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

Structural Analysis-II

P. Pages : 4 **PSM/KW/23/2224**

Time : Three Hours 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. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

1. Analyze the portal frame in fig. 1 by Kani's method Draw B.M.D. **13**

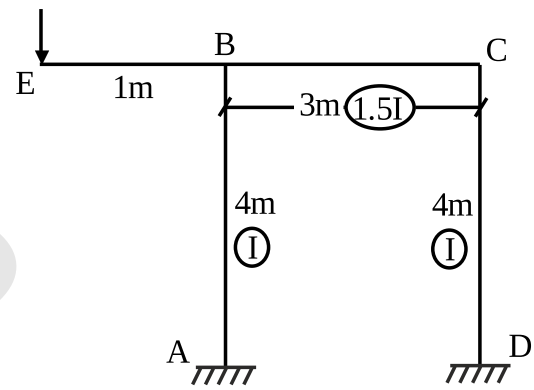


Fig.1

OR

2. Find the support moments & Draw B. M. D. for the frame shown in fig. 2. All members have the same section. **13**

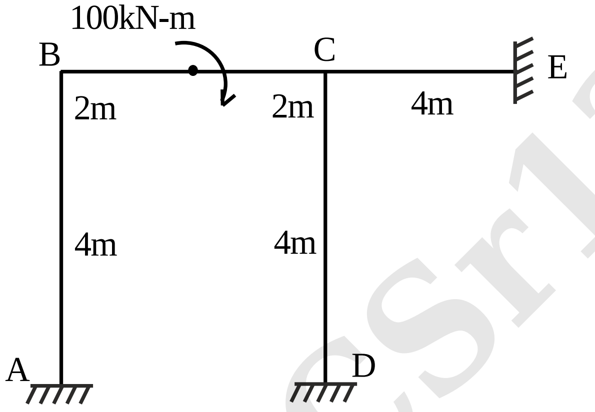


Fig.2

3. Analyze the continuous beam as shown in fig. 3 by moment distribution method. Draw B. M. D. & SFD. **13**

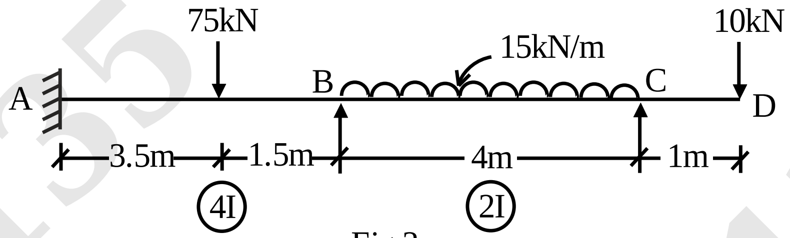


Fig.3

OR

4. Analyze the portal frame shown in fig. 4 by moment distribution method & draw BMD All members have the same section. **13**

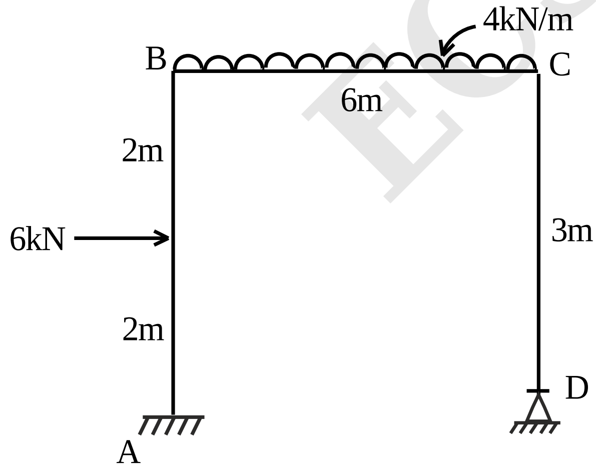


Fig.4

5. Assemble the global stiffness matrix and load matrix for the plane truss shown in fig. 5. If members meeting at joint B are subjected to temperature use 50ºC. Assume $E = 210\,kN / mm^2$ c/s. area of all members = $710\,mm^2$. **13**

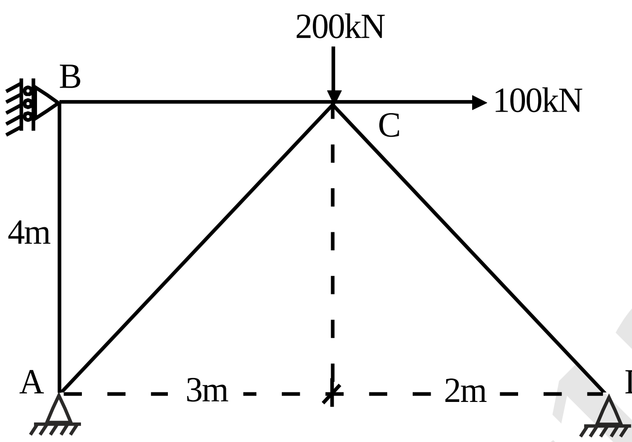


Fig.5

OR

6. a) Derive member stiffness matrix for prismatic plane beam element. **7**

b) Derive member stiffness matrix for plane truss element. **6**

7. Analyze continuous beam as shown in fig. 6 by stiffness method and draw B. M. D. Neglecting axial deformation. **14**

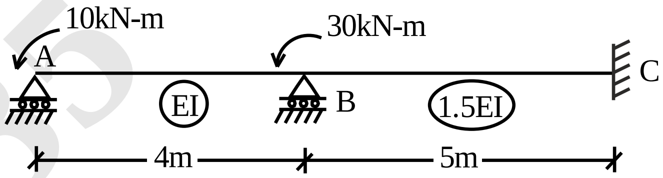


Fig.6

OR

8. Analyze continuous beam as shown in fig. 7 by stiffness method and draw B. M. D. Neglecting axial deformation. **14**

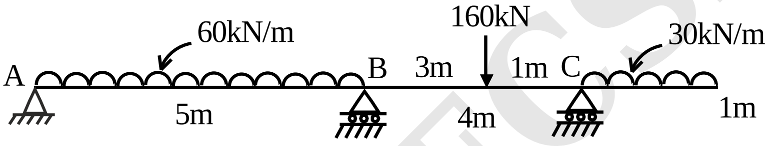


Fig.7

9. Analyze given portal frame by stiffness matrix method and plot B. M. D. Fig. 8. Take EI constant. **13**

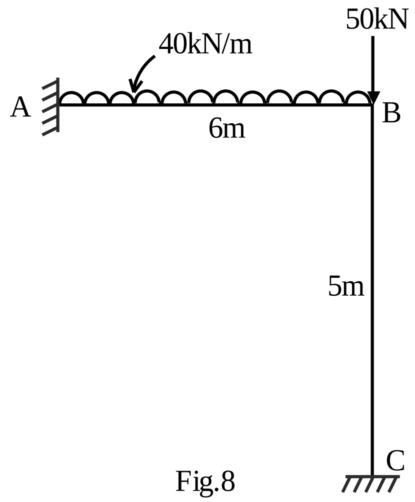


Fig.8

OR

10. Analyse given portal frame by stiffness method and plot the B. M. D. fig. 19. Neglecting axial deformation. EI constant. **13**

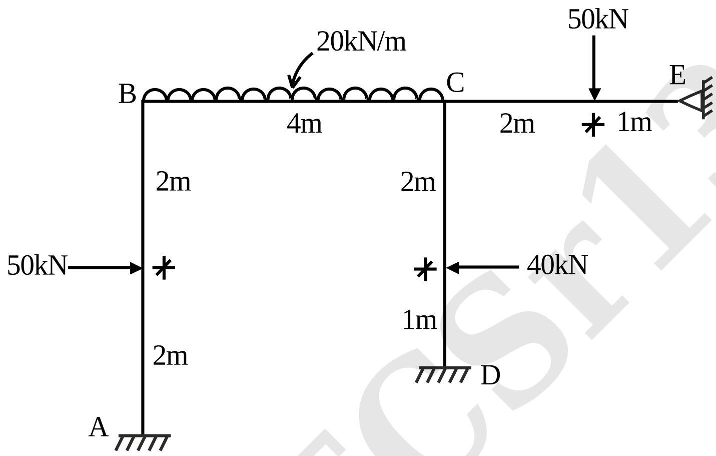


Fig.9

11. Analyze the bar element as shown in fig. 10. Using finite element method and calculate the stress and strain in each portion. **14**

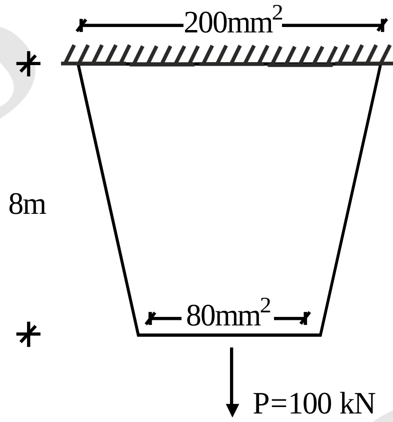


Fig.10

OR

12. a) Define: **any three**. **7**

i) Free vibration.

ii) Forced vibration.

iii) Transient vibration.

iv) Steady state vibration.

b) A load is supported by arrangement of two springs as shown in fig. 11. Determine the natural frequency of the system. **7**

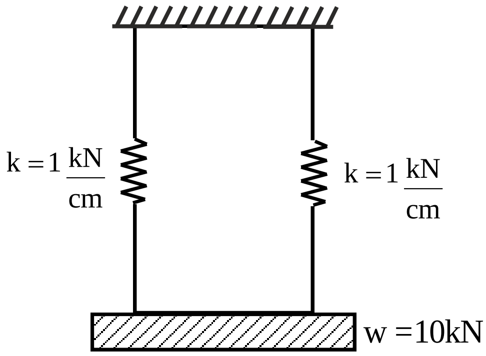


Fig.11

****

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

Reinforced Cement Concrete (RCC) Structures

P. Pages : 2

Time : Four Hours

PSM/KW/23/2225

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. 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.
12. IS 456:2000 IS 1893:2002 Part – I allowed.

1. a) State the drawbacks & limitations of working stress method. **3**

b) A RCC beam $230\text{mm}\times500\text{mm}$ effective depth, is reinforced with $4\times160\text{mm}$ dia bars. Calculate moment of resistance & safe working load using working stress method. Assume effective cover to reinforcement is 45mm & effective span is 3.5m. Use M20 grade concrete & Fe415 steel "use W.S.M.". **10**

OR

2. a) Differentiate between working stress & limit state method. **6**

b) Explain under reinforced, over reinforced & balanced section in WSM by deriving the equation of moment of resistance (WSM). **7**

3. a) A rectangular concrete beam of cross section 300mm deep & 200mm wide is prestressed by means of 15 wires of 5m diameter located 6.5cm from the bottom of the beam & 3 wires of diameter 5mm, 2.5cm from top. Assuming the prestress in steel as $840\,\text{N}/\text{mm}^2$. Calculate the stress at the extreme fibres of the midspan section when the beam supporting its own weight over a span of 6m. if uniformly distributed live load of 6 kN/m is imposed. Evaluate the maximum working stress in concrete. The density of concrete is $24\,\text{kN}/\text{m}^3$. **7**

b) Explain the advantages of prestressed concrete over R.C.C. **6**

OR

4. Explain in detail various system of pre stressing with neat sketches. **13**

5. a) Explain- **6**

i) Stress strain relationship for concrete

ii) Stress strain relationship for steel in LSM.

b) A rectangular beam is 20cm wide & 40cm deep of to the centre of reinforcement. Find the area of reinforcement require if it has to resist a moment of 25kN/m. Use M20 Concrete mix & Fe415 steel. Also give check for sectors. **7**

OR

6. a) Derive equation for limiting moment of resistant for balanced, underreinforced & over reinforced section by LSM of singly reinforced beam. **6**

b) A rectangular beam has a width of 250mm & effective depth of 500mm. The beam is provided with tension steel of 5 bars of 25mm diameter & compression steel of 2 bars of 25mm diameter. The effective cover to the compression steel being 50mm. Calculate the ultimate moment capacity of the section of fek=20MPa & fy=250MPa. **7**

7. Design a short column of reinforced concrete to carry an axial load of 1150kN. Width of the column is restructed to 300mm. Also design a rectangular footing of uniform thickness for an axial lended column of 1150kN. S.B.C. of soil is $200\,\mathrm{kN}/\mathrm{m}^2$. Use M20 concrete & Fe415 grade of steel. **13**

OR

8. a) A simply supported T beam has flange width of 2400mm & flange thickness of 120mm. The effective span of beam is 3.6m. The effective depth of beam is 580mm & it's width 300mm. It is reinforced with 8-20mm diameter. Fe415 grade steel. Determine the moment of resistance of the section. Use M20 grade of concrete. **6**

b) Design a circular column of diameter 400mm subjected to a load of 1300kN The column is having spiral ties. The column is 3m long & is effectively held in position at both ends but not restrained against rotation. Use M25 concrete & Fe 415 steel. **7**

9. A R.C beam $300\mathrm{mm}\times500\mathrm{mm}$ is reinforced on tension side with $3\times20\mathrm{mm}$ dia bars of grade Fe250 with an effective cover of 50mm. The beam is subjected to a shear of 150kN. Design the shear reinforcement using vertical stairrups with 1 bar of 20mm. dia. bent up at an angle of 45º. Use M20 grade concrete & Fe250 steel. **14**

OR

10. A rectangular beam $230\mathrm{mm}\times550\mathrm{mm}$ is subjected to a sagging BM of 40kN.m SF of 30kN & a twisting moment of 12kN/m at a given section. Design the reinforcement at the given section. **14**

Use M20 grade concrete & Fe 250 steel
Assume effective cover = 45mm

11. A simply supported slab of a corridor of a hospital building has a clear span 2.5m & is supported on beams 230mm width. Design the slab carrying live load of $3\,\mathrm{kN}/\mathrm{m}^2$ & floor furnish load $1\mathrm{kN}/\mathrm{m}^2$. M20 concrete & MXSD Fe415 steel. **14**

OR

12. Design a RCC slab for a room measuring $4\mathrm{m}\times6\mathrm{m}$. The slab is simply supported on all the four edges with corners held down. It carries a super imposed load of $6000\,\mathrm{N}/\mathrm{m}^2$. Inclusive of floor finishes etc. Use M20 concrete & Fe415 steel. **14**

****

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

Fluid Mechanics-I

P. Pages : 2 **PSM/KW/23/2226**

Time : Three Hours 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.

1. a) A liquid with a volume of 0.2m^3 at 300 kPa is subjected to a pressure of 3000 kPa and its volume is found to decrease by 0.2%. Calculate the bulk modulus of elasticity of the liquid. **5**

b) A 90 N rectangular solid block slides down at 30º inclined plane. The plane is lubricated by a 3mm thick film of oil of relative density 0.90 and viscosity 8.0 poise. If the contact area is $0.3\,\text{m}^2$, estimate the terminal velocity of the block. **8**

OR

2. a) State and prove "Pascal's Law". **5**

b) The barometric pressure at sea level is 760 mm of mercury while on a mountain top it is found to be 735 mm. If the specific weight of air is assumed constant at $1108\text{N}/\text{m}^3$, Calculate the height of the mountain. **8**

3. a) Derive expressions for total pressure and center of pressure for a vertically immersed surface. **6**

b) A rectangular plate $3\text{m}\times 1\text{m}$ is immersed vertically in water in such a way that its 3 metres side is parallel to water surface and is1m below it.
Find i) Total pressure on the plate and ii) Position of centre of pressure. **7**

OR

4. a) Derive an expression for calculating time of rolling of a floating body. **6**

b) A wooden block of size $2\text{m}\times 1\text{m}\times 0.8\text{m}$ is floating in water. If its specific gravity is 0.7, find its metacentric height. **7**

5. a) Differentiate between. **6**
i) Steady flow and unsteady flow ii) Uniform and Non-uniform flow.

b) For the velocity components in a fluid flow given by $u = 2xy$ and $v = a^2 + x^2 - y^2$, show that the flow is possible. Obtain the relevant stream function. **7**

OR

6. a) Explain: **6**
i) Circulation
ii) Vorticity

b) Determine whether the continuity equation is satisfied by the following velocity components for an incompressible fluid. **7**

$u = x^2 y, v = 2xy - xy^2, w = x^2 - z^2$

7. a) State and prove Bernoulli's equation. Also write assumptions for the same. **7**

b) Water is flowing through a pipe having diameters 600 mm and 400 mm at the bottom and upper end respective. The intensity of pressure at the bottom end is $350\,\text{kN}/\text{m}^2$ and at upper end $100\,\text{kN}/\text{m}^2$. Determine the difference in datum head if the rate of flows through the pipe is 60 lit / sec. **7**

OR

8. a) What is i) Impulse-momentum equation. **7**

ii) Orifice meter

b) A horizontal venturimeter $300\,\text{mm} \times 150\,\text{mm}$ is used to measure the flow of oil of sp. gravity 0.80. The rate of flow $0.5\,\text{m}^3/\text{sec}$. Find the reading of oil-mercury differential manometer. Cd = 0.98. **7**

9. a) What is Torricelli's theorem? **4**

b) How are hydraulic co-efficients determine experimentally. **5**

c) Differentiate between orifices and mouthpieces. **4**

OR

10. a) Explain i) Cipoletti weir ii) Francis formula **6**

b) A weir 36m long is divided into 12 equal bays by vertical posts, each 0.6m wide. Determine the discharge over the weir if the head over the crest is 1.20m and velocity of approach 1.2 m /sec. Use Francis's formula. **7**

11. Using Buckingham's π theorem, show that the velocity through a circular orifice is given by **14**

$$V = \sqrt{2gH}\,\phi\left[\frac{D}{H}, \frac{\mu}{\rho V H}\right]$$

Where , H = Head causing flow

ρ = mass density

D = Diameter of the orifice

g = Accl^n due to gravity

μ = dynamic viscosity

V = Velocity through a orifice

OR

12. a) Derive Hagen-Poiseuille equation. **5**

b) Explain about Reynold's experiment. **5**

c) What is laminar and Turbulent flow. **4**

****

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

Geotechnical Engineering-II

P. Pages : 2 **PSM/KW/23/2227**

Time : Three Hours 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. 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) What do you understand by the term disturbed and undisturbed soil samples? State clearly the significance of the following in sampling. **7**
   i) Area ratio
   ii) Inside clearance
   iii) Outside clearance ratio

b) What are geophysical methods? Explain any one with its limitation. **6**

OR

2. a) Explain split spoon sampler and its use. **6**

b) Explain in brief SPT with its correction. **7**

3. a) Derive an expression for the factor of safety of an infinite slope in a cohesive soil. What is critical height. **6**

b) An infinite slope is having following details: Saturated unit weight $= 17.8\,\mathrm{kN/m^3}$, $C = 10\,\mathrm{kN/m^2}, \phi = 20^{\circ}$. Height of slope = 6 m slope angle = 15º. If water table is located at ground surface and assuming that there is a seepage through the soil. Find the F.O.S. of the slope. **8**

OR

4. a) Explain Taylor's stability number. **7**

b) Explain friction circle method. **7**

5. a) Explain Culmann's graphical method. **6**

b) A retaining wall 8 m high with a smooth vertical back retains a clay backfill with $C^1 = 15\,\mathrm{kN/m^2}, \phi = 15^{\circ}\ y = 18\,\mathrm{kN/m^3}$. Calculate the total active thrust on wall assuming that tension cracks develop to Fill theoretical depth. **7**

OR

6. a) Give the critical comparison between Rankins & Coulomb Earth pressure theory. **6**

b) A retaining wall 36 m high supports a dry cohesionless backfill with a plane ground surface sloping upwards at a surcharge angle of 10º. From top of the wall. The back of the wall is inclined to be vertical at a positive batter angle of 9º. The unit weight of the backfill is $18.9\,kN/m^3$ and $\phi = 30^o$. Assume wall friction angle of 12º. Determine total active pressure by Rehbans method. **7**

7. a) Explain Ground Improvement technique with sand discuss method. **6**

b) Write short notes on function and application of Geo-synthesis. **7**

OR

8. a) Write short notes on Reinforced earth. **6**

b) Write short notes on vibroflation technique with neat sketch. **7**

9. a) The subsoil at building site consists of medium sand with $C' = 0, \gamma_{sat} = 18\,kN/m^3$, $\phi' = 25^o$ and water table is at ground surface. A 2.5 m square footing is to be placed at 1.5 m below G.L. compute net ultimate bearing capacity. What will be the net ultimate bearing capacity if water table goes down to 3 m below GL? **8**
$\phi = 25^o, Nc' = 25.1, N_q = 12.7, N_\gamma = 9.7$

b) Explain Culmann's graphical method for cohesionless soil. **6**

OR

10. a) Explain: **6**
i) Local Shear Failure
ii) General Shear Failure
iii) Punching Shear Failure

b) Determine the ultimate bearing capacity of strip footing 1.5 m wide with its base at a depth of 1 m. Take : **8**
$\gamma_d = 17\,kN/m^3, \phi = 38^o, C = 0, Nq = 60, N_\gamma = 75$

11. a) What are under reamed piles? Explain with neat sketches stages in construction of single under reamed pile. **6**

b) Explain the phenomenon of negative skin friction. **7**

OR

12. a) Discuss the various modes of classification of piles. **6**

b) A group of 9 piles arranged in a square pattern with diameter & length of each pile as 0.25 m and 10 m resp. Take unconfined comp. strength of clay is $120\,kN/m^2$ & pile spacing 1m c/c. Find load carrying capacity. Assume $Nc = 9, \alpha = 0.75, F.O.S. = 2.5$. **7**

****

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

Hydrology & Water Resources (HWR)

P. Pages : 3 **PSM/KW/23/2228**

Time : Three Hours 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. 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) Explain the occurrence of various forms of precipitation with the help of a neat sketch. Also write Hydrologic equation. **7**

b) The annual rainfall depths recorded at five rain gauge stations in a drainage basin are: **7**

Rain gauge Station	A	B	C	D	E
Annual Rainfall (cm)	82	96	115	91	108

i) What is the % accuracy of the existing rain gauge network in estimation of rainfall over the basin?

ii) If it is desired to estimate the rainfall over the basin with not less than 88% accuracy, is there a need to install additional rain gauges? If so, how many?

OR

2. a) Explain various types of Rain Gauges. any two. **7**

b) An analysis of a storm occurring in a catchment gives the following information about the isohyets and their corresponding areas. Calculate the average depth of rainfall over the catchment. **7**

Isohyet interval in mm	70-80	80-90	90-100	100-110	110-120	120-130
Area in km^2	10	85	120	95	136	67

3. a) Explain the water budget methods for determining lake evaporation. **6**

b) A two and a half hrs. storm produced the following rainfall intensities at half an hour interval over a basin are 15, 35, 60, 30 and 20 mm/hr. The corresponding surface runoff rainfall excess is estimated as 40 mm. Assume initial abstraction as 5mm and estimate the Φ-index and w-index. **7**

OR

4. a) Explain briefly: **6**

i) Infiltration curve and Horton's equation

ii) Surface Evaporating Pan

b) If mean monthly temperatures during July to October at a place of latitude 10ºN are 25.4, 24.6, 22.0 and 22.6ºC respectively, determine the evapotranspiration of the vegetable during the period July to October by using Blaney Criddle method. The % sunshine hours are 8.84, 8.74, 8.26 and 8.29 and Crop factors are 0.8, 0.85, 0.75 and 0.6 resp. **7**

5. a) What is Hydrograph. Explain various components of its with neat sketch. **6**

b) The ordinate of 3 hours unit hydrograph for a drainage basin is given between 0 to 42 hours at every 3 hour interval are as follows: **7**

Time (hr)	0	3	6	9	12	15	18	21	24	30	33	36	39	42
3 hr. UH Ordinates (m^3/s)	0	15	50	220	185	150	115	90	70	60	50	30	20	0

Derive the ordinates of the 9 hr unit hydrograph for the same catchment.

OR

6. a) Explain in brief the climatic factors affecting runoff. **6**

b) Following table shows the direct runoff hydrograph for a catchment resulting from a 5.0 cm of effective rainfall of 6 hour duration occurring uniformly over the catchment. Determine the ordinates of 6 Hour Unit hydrograph. **7**

Time (hr)	0	6	12	18	24	30	36	42	48	54	60	66	72
6 hr. UH Ordinates (m^2/s)	0	25	175	320	360	310	230	165	105	60	30	10	0

7. a) Define recurrence interval. Calculate the probability of 30-year flood occurring exactly thrice in a 30-year period. **6**

b) A small watershed consists of 1.5 Sq. km. of cultivated area (Runoff Coefficient, C = 0.20), 2.5 Sq km under forest (C = 0.10) and 1.0 Sq km under grass cover (C = 0.35). There is a fall of 22m in a watercourse length of 1.8 km. The intensity-frequency-duration relation for the area may be taken as $I = \frac{80 * Tr^{0.2}}{(t+13)^{0.46}}$, where I is in cm/hr, T_r is in years and t is in minutes. Estimate the peak rate runoff for a 25 year frequency. **7**

OR

8. a) Explain the following **6**

i) Flood Routing
ii) Design Flood
iii) Time of Concentration

	b)	A flood of certain magnitude has a return period of 25 years. What is the probability of its exceedance? What is the probability that a flood of this magnitude may occur in the next: i) 15 years ii) 10 years?	**7**
9.	a)	Distinguish between (**any two**) i) Aquifer and Aquifuge ii) Specific yield and Specific retention iii) Transmissibility and coefficient of permeability	**7**
	b)	An unconfined aquifer of 8 m thick, a fully penetrating 20cm diameter well is pumped at a rate of 35 lit/s. The drawdown observed in two wells located at 10m and 100 m distances from the well are 7.5m and 0.5m resp. compute the average hydraulic conductivity of the aquifer. At what distances from the well the drawdown is insignificant?	**7**

OR

10.	a)	Derive an expression for a steady state discharge of well into a confined aquifer.	**7**
	b)	During a recuperation test conducted on an open well in a region, the water level in the well was depressed by 3m and it was observed to rise by 1.75m in 75 min. i) What is the Sp. Yield of open wells in that region? ii) What could be the yield from a well of 5m dia. under a depression head of 2.5m? iii) What should be the diameter of the well to give a yield of 12 lit/s under a depression head of 2.0m?	**7**
11.		Explain in brief **any three** i) Groundwater recharging methods ii) Groundwater Quality iii) Multipurpose projects iv) Groundwater movement in porous media v) Interstate river disputes.	**13**

OR

12.		Explain in brief **any three** i) Groundwater exploration methods ii) Watershed management iii) Water Resources planning iv) Inter basin water transfer v) Rain water harvesting	**13**

****

ECSr135
ECSr135
ECSr135

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

Hydraulic Engineering

P. Pages : 2 **PSM/KW/23/2652**

Time : Three Hours * 2 3 5 5 * 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.

1. a) Derive Hagen-Poiseuille equation and write the assumptions made in it. **7**

b) Calculate the weight of the ball of diameter 80mm which is just supported in a vertical air stream which is flowing at a velocity of 7 m/s. The density of air is given as 31.25kg/m. The kinematic viscosity of air 1.5 stokes. **7**

OR

2. a) Explain:- **8**

i) Drag and lift force

ii) Displacement thickness, & Energy thickness

b) Explain the separation of boundary layer on curved surface. **6**

3. a) Explain: **6**

i) Hydraulically smooth and rough boundaries

ii) Total energy line & Hydraulic grade line

b) A siphon of diameter 200mm connects two reservoirs having a difference in elevation of 20m. The length of the siphon is 500m and the summit is 3m above the water level in the upper reservoir. The length of the pipe from upper reservoir to the summit is 100m. Determine the discharge through the siphon and also pressure at the summit. Neglect minor losses. f=0.005. **8**

OR

4. a) Derive Darcy-Weisbach equation for frictional head loss. **7**

b) A pipe in system consists of three pipes arranged in series. The length of the pipes is 1200m, 750m and 600m and diameter 780mm, 600mm and 480mm. **7**

i) Transform the system to an equivalent 450mm diameter pipe

ii) Determine an equivalent diameter of pipe 2550m long.

5. a) Define most economical channel section of an open channel. What are the conditions to be satisfied for most economical trapezoidal sections? **7**

b) Find the slope of bed of rectangular channel of width 5m when depth of water is 2m and rate of flow is given as $20\,m^3/s$. Take Chezy's constant C=50. **7**

OR

6. a) Prove that for a given value of specific energy discharge is maximum in a channel when the flow is critical. **6**

b) A rectangular open channel has following details- **8**

i) Discharge = $16\,m^3/sec$ ii) Bed width = 10m

iii) Depth of water = 1.0m.

Find-

i) Specific Energy ii) Critical Depth

iii) Critical velocity iv) Minimum specific energy required for this discharge

7. a) Define hydraulic jump. Derive the expression of sequent depth in hydraulic jump. **6**

b) A rectangular channel has to carry discharge of $12\,m^3/s$ a velocity of 7 m/s. **8**

Determine-

i) Whether hydraulic jump will occur & Not
ii) Depth before and after jump
iii) Head loss in jump
iv) Height of jump
v) Length of jump
vi) Power loss in jump if width of channel is 7m.

OR

8. a) Give the classification & characteristics of surface profiles. For steep slope & critical slope. **7**

b) Derive the GVF equation and list the various assumptions made in it. **7**

9. a) A hydraulic turbine develops 580 KW under a head of 15m and given an efficiency of 90%. Calculate specific speed of the turbine. Also calculate power generated if the head is reduced to 7m. Assume N = 400rpm. **7**

b) A single acting reciprocating pump has a plunger diameter of 50cm & a stroke length of 100cm. If the speed of the pump is 80 rpm & coefficient of discharge is 0.95, determine the actual discharge & the % slip of the pump. **7**

OR

10. a) Write short note on: **7**

i) Heads and efficiency of a turbine.
ii) Centrifugal pump and its component parts.

b) At a design speed of 1000 r.p.m. at centrifugal pump is to deliver water against at a head of 5.0m. The vanes are curved backyard to an angle of 30º with the periphery. The impeller diameter is 30cm, the outlet width is 5cm. What will be the discharge if the hydraulic efficiency of the centrifugal pump is 94%? **7**

****

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

Reinforced Cement Concrete (RCC) Designs

P. Pages : 2

PSM/KW/23/2653

Time : Four Hours

* 2 3 5 6 *

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.
11. Use of I.S. 456 is permitted.
12. Use of SP 16 interaction charts for Q.6 only is permitted.

1. a) Explain Under Reinforced, over reinforced and balance section in WSM by deriving the equation of Moment of Resistance. **6**

b) RCC beam $300\,\text{mm} \times 500\,\text{mm}$ overall is reinforced with 4 bars of 16mm diameter. The beam has to carry a superimposed load of 30 kN/m including self weight of the beam over an effective span of 4.5m. Find the actual stresses developed in steel and concrete. The effective corner is 40 mm. Take modular ratio m = 13.33. Also find compressive stress in concrete 60 mm from top of the beam and draw bending stress diagram. **8**

OR

2. a) Explain the advantage of pre stressed concrete over RCC. **6**

b) Explain different types of losses in prestress concrete. **4**

c) Explain Pre-Tensioning and Post-Tensioning. **4**

3. a) Derive Equation for limiting moment of resistance for balanced, under reinforced and over reinforced section by LSM of singly reinforced beam. **6**

b) A simply supported beam with effective span as 4m. The effective depth of beam is 580 mm and its width 300 mm. It is reinforced with $6 - 16\text{mm}\phi$, Fe 500 Grade steel. Determine the moment of resistance of the section. Use M25 grade of concrete. **8**

OR

4. a) A rectangular beam is 25 cm wide and 40 cm deep upto center of reinforcement. Find the area of steel reinforcement require if it has to resist a moment of 35 kN-m. Use M25 concrete mix and Fe500 steel. Also given check for section. **6**

b) A simply supported T-beam has flange width of 2400 mm and flange thickness of 120 mm. The effective span of beam is 3.6 m. The effective depth of beam is 580 mm and its width 300 mm. It is reinforced with 8-20mm diameter, Fe415 steel bars. Determine the moment of resistance of the section. Use M20 concrete. **8**

5. Design a short axially loaded circular column with Helical reinforcement. The diameter of column is 400 mm and axial service load on column is 800 kN. Use M20 concrete and Fe415 steel. Draw a neat reinforcement sketch. **14**

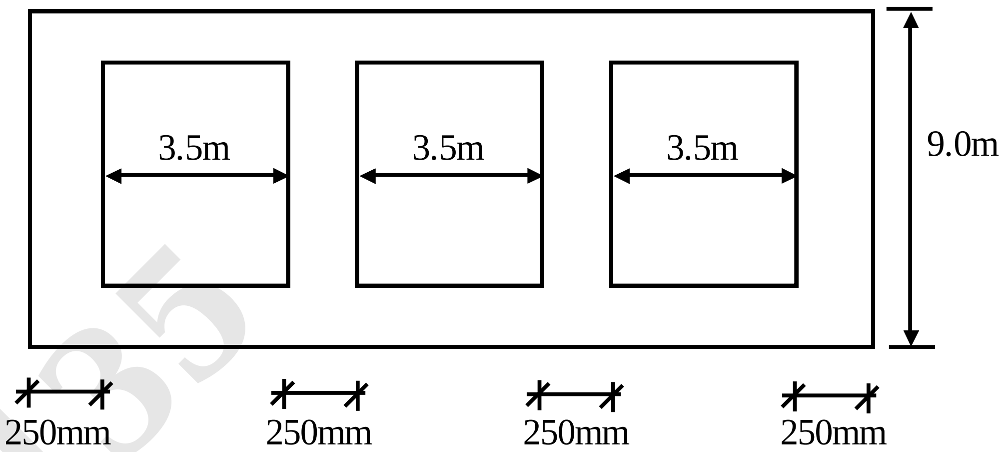
OR

6. Design a short RCC rectangular column to carry ultimate load of 800 kN and ultimate moment of 100 kN-m about on axis bisecting the depth of column. The width of supporting beam is 230 mm. Use M20 grade concrete and Fe415 steel. Use suitable interaction curves. **14**

7. Design a simply supported one-way slab over a clear span of 3.5m. It carries a live load of $4\,kN/m^2$ and floor finish of $1.5\,kN/m^2$. The width of supporting wall is 230mm. Adopt M20 Grade concrete and Fe415 steel. **14**

OR

8. Design a one way continuous slab for Three-rooms of clear span 3.5m each supported on 250mm thick brick walls. Take live load on slab $2.5\,kN/m^2$ and flour finish $1.0\,kN/m^2$. Use M20 concrete and Fe415 steel. Show Reinforcement details. **14**



9. Desing a isolated sloped footing for a column square in shape having size $400\,mm \times 400mm$ carrying an axial load of 600 kN. SBC of soil is $200\,kN/m^2$. Use M20 concrete and Fe415 steel. Give all necessary checks as per I. S. 456 with neat reinforcement sketch. **14**

OR

10. Design a RCC slab for a room measuring $4m \times 6m$. The slab is simply supported on all the four edges with corners held down. It carries a super imposed load of $6000\,N/m^2$ inclusive of floor finish. Use M20 Grade concrete and Fe415 steel. **14**

****

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

Civil Engineering Materials, Testing & Evaluation

P. Pages : 2 **PSM/KW/23/2654**

Time : Three Hours * 2 3 5 7 * 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. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) What are the uses of cement, sand & Aggregates. **7**

b) Explain the following terms. **7**

i) Clay bricks.

ii) Calcium silicate bricks.

iii) Concrete blocks.

OR

2. a) What are the mechanical properties of steel with different application of Strcutural steel. **8**

b) Write down the difference between wetting agents and water proof agents with example. **6**

3. a) Explain the importance of polymers and plastics in construction of civil Engg. **7**

b) Write down the importance of ceramics & composite in construction. **7**

OR

4. a) Explain the following terms and mention the values of plastics, steel, glass and concrete any three. **6**

i) Specific heat.

ii) Temperature

iii) Thermal Expansion

iv) Thermal conductivity.

b) Explain the coefficient of thermal expansion with values of thermal expansion for concrete, tiles, glass, plastic & wood. **8**

5. a) Explain the following terms **any two**. **8**

i) Autoclaved created concrete blocks.

ii) Wood plastic composite material.

iii) Composite bridge decks.

b) Explain the polymer based materials used in civil Engg. Construction. **6**

OR

6. a) Explain the new construction techniques like 3D printing and self healing concrete. **8**

b) Explain the photo catalytic admixture & biomaterials which is used in construction. **6**

7. a) Explain Non Destructive test with brief example. **7**

b) What are the various destructive test, Explain the destructive test with any one example. **7**

OR

8. a) Write down the test procedure for compressive strength of brick and impact test of coarse aggregates. **7**

b) Document the experimental programme for bulking of fine aggregates including procedure with interpretation of test result & final result. **7**

9. a) Write down the acceptance criteria for various test of coarse aggregates & Reinforcing steel. **7**

b) How quality control test report is useful for selection of various material used in construction. **7**

OR

10. a) What are the factors affecting the strength of timber as per IS code 3629-1986. **7**

b) Write down the selection criteria for thickness of glass and per IS code 3548-1988. **7**

****

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

Professional Practice, Law & Ethics

P. Pages : 1 **PSM/KW/23/2655**

Time : Three Hours 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.

1. a) Which are the objectives of professional ethics? **5**

b) What is civic virtue? Explain its importance. **5**

c) Write a note on Honesty & Courage. **4**

OR

2. a) Define the term integrity? Explain its types. **5**

b) What is courage? How is it classified? **5**

c) Write a note on- **4**
Respect for others

3. a) Explain the senses of engineering ethics. **7**

b) Define moral dilemma. State the variety of moral issues. **7**

OR

4. a) How Gilligan revised the three levels of moral development of Kohlberg's theory? **7**

b) Define moral autonomy. Explain the types of inquires carried out in profession. **7**

5. a) Discuss important features of the industrial dispute Act 1947. **7**

b) Justify the statement "Engineering as experimentation". **7**

OR

6. a) What are the four important feature of morally responsible engineers. **6**

b) Write a note on- **8**
i) RERA Act 2017 ii) The workmen's compensation Act 1923

7. a) List down the methods for risk assessment. **7**

b) Define the term collective bargaining. State its types in detail. **7**

OR

8. a) Define the term safety & risk and state the difference between it. **7**

b) What are employee rights and professional rights? Explain. **7**

9. a) Explain about multinational corporations and their orle in making the better society. **7**

b) What is computer ethics? Explain its types? Also the ethical features involved in computer crime. **7**

OR

10. a) Explain in details about engineers as managers. **7**

b) Discuss the term corporate social responsibility. State its types. **7**

****

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

Elective-I : Advanced Structural Analysis

P. Pages : 3 **PSM/KW/23/2656**

Time : Three Hours 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. Use of non programmable calculator is permitted.

1. Analyse the frame as shown in fig. 1 by Strain Energy method and draw BMD. **14**

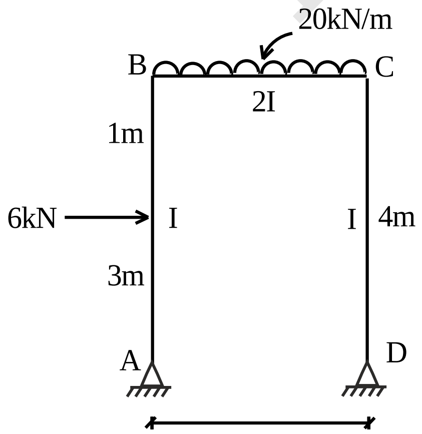


Fig.1

OR

2. Find the vertical deflection of the joint C of the loaded truss shown in fig. The sectional are of member are as follows horizontal member $3000\,mm^2$, vertical member $= 400\,mm^2$, inclined member $5000\,mm^2$. Take $E = 200\,kN/mm^2$. **14**

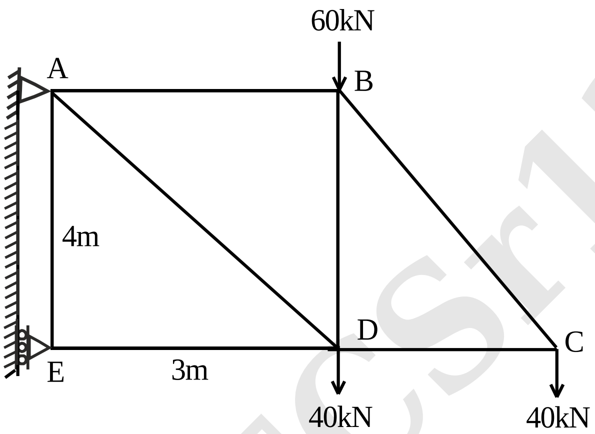


Fig.2

3. a) Derive the Rankines formula for buckling of column and clarify the statement, Rankine formula is applicable for any length of column. **7**

b) Derive from the first principle Euler's Crippling load for the column for length 'L' with both end hinged. **7**

OR

4. A two hinged parabolic arch 30 m span and 8m rise is subjected to UDL of 15 kN/m over left half of arch. Find the reaction at supports, normal thrust and radial shear at section 10 m from left support. **14**

5. Analyse the frame as shown in fig. 3 by cantilever method if area of each exterior column is one half of area of interior column. **14**

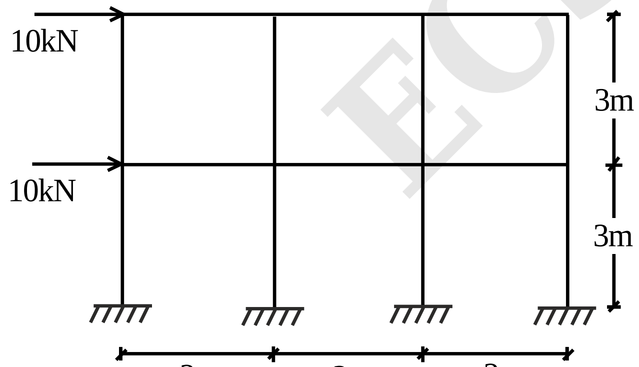


Fig.3

OR

6. For the portal frame as shown in fig. 4. Draw BMD and calculate axial forces in column member using portal method. **14**

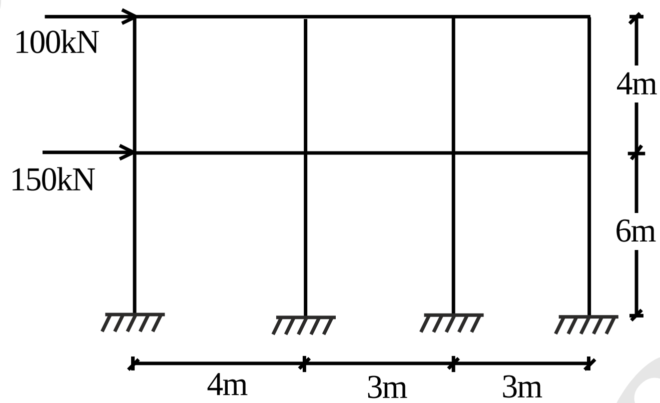


Fig.4

7. Analyse the beam as shown in fig. 5 by flexibility method and draw BMD. **14**

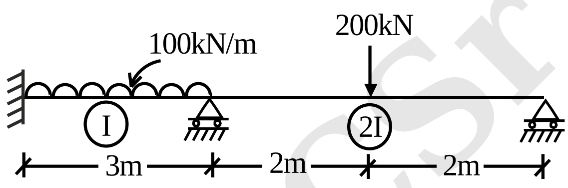


Fig.5

OR

8. Analyse the fixed beam shown in fig. 6 by column Analogy method and Draw BMD. **14**

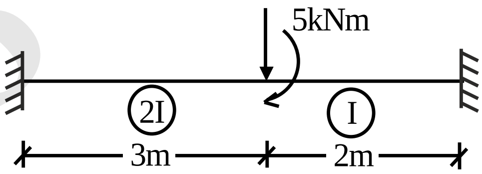


Fig.6

9. Using Finite Element Method find out the displacement of tapered section as shown in fig. 7 take area of bar $A = 400\,mm^2$ and $B = 200\,mm^2$ take $E = 2\times10^5\ N/mm^2$. **14**

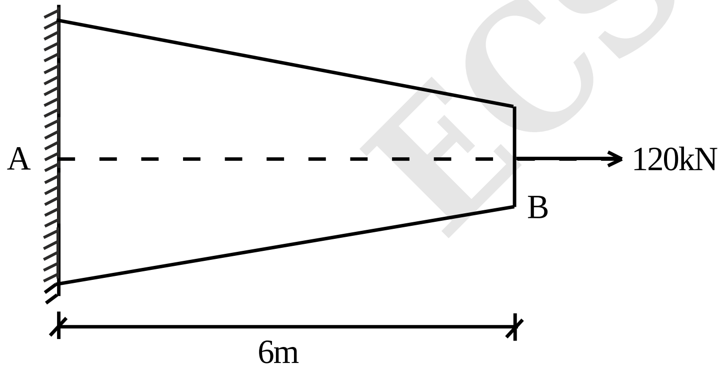


Fig.7

OR

10. Explain the following terms in details **any three.** **14**

a) D Alembert principle.

b) Inertia force

c) SDOF system

d) Equation of motion

****

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

Elective-I : Groundwater Hydrology

P. Pages : 2 **PSM/KW/23/2657**

Time : Three Hours 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. 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) Derive Der pits equation with assumptions. **8**

b) Define Aquifer & explain the classification of Aquifer. **6**

OR

2. a) Explain in detail. Role of Ground water in the hydrological cycle. **7**

b) Explain in details rock properties affecting ground water. **7**

3. a) Explain the aquifer parameter by Jacob's method. **6**

b) Describe with neat sketches, radial flow to wall in both confined α unconfined aquifer. **8**

OR

4. a) Discuss different types of wall construction along with their suitability. **6**

b) Derive the equation of unsteady state flow of ground water. **8**

5. a) What is recharging? What are the factors governing selection of recharge site. **8**

b) Write a short notes on. **6**

i) Seismic Refraction method.

ii) Electrical resistivity method.

OR

6. a) Explain with the neat sketch recharge through rain water Harvesting. **6**

b) Explain in details. **8**

i) Geophysical exploration.

ii) Ground water lend measurement.

7. a) Write a short notes on. **14**

i) Measures of ground water quality.

ii) Potential evaluation of pollution.

iii) Ground water salinity.

iv) Ground water development.

OR

8. a) What are the various parameter of analysis of ground water? Explain in details. **6**

b) What are the various sources of ground water pollution? Write the causes of pollution. **8**

9. a) Explain in detail electric analog/ digital computer model. **8**

b) Explain in detail about ground water basis investigator process. **6**

OR

10. Write short notes on **any four**. **14**

a) Stream – aquifer interaction.

b) Ground water Bani management.

c) Ground water basin investigation.

d) Digital computer model.

e) Safe yield of Aquifer.

****

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

Elective-I : Geo Environmental Engineering

P. Pages : 2 **PSM/KW/23/2658**

Time : Three Hours 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. Diagrams and chemical equations should be given whenever necessary.

1.	a)	Explain the soil- water- environmental interaction on geotechnical problem.	**8**
	b)	What are the geotechnical properties of solid waste.	**6**
		OR	
2.	a)	With neat sketch write the multiphase behaviour of soil.	**4**
	b)	Explain about environmental impact of waste dumping.	**5**
	c)	List out and explain various waste management strategies.	**5**
3.	a)	What do you mean by MoEF guidelines? Explain it's purpose.	**5**
	b)	What factors to be considered for the selection of site for landfill?	**5**
	c)	Mention the various processes in soil structure interaction.	**4**
		OR	
4.	a)	What are the impacts of waste dump and it's remedial measures?	**8**
	b)	Explain the significance of soil sorption behaviour in waste management.	**6**
5.		Explain with neat sketch the various components of a sanitary landfill and it's function.	**14**
		OR	
6.	a)	What are the different types of engineered landfills based on site topography and capacity requirements?	**7**
	b)	Explain the need for proper management of landfill gas.	**7**
7.	a)	What are the sampling methods used for the investigation of contaminated soil?	**7**
	b)	What are the various types of Phyto remediation.	**7**

OR

8. a) Discuss in details Electro kinetic remediation of contaminated soil. **6**

b) Describe in details different processes involved in phytoremediation process. **8**

9. Explain in details the variations of engineering properties of soil due to change in environment. **14**

OR

10. Write briefly on the following **any three**. **14**

a) Electro kinetic remediation.

b) Transport of contaminant in saturated soil.

c) Pump and treat method.

d) In situ and exit remediation.

****

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

Elective-I : Geo Synthetics Engineering

P. Pages : 2 **PSM/KW/23/2659**

Time : Three Hours Max. Marks : 70

* 2 5 3 9 *

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.

1. a) What are the functional requirements of Geosynthetics? **7**

b) List the various test conducted on Geotextile to determine its survivability characteristics and explain any three of them. **7**

OR

2. a) Explain with the help of neat sketch how the interface angle of friction between the soil and Geogrid is determined by laboratory test. **7**

b) Explain application of geosynthetics. **7**

3. a) Explain functions of coir Geotextile & Geotextile silt fences for sediment control. **7**

b) What are the Mechanism of erosion control with reinforced vegetation. **7**

OR

4. a) Explain use of Geosynthetics in road for dewatering and reclamation of land. **7**

b) What are the benefits of using Geo- synthetics in pavements? **7**

5. a) How Geosynthetics are used for control of ground water level in drainage system. **7**

b) List the assumptions made in Binquet and Lees's analysis with neat figures. **7**

OR

6. a) Explain the procedure of Installation of Geotextile under riprap slope protection. **7**

b) Write down Geotextile filter mechanism, & Filter criteria. **7**

7. a) Write down construction sequence of Geotextile reinforced wall and Geogrid soil wall. **7**

b) Analyze the retaining walls for external stability and internal stability while using soil reinforcement. **7**

OR

8.	a)	What is the application and advantages of Reinforced retaining walls.	**7**
	b)	Write down different components of reinforced soil walls and explain about types of facing units in short.	**7**
9.	a)	What is the application and advantages of Reinforced soil embankments?	**7**
	b)	Explain the use of Geomembrane for lining application, management and maintenance.	**7**

OR

10.	a)	Explain the basic concept for the construction of embankment on soft soil while using soil reinforcement.	**7**
	b)	Explain single composite liner system for MSW landfill.	**7**

****

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

Elective-I : Advanced Surveying

P. Pages : 2 **PSM/KW/23/2660**

Time : Three Hours 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) What do you understand by remote sensing and explain different thermal remote sensing and microwave remote sensing? **7**

b) Explain the interaction mechanism of EM Radiation with earth surface, stating basic interaction equation. **7**

OR

2. a) Write note on various types of sensors used for remote sensing in India. **7**

b) Write a details note on principles of remote sensing. **7**

3. a) Write details note on different types of Drone and its applications. **7**

b) What are Application of Drone Technology for large area mapping. **7**

OR

4. a) Explain LiDAR techniques and its types. **7**

b) Explain the procedure how the 3D data generation from Drone Technology? **7**

5. a) Explain the principles of interpretation of aerial and satellite images. **7**

b) What are the advantages of multi date and multi band images. **7**

OR

6. a) Explain the ground truth collection and verification. **7**

b) What are the image enhancement techniques in Digital image processing. **7**

7. a) What do you understand by a geographical information system. **7**

b) What are the essential of a GIS. **7**

OR

8.	a)	Write note on component of a GIS.	**7**
	b)	Write down advantages of GPS and GIS in the storage of the matic information extracted from remotely sensed image.	**7**
9.	a)	What note on advanced DGPS application?	**7**
	b)	Explain the DGPS techniques post process kinematic and real time Kinematic technique.	**7**

OR

10.	a)	Explain the DGPS triangulation and closing techniques.	**7**
	b)	Explain Geospatial reference systems.	**7**

****

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

Elective-I : Advanced Building Materials

P. Pages : 2 **PSM/KW/23/2661**

Time : Three Hours Max. Marks : 70

* 2 5 4 1 *

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. Diagrams and chemical equations should be given whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Classify the civil construction materials. **7**

b) Explain physical and mechanical properties of materials. **7**

OR

2. a) What are the selection criteria for construction materials? **7**

b) Discuss on reuse and recycling of waste construction products. **7**

3. a) Explain in detail process of lime manufacturing. **7**

b) What are the advantages of pozzolanic materials in concrete? **7**

OR

4. a) Write short note on "Admixtures". **7**

b) Discuss various types of mortars used in construction. **7**

5. a) Explain various types of glass. **7**

b) What are the properties of refractories? **7**

OR

6. a) What are the thermal and electrical properties of materials? **7**

b) Explain fire resistive properties of following building materials. **7**
Brick
Stone
Concrete
Steel

7.	a)	Explain polymerization mechanism.	**7**
	b)	Explain properties of plastic and Rubber.	**7**

OR

8.	a)	What are the various types of structural steel?	**7**
	b)	Short note on light gauge steel.	**7**
9.	a)	Short note on green building materials.	**7**
	b)	Explain mandatory criterias in IGBC rating system.	**7**

OR

10.	a)	What are the various methods of rainwater harvesting?	**7**
	b)	How to design solar passive architecture of a building? Explain with examples.	**7**

****

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

Elective-II : Climate Change and its Mitigation

P. Pages : 1 **PSM/KW/23/2662**

Time : Three Hours 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. 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)	Explain causes of global and regional climate change.	**7**
	b)	Explain wind global ocean circulation and its effect.	**7**
		OR	
2.	a)	Explain in details about climate change and its effect.	**7**
	b)	Explain in detail about Carbon cycle with neat sketches.	**7**
3.	a)	Explain in detail about greenhouse gases and its effect.	**7**
	b)	What are the various cycle in atmosphere? Explain in brief.	**7**
		OR	
4.	a)	Explain Radiative forcing.	**7**
	b)	What are the various effects of radiative forcing on plants and animals.	**7**
5.	a)	Explain Impacts of climate change on agriculture and forestry.	**7**
	b)	Write various changes observed in agricultural production due to impacts of climate change.	**7**
		OR	
6.	a)	Write in detail about Spread of epidemics due to climatic changes.	**7**
	b)	What are the Traditional practices carried out to cope with climate change impacts?	**7**
7.	a)	Explain various Municipal Solid waste in details.	**7**
	b)	Write in brief about the Alternative Energies of future power generation.	**7**
		OR	
8.	a)	Explain what is Bio Fuel and Clean Technologies.	**7**
	b)	What is Natural Compost and Eco Friendly plastic?	**7**
9.	a)	Explain in details climate change response measures.	**7**
	b)	What is the role of fossil fuels in climate change?	**7**
		OR	
10.	a)	Explain role of Government in industries and regulation to control climatic change.	**7**
	b)	Explain characteristics of mitigation.	**7**

****

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

Elective-II : Advanced Concrete Structures

P. Pages : 2 **PSM/KW/23/2663**

Time : Three Hours 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. Due credit will be given to neatness and adequate dimensions.
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.
10. Use of IS 456:2000, IS 875-1987, IS 3370: 2009 - IV is permitted.
11. Use SP-16 design charts.

1. Design a biaxially eccentrically loaded braced rectangular column deforming into single curvature for the following data: **18**

i) Factored axial load = 1980 kN

ii) Factored moment acting parallel to longer direction:
  a) Larger end moment at Top = 220 kN.m
  b) Smaller end moment at Bottom = 170 kN.m

iii) Factored moment acting parallel to shorter direction:
  a) Larger end moment at Top = 120 kN.m
  b) Smaller end moment at Bottom = 70 kN.m

iv) Unsupported length = 8m.

v) Effective length in long direction = 7.5m.

vi) Effective length in short direction = 6m

vii) Column section = $400\text{mm} \times 600\text{mm}$

Take grade of steel-fe415 and grade of concrete – M25

Consider environment is moderate.

OR

2. Design an isolated footing for a column $400\text{mm} \times 300\text{mm}$ transmitting load of 950 kN and moment of 80 kN.m The SBC of soil is $190\,\text{kN}/\text{m}^2$. Use M20 grade of concrete and Fe415 grade of steel. **18**

3. A circular water tank of capacity 5 lac lit resting on a firm ground and having rigid joint at the base. The depth of water is 4m including a free board of 200 mm. Design top Dome and circular wall of tank. Use M20 grade of concrete and Fe415 grade steel. **17**

OR

4. a) Design dog legged stair for a building in which the vertical distance between the floor is 3.6m. The stair hall measures $2.5\text{m} \times 5\text{m}$. The live load may be taken as $2500\,\text{N}/\text{m}^2$. Use M15 concrete and Fe250 reinforcement. Show reinforcement details. **13**

b) Explain effective span for stairs spanning longitudinally. **4**

5. Desing a cantilever retaining wall for a road for the following requirements: **18**

i) Height of stem = 4m
ii) Backfill is levelled.
iii) Unit wt. of fill = $18\,kN/m^3$
iv) Angle of internal friction for fill material = 30º
v) Allowable S. B. C. = $200\,kN/m^2$
vi) Coefficient of friction between concrete and ground = 0.5. Use M20 grade concrete and Fe415 steel.

OR

6. Design a stem of a counter-fort retaining wall of 6.8m height. The counter forts are 300mm thick with the center to center distance between the counter-forts is 3.0m. The safe bearing capacity of soil $180\,kN/m^2$, and the angle of shearing resistance is 30º. Use M20 grade of concrete and Fe415 steel. Draw reinforcement details. **18**

7. Design a combined rectangular footing for two columns spaced at 4 m c/c. Both the columns are of section $800\,mm \times 800mm$ and $600\,mm \times 600mm$ and are subjected to 1500kN and 1000 kN loads respectively at service state. The width of the footing should not exceed 2.2m. Assume unit weight of soil $20\,kN/m^3$. Angle of repose of soil is 30º. Allowable bearing capacity of soil is $160\,kN/m^2$. Provide all checks. Sketch the reinforcement details. Use M20 grade concrete and Fe415 grade steel. **17**

OR

8. Design a combined footing and it's main reinforcement for two columns $400 \times 400\,mm$ and $500 \times 500mm$ supporting the service loads of 900 kN and 1600 kN respectively and center to center distance between then is 4.5m. The width of combined footing is restricted to 1.8m. The allowable safe bearing capacity of soil is $200\,kN/m^2$. Use M25 grade concrete and Fe415 grade steel. Show reinforcement details. **17**

****

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

Elective-II : Advanced Concrete Technology

P. Pages : 2

Time : Three Hours

* 2 5 4 7 *

PSM/KW/23/2664

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. Diagrams and chemical equations should be given whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Write short note on 'Composition of concrete'. **7**

b) What are various types of cement. **7**

OR

2. a) How will you classify aggregates on basis of shape and size? **7**

b) What are limiting values of impurities for water used in construction? **7**

3. a) Write short notes on autoclave aerated concrete. **7**

b) Explain concrete with different cementations materials for GGBS. **7**

OR

4. a) Explain High performance concrete. **7**

b) Explain the process of shotcrete. **7**

5. a) What are various methods for a concrete mix design? **7**

b) What are the objectives of concrete mix design? **7**

OR

6. Explain the different steps involved in Mix design of concrete as per IS code. **14**

7. a) What are various failure modes of concrete? **7**

b) Write short note on Modulus of elasticity of concrete. **7**

OR

8.	a)	Explain compressive strength of concrete and factors affecting it.	**7**
	b)	Explain Tensile strength Test of concrete.	**7**
9.	a)	How you will explain water as an agent of deterioration.	**7**
	b)	Explain permeability of concrete.	**7**

OR

10.	a)	Explain alkali-aggregate reaction.	**7**
	b)	Write short note on Non-destructive testing on concrete.	**7**

****

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

Elective-II : Earth Retaining Structures

P. Pages : 2 **PSM/KW/23/2665**

Time : Three Hours Max. Marks : 70

* 2 5 4 5 *

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) Explain in detail types of lateral earth pressure. **7**

b) Determine the active and passive earth pressure given the following data: **7**
Height of Retaining wall 10 m, $\Phi = 25^{o}, \gamma_d = 17\,kN/m^3$.

OR

2. a) Distinguish between 'Active' and 'Passive' Earth Pressure. **7**

b) Explain Rankine Theory of Earth Pressure. **7**

3. a) Explain about Gabion Walls. **7**

b) Explain different type of Retaining Wall. **7**

OR

4. a) Explain Soil Nailing. **7**

b) Explain Rankine theory of Earth Pressure. **7**

5. a) Explain construction methods of sheet pile wall. **7**

b) Write Distinction between Sheet Pile and Retaining Wall. **7**

OR

6. a) Write down different types of cofferdam in details. **7**

b) The height of cantilever sheet pile from the top of the dredge level is 9m. The water level in the backfill is at 2 m from top. Find the depth of penetration required for a factor of safety equal to 1. Assume that above the water table, the soil is dry. The other properties of soil are $\gamma_{sat} = 20\,kN/m^3$, $K_A = 0.33$, $K_p = 3.0$, $Gs = 2.6$. **7**

7. a) Explain different methods of improving the stability of slopes. **7**

b) Explain the method of slices for stability analysis of slopes. **7**

OR

8. a) Explain different type of slope failure. **7**

b) An embankment is inclined at an angle 35º, and its height is 15 m. The angle of shearing resistance is 15º and the cohesion intercept is 200 kN/m^2, the unit weight of soil is 18.0 kN/m^3, If the Taylor stability number is 0.06, find the factor of safety with respect to cohesion. **7**

9. a) Explain stability of slope during construction. **7**

b) An earth dam of height 20 m is constructed of soil of which the properties are $\gamma = 20\,kN/m^2$, $c = 45\,kN/m^2$, and $\Phi = 20^o$. The side slopes are inclined at 30º to the horizontal. Find the factor of safety immediately after draw down condition. **7**

OR

10. a) Explain stability of slope During steady seepage condition. **7**

b) Explain stability of slope after sudden drawdown condition. **7**

****

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

Elective-II : Flood Control and Drainage (Flood Control Drainage Engineering)

P. Pages : 1 **PSM/KW/23/2666**

Time : Three Hours 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 Flood. What are the various causes of flooding? **7**

b) Explain in brief Flood management measures. **7**

OR

2. a) Explain various environmental and economic losses due to flood. **7**

b) What are the various flood control strategies. **7**

3. a) Explain ISD method, modified pulse method. **7**

b) Explain various empirical formulas for flood. **7**

OR

4. a) Explain flood routine through channels and Muskingum method. **7**

b) What is flood frequency? Explain in brief Gumbel's method. **7**

5. a) What do you understand by Risk assessment, Risk reduction and management? **7**

b) Explain advance warning systems for Risk management. **7**

OR

6. a) Explain applications of remote sensing and GIS in Rick Management. **7**

b) Explain the role of Information Technology in Natural Hazards Mitigation management. **7**

7. a) Explain the necessity of Land Drainage System. **7**

b) Explain effect and consequences for drainage due to urbanisation. **7**

OR

8. a) Explain in brief various types of Land drainage system. **7**

b) Explain in brief operation and maintenance of urban drainage system. **7**

9. a) Explain Drainage criteria formulation for off season drainage. **7**

b) Explain use of steady state and unsteady state approaches in formulation. **7**

OR

10. a) Explain various patterns of drainage system. **7**

b) Explain grope season drainage and slot drainage. **7**

****

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

Elective-II : Railway Engineering

P. Pages : 2
Time : Three Hours

PSM/KW/23/2667
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. 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) Define Gauge of Railway track. What are the factors which affect the selection of the Guage. **7**

b) Explain various Engineering surveys carried out for Railway Alignment. **7**

OR

2. a) What do you understand by the term permanent way? Discuss the requirement of ideal permanent way. **7**

b) Define Tracks and explain track stresses in brief. **7**

3. a) Explain in detail “creep of Rail”. **7**

b) Using the sleeper density of n+6.2 calculate the number of sleepers required for contracting a railway tracks 1280m long (BG Track). **7**

OR

4. a) Explain **6**
a) Rails
b) Sleepers
c) Ballast

b) A 5 degree curve diverges from a 3 degree. Main curve in reverse direction in the layout of B.G. Yards. If the speed on the branch line restricted to 40 kmph, determine the restricted speed on the main line. **8**

5. a) Explain points and crossing in details. **6**

b) Explain **8**
a) Track junctions
b) Simple track layout

OR

6. a) Explain **7**
   a) Rail joints
   b) Welding of Rails

b) Explain **7**
   a) Track maintenance
   b) Track drainage

7. a) Explain various modern methods of track maintenance. **6**

b) Explain in brief **8**
   a) Rehabilitation of track
   b) Renewal of track

OR

8. a) What is the necessity of track maintenance? Discuss.

b) What are the construction steps for railway track? Discuss in brief.

9. a) Explain types of signal in railway. **7**

b) Explain Interlocking and marshaling yard. **7**

OR

10. Explain the following **any three.** **14**

i) Drainage in tunnels.

ii) Tunnel lighting

iii) Heel clearance and flange way depth.

iv) Tongue Rail.

****