section and sketch the shear stress distribution across the section of the beam. If it carries a shear force of 300 kN at a section. **14**

7. A S/S beam of span 7m, carries loads as shown in fig. 3. Compute deflection at D and at E. Point E is the mid point of DB. $E = 200GPa$ $I = 150 \times 10^6 mm^4$. **14**

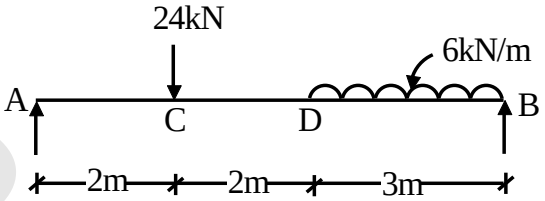

Fig. 3

OR

8. a) Derive differential equation of flexural beam. **5**

b) Compute the deflection of simply supported beam carrying a point load at the center. **9**

9. a) State the assumptions in pure torsion. **7**

b) A solid circular shaft transmits 7.5 kw at 200 r.p.m. Calculate the shaft diameter if the twist in the shaft is not to exceed 1º in 2 meter length of shaft and the shearing stress is limited to 50 N/mm^2. Take $C = 1 \times 10^5 N/mm^2$. **7**

OR

10. a) Derive the expression for deflection and stiffness in closed coiled helical spring. **7**

b) A closely coiled helical spring is used to carry a load of 500 N. Its mean coiled diameter is to be 10 times that of wire diameter. Calculate the diameters if the maximum shear stress in the material of the spring is to be 80 N/mm^2. **7**

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B.Tech. (Civil Engineering) Third Semester (C.B.C.S.)

Geotechnical Engineering

P. Pages : 2 **PSM/KW/23/2550**

Time : Three Hours * 2 7 4 1 * Max. Marks : 70

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Due credit will be given to neatness and adequate dimensions.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Briefly describe the process of soil formation and differentiate between residual and transported soils. **7**

b) A soil sample from field has a volume of $300\,cm^3$ and weights 600 gms. Water content is 12%. If G = 2.62 find void ratio, porosity and degree of saturation. **7**

OR

2. a) A liquid limit test by the Casagrande's apparatus gave the following results: **7**

Number of blows	16	20	30	43
Moisture content	52.5	49.5	46.0	41.8

Plot the flow curve and find the liquid limit and the flow index.

b) Explain the particle size distribution curve. **7**

3. a) Discuss the various factors affecting permeability of soil. **7**

b) A falling head permeability test was carried on 150 mm long clay sample. The diameter of sample and stand pipe was 98 mm and 7.5 mm respectively. The level of water in stand pipe dropped from 600 mm to 450 mm in 12 minutes, Determine (i) permeability in m/day, (ii) time required for level to drop to 100 mm. **7**

OR

4. a) State Darcy's law and its validity. **6**

b) Calculate the horizontal and vertical permeability of soil deposit consisting of three layers 150 cm, 180 cm and 200 cm thick with permeability 1×10^{-5}. **8**

5. a) Discuss various factors affecting compaction of soils. **6**

b) Standard compaction test was performed on a soil sample and following data was obtained: **8**

Water Content (%)	7.7	11.5	14.6	17.5	19.7	21.2
Bulk unit weight (kN/m^3)	17.55	19.51	20.96	20.55	20.24	19.83

Take G = 2.65, determine maximum dry density and optimum moisture content. Also plot zero air void line.

OR

6. a) State the difference between compaction and consolidation. **6**

b) From a direct shear test on an undisturbed soil sample, the following data have been obtained. Evaluate the undrained shear strength parameters. Determine shear strength, major and minor principal stresses and their planes in the case of specimen of same soil sample subjected to a normal stress of $100\,kN/m^2$. **8**

Normal stress (kN/m^2)	70	96	114
Shear stress at failure (kN/m^2)	138	156	170

7. a) Write short note on effect of water table on bearing capacity. **6**

b) A square footing of size $1.3\,m \times 1.3\,m$ is located at depth of 1 m below ground level. The soil properties are $c = 22\,kN/m^2, \phi = 22^o$ and $\gamma = 18\,kN/m^3$. Determine net ultimate bearing capacity without water table effect. Also determine the change in net ultimate bearing capacity if water table rises 0.5 m above the foundation level. **8**
Take $N_c = 22.5, N_q = 10.2, N_\gamma = 8.1$.

OR

8. a) Explain how piles are classified. **7**

b) A group of 9 piles arranged in a square pattern with diameter and length of each pile as 0.25 m and 10 m respectively is used as a foundation in soft clay deposit. Taking unconfined compressive strength of clay as $120\,kN/m^2$ and pile spacing 1m center to center. Find the load capacity of the pile group. Take $\alpha = 0.75$ and $N_c = 9$. Factor of safety = 2.5. **7**

9. a) Describe internal structure of the earth with a neat sketch. **7**

b) Explain erosional and depositional landforms developed by wind action. **7**

OR

10. a) What is an earthquake? Discuss various causes of earthquakes. Describe in brief the characteristics of various Seismic waves. **7**

b) Explain magnitude and intensity of earthquake. **7**

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B.Tech. (Civil Engineering) Third Semester (C.B.C.S.)

Building Construction & Elementary Building Drawing

P. Pages : 2 **PSM/KW/23/2551**

Time : Three Hours * 2 7 4 2 * Max. Marks : 70

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Due credit will be given to neatness and adequate dimensions.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

1. a) What is foundation? State the essential requirements of good foundation. **7**

b) Differentiate between load bearing & framed structure. **7**

OR

2. a) Enumerate the causes & remedial measures for the failure of foundation. **7**

b) What is timbering to the trenches? Discuss any two situation along with the methods of trenching adopted. **7**

3. a) What are the points to be observed while supervising the brick work? Explain in detail. **7**

b) Define Bond in brick masonry work. Explain in detail English bond with neat sketch. **7**

OR

4. a) Explain with neat sketches different forms of rubble masonry? **7**

b) Enumerate the functional and structural difference between Arches and Lintel. **7**

5. a) Discuss the causes and effects of dampness. **7**

b) What are the different methods of damp proofing? Explain in brief. **7**

OR

6. a) Enlist various types of pitched roofs and explain any one in detail. **7**

b) Enumerate ideal requirement of a floor? Explain in brief. **7**

7. a) Design a dog legged stair case for a room size of 2.50×5.0m . The height of floor is 3.60m. (Assume suitable data) Draw the sketch of plan & elevation. **10**

b) What are the different types of stairs. **4**

OR

8. a) Discuss the following items related with Doors. **7**
i) Location
ii) Purpose
iii) Size

b) Classify with the help of sketches various types of windows based on their method of operation. **7**

9. a) What are the objects of plastering? Describe the procedure for carrying out the plastering to brick wall in cm 1:4 in two coats. **7**

b) Enumerate various types of pointing with neat sketches. **7**

OR

10. a) Discuss the process of underpinning. **7**

b) State the objective of painting. Describe briefly various types of painting. **7**

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B.Tech. (Civil Engineering) Third Semester (C.B.C.S.)

Effective Technical Communication

P. Pages : 3 **PSM/KW/23/2552**

Time : Two Hours * 2 7 4 3 * Max. Marks : 35

Notes : 1. All questions carry marks as indicated.

1. a) Correct the following sentence **any three**. **3**

i) The cluster of islands are on the other side of the hill.

ii) The king as well as his brothers are to blame.

iii) Each of the girls have worm college uniforms

iv) He has to do regular exercises, has he?'

v) The creativity of the artists are inspiring

b) Do as directed. **Any three** **3**

i) He said, "What is the option we are left with?" (Change the narration)

ii) The college will organize a national event. (Change the voice)

iii) This house was built by my father. (Change into complex sentence)

iv) Many workshops on Universal Human values have been organized by the UGC. (Change the voice)

v) He said, "We have not received any good news till now" (Change the narration)

c) Use the following phrases and idioms in your own sentences. **Any two.** **2**

i) Crocodile's tears

ii) Hobson's choice

iii) At the drop of a hat

iv) A Read Letter day

2. a) Do as directed **Any three** **3**

i) Make any two words using the prefix 'Anti'-

ii) Give two examples of words formed out of compounding

iii) Make a new word with the suffix – 'ment' and explain the meaning

iv) Explain the foreign word – 'Ombudsman'

v) Write any two technical jargons related to Hospitality Industry

b) Answer the following **Any two.** **2**

i) Give one word for 'A person who knows many languages'

ii) Choose the correct synonym for the word "placebo"

a) Ingest b) Calmness
c) Inactive medicine d) Consume

iii) Antonym for 'Abject' is

a) Worthy b) Ideation
c) Undivided d) Impede

iv) Find an analogy of:
Coffee : Beverages

a) Bread : Butter b) Milk : Tea
c) Burger : Snacks d) Grapes : Wine

c) What are different types of interviews? **4**

3. a) Applications are invited for the post of Mechanical Engineers for a reputed company dealing in hospital equipment's. Qualified Engineers with a minimum of five years experience may apply. Write your applications along with resume, to Telex India Ltd. **5**

OR

Write an Order letter to the Purchase Manager, TATA MOTORS, MIDC, Waluj Aurangabad 431003 for the purchase of certain parts of an Electric Moped. Having received the wrong consignment write a complaint letter for the same.

b) Read the following passage carefully and answer the questions given below: **4**

These days, it is not unusual to see people listening to music or using their electronic gadgets while crossing busy roads or travelling on public transports, regardless of the risks involved. I have often wondered why they take such risks: is it because they want to exude a sense of independence, or is it that they want to tell the world to stop bothering them? Or is it that they just want to show how cool they are? Whether it is a workman or an executive, earphones have become an inseparable part of out lives, sometimes even leading to tragicomic situations.

The other day, an electrician had come to our house to fix something. We told him in detail what needed to be done. But after he left, I found that the man had done almost nothing. It later turned out that he could not hear our directions clearly because he had an earphone on. Hundreds of such earphones addicts commute by the Delhi Metro every day. While one should not begrudge anyone their moments of privacy or their love for music, the fact is 'iPod oblivion' can sometimes be very dangerous. Recently, I was travelling with my wife on the Delhi Metro. Since the train was approaching the last station, there weren't too many passengers. In our compartment, other than us, there were only two women sitting cm the other side of the aisle. And then suddenly, I spotted a duffel bag. The bomb

scare lasted for several minutes. Then suddenly, a youth emerged from nowhere and picked up the bag. When we tried to stop him, he looked at us, surprised. Then he took off his earpieces, lifted the bag, and told us that the bag belonged to him and that he was going to get off at the next station.

We were stunned but recovered in time to ask him where he was all this while. His answer : he was in the compartment, learning against the door totally immersed in the music. He had no clue about what was going on around him. When he got off, earplugs in his hand, we could hear strains of the song.

i) What reasons does the author offer for the people taking risks on the road?

ii) Why didn't the electrician carry out the work properly?

iii) Why were the passengers stunned?

iv) Explain the term 'earphone addicts'?

4. a) There has been a fire breakout in a factory manufacturing plastic products. As the Works Manager, draft and accident report to be sent to the Zonal Manager, Mumbai, MS. **5**

OR

What elements must appear in the User Manual of a Washing machine?

b) Draft a project proposal to be sent to the Director of LG Electronics, stating the need for setting up a canteen adjacent to the branch office for the employees who stay till late at night with facility of drinking water, coffee kiosk, sufficient snacks and security arrangements. **4**

OR

Explain in detail the format of a research paper.

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B.E. (Civil Engineering) Third Semester (C.B.S.)

Mathematics-III

P. Pages : 3 **PSM/KW/23/8212**

Time : Three Hours * 2 8 4 3 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
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6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Use of non programmable calculator is permitted.

1. Find Fourier series for $f(x) = x - x^2, -\pi < x < \pi$. **7**

OR

2. Find half range cosine series for $f(x) = (x-1)^2$, $0 < x < 1$. **7**

3. a) Solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$ **6**

b) Solve $\frac{\partial^2 z}{\partial x^2} + 2\frac{\partial^2 z}{\partial x \partial y} - 3\frac{\partial^2 z}{\partial y^2} = e^{2x+y}$ **6**

c) Solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ given that $u(x,0) = 6e^{-3x}$ by the method of separation of variables. **6**

OR

4. a) A tightly stretched string with fixed end points x = 0 and $x = \ell$, is initially at rest in its equilibrium position. If it is set vibrating by giving each point a velocity $\lambda x(\ell - x)$, find the displacement of the string at any distance from one end at any time t, if $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$ **8**

b) Solve $z(p-q) = z^2 + (x+y)^2$. **5**

c) Solve $\left(D^2 - 3DD' + 2D'^2\right)z = e^{2x+3y} + \sin(x-2y)$. **5**

5. Prove that the sphere is the solid of revolution, which for given surface area has the maximum volume. **7**

OR

6. Find the extremals of the functionals $\int_{x_0}^{x_1}\left[y^2-(y')^2-2y\sin x\right]dx$ **7**

7. a) Examine the following system of vectors for linearly dependent and find the relation between them. **6**

$X_1=(1,1,-1,1),\ X_2=(1,-1,2,-1),\ X_3=(3,1,0,1)$

b) Find eigen values, eigen vectors and modal matrix for the matrix **6**

$$A=\begin{bmatrix}6 & -2 & 2\\ -2 & 3 & -1\\ 2 & -1 & 3\end{bmatrix}$$

c) Verify Cayley-Hamilton theorem and express $A^5-4A^4-7A^3+11A^2-A-10I$ as a linear polynomial of A, if $A=\begin{bmatrix}1 & 4\\ 2 & 3\end{bmatrix}$ **6**

OR

8. a) Use Sylvester's theorem to show that $3\tan(A)=(\tan 3)(A)$, where $A=\begin{bmatrix}-1 & 4\\ 2 & 1\end{bmatrix}$ **6**

b) Solve $\frac{d^2y}{dx^2}-3\frac{dy}{dx}-10y=0$, given $y(0)=3\ \ y'(0)=15$ by matrix method. **6**

c) Reduce the quadratic form $6x^2+3y^2+4z^2-4xy+4zx-2yz$ to the canonical form. **6**

9. a) Using the method of false position, find the root of the equation $x\log_{10}^{x}-1.2=0$, correct upto three places of decimal. **5**

b) Apply Crout's method to solve the equations **6**

$3x+2y+7z=4$

$2x+3y+z=5$

$3x+4y+z=7$

c) Given $\frac{dy}{dx}=x+y,\ y(0)=1$, find y upto five terms by Picard's method and hence find y when x = 0.1 & x = 0.2. **7**

OR

10. a) Find by Newton-Raphson method the root of the equation $e^x-4x=0$ near to 2, correct to three decimal places. **5**

b) Solve by Gauss – Seidel method. **6**

$2x + 10y + z = 13$

$2x + 2y + 10z = 14$

$10x + y + z = 12$

c) Solve by 4th order Runge Kutta method $\frac{dy}{dx} = xy + y^2$ given $y(0) = 1$, $h = 0.1$, find $y(0.1)$ & $y(0.2)$. **7**

11. A company manufactures three products A, B and C. Each product has to undergo operations on three types of machines M_1, M_2, M_3 before these are ready for sale. The time that each product requires on each machine are given in the following table. The table also show the net profit per unit on the sale of the three products. Formulate the mathematical model for this problem to maximize the total net profit of the company per day and obtain its solution by simplex method. **12**

Machine ↓ Product →	Time required per unit in minutes			Total time available per day in minutes
	A	B	C	
M_1	1	2	1	480
M_2	2	1	0	540
M_3	1	0	3	510
Profit per unit (Rs)	4	3	5	

OR

12. a) Solve the following L.P.P. using Graphical method. Minimize $z = 5x_1 + 8x_2$ **6**

Subject to $x_1 \le 4$, $x_2 \ge 2$, $x_1 + x_2 = 5$ and $x_1, x_2 \ge 0$

b) The standard weight of a special purpose brick is 5 kg and it contains two basic ingredients B_1 and B_2. B_1 Costs Rs. 5 per kg and B_2 costs Rs. 8 per kg strength considerations dictate that the brick contains not more than 4 kg of B_1 and a minimum of 2 kg of B_2. Since the demand for the product is likely to be related to the price of the brick, formulate L.P.P. model to minimize the cost of the brick satisfying the above conditions. **6**

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B.E. (Civil Engineering) Third Semester (C.B.S.)

Strength of Materials

P. Pages : 3 **PSM/KW/23/8213**

Time : Three Hours * 2 8 4 4 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
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7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) Draw stress-strain diagram for mild steel under tension and explain salient points. **5**

b) A circular bar tapers from 10 cm diameter to 8 cm diameter in a length of 1 m. Determine elongation of the bar under a pull of 80 kN. Assume E = 200 kN/mm^2. Also derive the expression which you use. **8**

OR

2. Determine the greatest permissible weight 'W' which can be supported as shown in Fig. 1, if the stresses in steel and bronze are not to exceed 20 kN/cm^2 and 8 kN/cm^2 respectively. Assume the horizontal beam is hinged at A and it is rigid. **13**

$E_{st} = 2 \times 10^7 \text{ N/cm}^2$

$E_{br} = 1.2 \times 10^7 \text{ N/cm}^2$

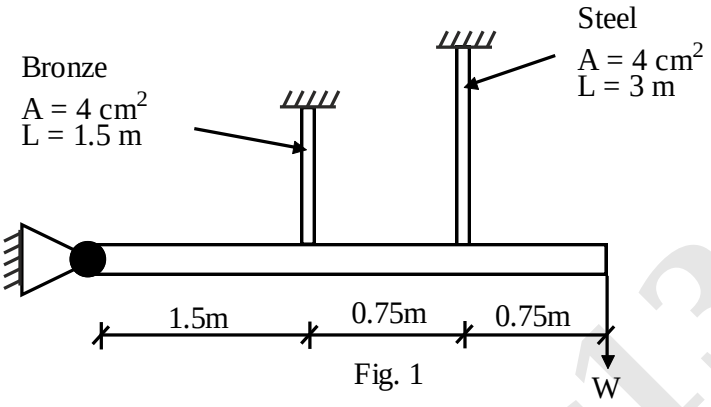

Fig. 1

3. A brass rod is 50 mm in diameter and it is fitted co-axially in a steel tube having 100 mm outer diameter and 75 mm inner diameter. Initial temperature of the compound bars is 200ºC and the bars are cooled to 20ºC. Find the stress in brass rod and steel tube. **14**

E_{st} = 200 kN/mm^2, E_b = 100 kN/mm^2, $\alpha_{st} = 12 \text{x} 10^{-6}/^{o}\text{C}$, $\alpha_b = 18 \text{x} 10^{-6}/^{o}\text{C}$.

OR

4. Draw shear force and bending moment diagram for the beam shown in Fig. 2 and locate the point of contra-flexure if any **14**

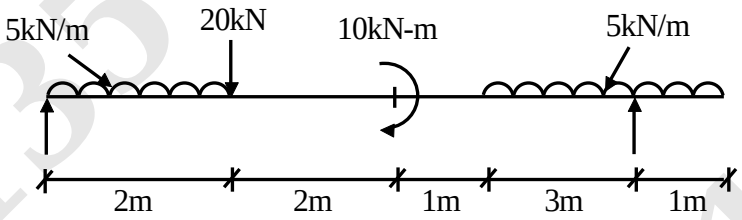

Fig. 2

5. For the same bending stress. Compare the moment of resistance of a beam of square section when placed. **13**

i) With two sides of the square horizontal and
ii) With one of its diagonal horizontal.

OR

6. Draw SFD & BMD of beam as shown in fig. – 3. **13**

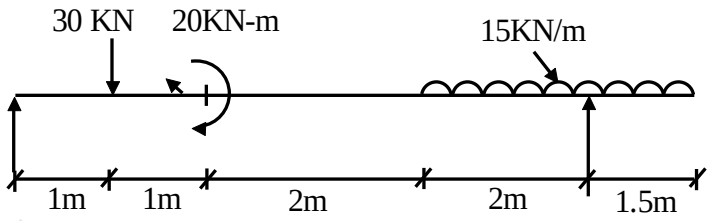

Fig. 3

7. Calculate the deflection under point loads for the beam shown in Fig. 4 by Macauley's method. **13**

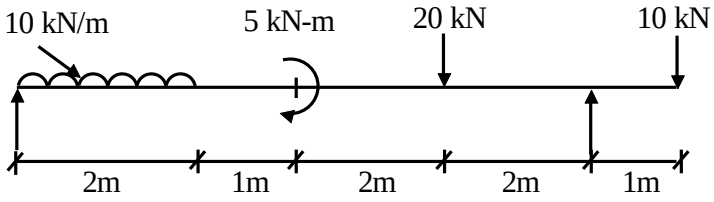

Fig. 4

OR

8. Stress at a point is given below **13**

δ_x = 100 MPa (Tensile)

δ_y = 75 MPa (Compressive)

τ_{xy} 50 MPa acting downward on right face.

Calculate :-

i) Principal Plane's location
ii) Principal stresses
iii) Stresses on a plane making 30º Clockwise with x axis

9. a) Derive expression of stresses for thin cylinder subjected to internal pressure. **6**

b) A cylindrical shell 1 m long, 18 cm internal diameter, 8 mm thick in wall is filled with fluid at atmospheric pressure. If an additional 20 cm^3 of the fluid is pumped into the cylinder, find the pressure exerted by the fluid on the walls of cylinder. E = 200 kN/mm^2, Poisson's ratio = 0.3. **8**

OR

10. A solid rectangular column 200 mm wide and 150 mm thick carries an eccentric load of 100kN, the eccentricity being 50 mm on the centroidal axis bisecting the thickness. Determine the maximum and minimum intensity of the stresses in the column. **14**

11. Explain in brief **any three:-** **13**

i) Kernel or core of rectangular section.

ii) Shear Centre.

iii) Relationship between E and K.

iv) Types of springs and their applications.

OR

12. Derive the equation of 'Deflected curve' & find the max. deflection of simply supported beam having point load acting on center of beam. **13**

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B.E. (Civil Engineering) Third Semester (C.B.S.)

Environmental Engineering-I

P. Pages : 2 **PSM/KW/23/8214**

Time : Three Hours * 2 8 4 5 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Diagrams and chemical equations should be given whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) What are the various water demands? Explain the various factors affecting water demand. **7**

b) Determine the population of a city in 2011 by arithmetic increase method & Geometric increase method by using following data. **7**

Year	1951	1961	1971	1981	1991
Population in thousand	85,000	1,12,000	1,44,000	1,72,000	2,12,000

OR

2. a) Explain the importance and necessity of public water supply scheme. **7**

b) What are 'Infiltration galleries' and 'Infiltration wells'? Explain with neat sketches. **7**

3. a) Explain following pipes with their advantages & disadvantages **any two.** **7**
i) Cast iron pipe
ii) Steel pipe
iii) RCC pipe

b) List out the various pipe joints used in water supply scheme and explain socket and spigot joints. **7**

OR

4. a) Explain the following with neat sketch **any two.** **7**

i) Scour valve

ii) Spigot and socket joint

iii) Pressure Relief valve

b) Enlist various types of pump. Explain in detail centrifugal pump. **7**

5.	a)	Draw a flow sheet of conventional water treatment plant & explain the function of each unit.	**7**
	b)	What are the various characteristics of water? Explain in detail.	**7**

OR

6.	a)	Explain 'Clariflocculator' with a neat sketch.	**7**
	b)	Design a Cascade Aerator for a capacity of 12 MLD.	**7**
7.	a)	Derive an equation for settling velocity of discrete particles freely falling in a Sedimentation tank.	**7**
	b)	Design a plain sedimentation tank for a population of 2 lakh with water supply rate 200 Lpcd. Assuming detention period = 60 minutes velocity = 50 cm/min and depth = 3.5M.	**7**

OR

8.	a)	What is Sedimentation? State & explain various factors affecting it.	**7**
	b)	Draw a neat sketch of Rapid sand Filter & explain its working and cleaning process.	**7**
9.	a)	What is chlorination? Discuss disinfecting action of chlorine.	**7**
	b)	Chlorine usage in the treatment of 25000 m3/day is 9kg/day. The residual chlorine after 10 minutes contact is 0.2 mg/l. Calculate the dosage in milligrams per litre and the chlorine demand of the water.	**7**

OR

10.	a)	What is Break point chlorination? Explain in detail.	**7**
	b)	Explain the layout of various water Distribution system.	**7**
11.	a)	What is Municipal Solid Waste? Explain in brief the classification of solid waste with their sources of generation.	**7**
	b)	Write short note on "Collection methods" of solid waste.	**7**

OR

12.	a)	Explain Transfer station and also state the requirements of transportation vehicle.	**7**
	b)	What are the points to be considered while selecting the site for sanitary land filling?	**7**

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B.E. (Civil Engineering) Third Semester (C.B.S.)

Concrete Technology

P. Pages : 2 **PSM/KW/23/8216**

Time : Three Hours * 2 8 4 6 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Diagrams and chemical equations should be given whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) List different types of cements. Explain any two types in detail. **7**

b) What are the field tests for judging the preliminary quality of cement? **7**

OR

2. a) Explain the test on specific gravity Bulk density & Moisture contents of aggregates. **7**

b) What are the sources of aggregates. Explain the classification of aggregate? **7**

3. a) What is workability? List out the tests for workability measurements. **7**

b) Explain the significance of curing of concrete? Also explain maturity of concrete. **6**

OR

4. a) Write short note on hot weather concreating and underwater concreting. **7**

b) Explain significance of water cement ratio. What is segregation and bleeding of concrete. **6**

5. a) Explain the various properties which affect the quality of concrete. **5**

b) Explain modulus of elasticity of concrete. **4**

c) Explain Poisson ratio of concrete. **4**

OR

6. a) Compare compression test by cube strength, cylinder strength and abrasion resistance. **7**

b) Explain accelerated curing test of concrete. **6**

7. a) Explain Mix design procedure by IS 10262:2009. **7**

b) What are the significance of fly ash & pozzolanas in view of quality of concrete. **6**

OR

8. a) Explain concrete mix design by Road Note no. 4 (BS). **7**

b) Write short note on air entraining admixtures & plasticizers. **6**

9. a) Explain self compacting concrete and high performance concrete. **7**

b) Explain the factors affecting creep & shrinkage of concrete. **7**

OR

10. Explain: **14**

i) Different shrinkage.

ii) Relation Between creep & time

iii) Shotcrete pumped concrete

11. a) Explain water as an deterioration of concrete. **7**

b) What are the types of cracks in concrete? Explain various causes of cracks in concrete. **6**

OR

12. Explain in brief following non destructive testing of concrete. **13**

i) Rebound Hammer Method.

ii) Ultrasonic pulse velocity testing method.

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