B.E. (Civil Engineering) Fifth Semester (C.B.S.) Winter 2022

Structural Analysis-II

P. Pages : 4 **SPM/KW/22/2161**

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. Diagrams and chemical equations should be given whenever necessary.
11. Illustrate your answers whenever necessary with the help of neat sketches.
12. Use of non programmable calculator is permitted.

1. Analyze the frame shown in fig. (1) by Kanis method and draw BMD. **14**

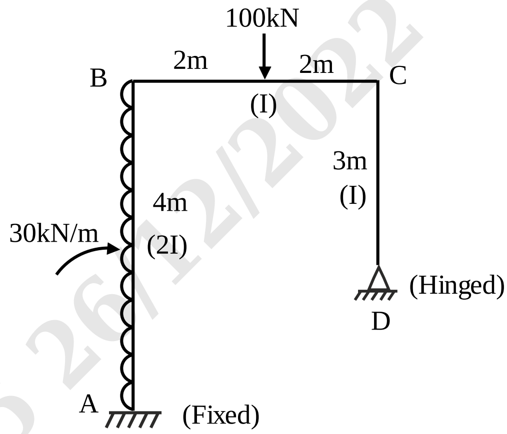


Fig. (1)

OR

2. Analyze the frame shown in fig. (2) by Kanis method and draw B. M. D. **14**

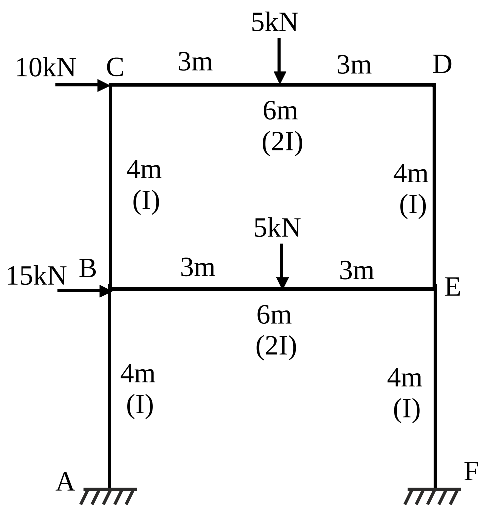


Fig. (2)

3. Analyze the continuous beam by moment distribution method shown in fig. (3) and draw B.M.D. Taking EI as constant. **13**

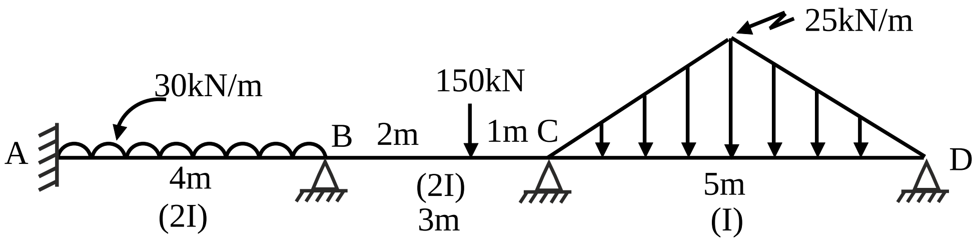


Fig. (3)

OR

4. Analyze the frame by moment distribution method shown in fig. (4) and draw BMD. **13**

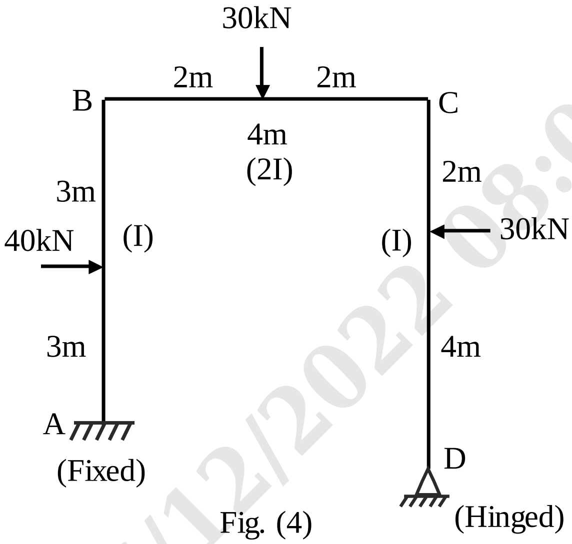


Fig. (4)

5. Find the force in the truss member using stiffness method shown in fig. (5). Sectional area of each member = $800 mm^2; E = 200\, kN / mm^2$ **14**

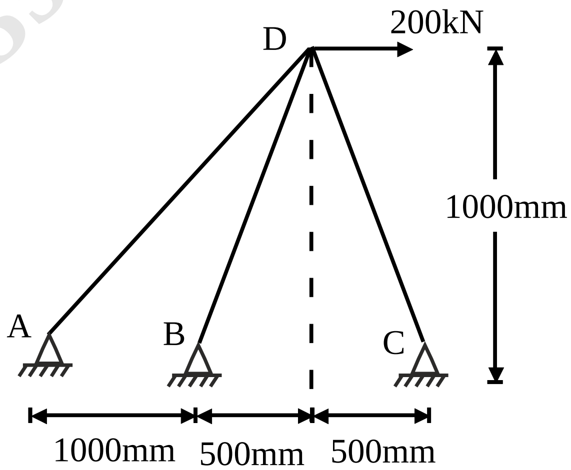


Fig. 5

OR

6. Evaluate Global Stiffness matrix for the truss shown in fig. (6) Area of each member is shown on member in cm^2 $E = 2\times10^4 kN/cm^2$ **14**

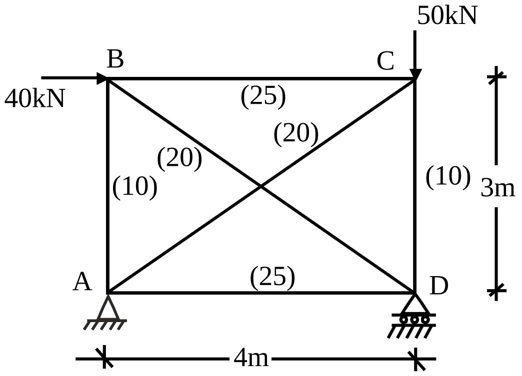


Fig. (6)

7. a) Derive the stiffness matrix for beam element. **4**

b) Analyze the continuous beam shown in fig. (7). Draw SFD and BMD, EI is constant. **9**

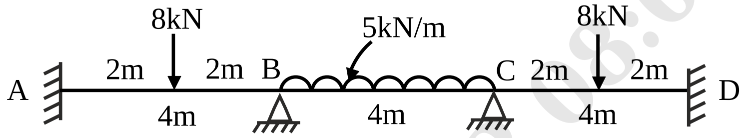


Fig. (7)

OR

8. Analyze the continuous beam shown in fig. (8). Draw SFD and BMD Take EI=1 unit. **13**

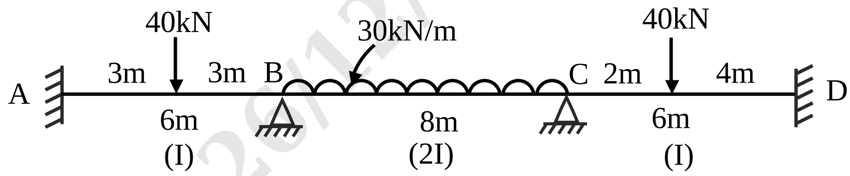
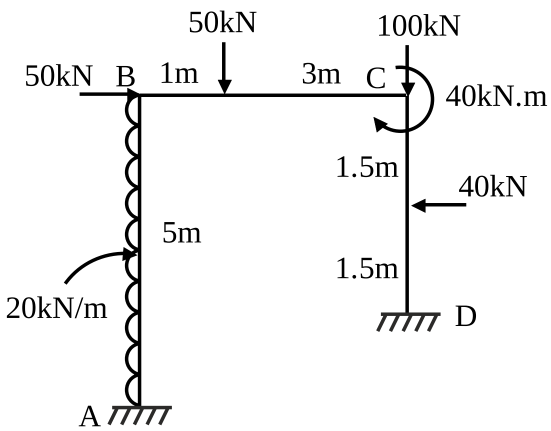


Fig. (8)

9. a) Derive stiffness matrix for a plan frame element from basic principle. **5**

b) Find Global stiffness matrix of the plane frame shown in fig. (9) size of column = 230×500 mm, size of beam = 230×650mm **8**

(Neglecting axial deformation.)



OR

10. Analyze the plane frame shown in fig (10) by stiffness method. **13**

Take $E = 25.5 \times 10^6 kN/m^2$, size of member $230 \times 450\,mm$

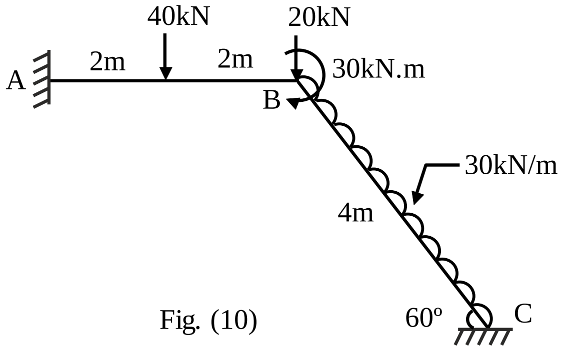
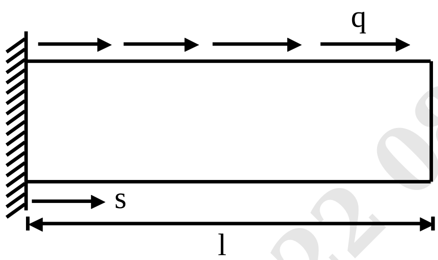


Fig. (10)

11. Using Rayleigh – Ritz method, find the end displacement of bar element structure using $u = a_1 x + a_2 x^2$ displacement filed Body force $q = c \times s$. EA is constant. **13**



OR

12. Define **any three**. **13**

i) D' Alembert principle.
ii) Single Degree of Freedom.
iii) Natural Frequency
d) Damping.

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B.E. (Civil Engineering) Fifth Semester (C.B.S.) Winter 2022

Reinforced Cement Concrete Structures

P. Pages : 2 **SPM/KW/22/2162**

Time : Four Hours Max. Marks : 80

* 0 0 1 1 *

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10. Illustrate your answers whenever necessary with the help of neat sketches.
11. IS 456 : 2000 may be consulted.

1. a) Write down the demerits of working stress method. **6**

b) A reinforced concrete beam 200 x 450 mm effective in reinforced with 3 numbers 16 mm diameter bars. Find out the moment of resistance of the beam and safely distributed load, the beam can carry effective span of the beam is 4.8 m. Take concrete grade M_{15} and mild steel of grade Fe_{250}. **7**

OR

2. a) ‘Working stress method is unrealistic and irrational at ultimate state’, justify the statement. **6**

b) The cross-section of a rectangular beam has to resist a bending moment of 80 kNm. Design the section using M_{15} grade concrete and Fe_{415} grade steel. Width of the beam is restricted to 250 mm. **7**

3. a) Explain pre-tensioning and post-tensioning methods of prestressing. **6**

b) Explain Freyssinet anchorage system with its advantage and disadvantages. **7**

OR

4. a) Explain different types of losses in prestressing process. **5**

b) A prestressed concrete beam of section 350 mm x 600 mm has a span of 6 m and in subjected to a uniformly distributed load of 20 kN/m including self weight of the beam. The prestressing tendons are located at the lower third point of the section and provide an effective prestressing force of 850 kN. Determine the extreme fibre stresses in concrete at the mid span section. **8**

5. a) Derive stress block parameters for a singly reinforced beam using LSM. **5**

b) Calculate moment of resistance of a singly reinforced simply supported RCC beam 250 mm wide and 400 mm deep effective reinforced with 3 numbers 20 mm diameter bars. Take concrete grade M_{15} and steel grade Fe_{415}. Find the concentrated load the beam can support at the centre if the span of the beam is 4 m. **8**

OR

6. Find the moment of resistance of the beam section 250 mm wide and 460 mm deep effective reinforced with 2 x 12 mm diameter bars on compression zone and 4 x 20 mm. diameter bars in tension zone. Each end has an effective cover of 40 mm. Materials M_{15} and Fe_{415} are used. **13**

7. Design a simply supported T beam of effective span 8 m for the following data: **14**
   * Spacing of beams – 3.5 m c/c
   * thickness of slab – 125 mm
   * width of web – 300 mm
   * Live load on floor – $4\,kN/m^2$
   * Load from floor finish – $1\,kN/m^2$
   * Effective beam depth – 450 mm
   * Materials : M_{20} grade concrete and Fe_{415} grade steel.

   The beam supports a partition wall which transmits a load of 10 kN/m.

OR

8. Design a rectangular pad footing for an axial load of 1000 kN. Size of column is 300 x 450 mm and safe bearing capacity of soil is $150\,kN/m^2$. Use concrete grade M_{20} and steel grade Fe_{415}. **14**

9. a) A simply supported RCC beam 350 mm wide and 750 mm deep carries a udl of 80 kN/m over a span of 8 m. The beam is reinforced with 6 nos 22 mm diameter bars of grade Fe_{415} on tension face. Design the shear reinforcement using two bars bent up. Assume M_{15} grade concrete and effective cover 40 mm. Take width of support 300 mm. **7**

   b) A RCC beam 300 x 600 mm deep is resting over an effective span of 6 m. The beam is carrying a udl of 60 kN/m including its own weight. The beam is reinforced with 6 numbers 20 mm diameter bars of grade Fe_{415} at the midspan. It is proposed to curtail 2 numbers and continue 4 numbers to support. Provide the check for development length at support. **7**

OR

10. A reinforced concrete beam 230 mm wide and 400 mm deep is reinforced with 3 numbers 16 mm diameter bars at top and 4 numbers 16 mm diameter bars at bottom with an effective cover of 35 mm from the nearer face. Calculate the strength of the section in torsion when it is also subjected to an ultimate shear of 10 kN and ultimate bending moment of 30 kNm. Design the transverse reinforcement for the section. Assume concrete of grade M_{20} and steel of grade Fe_{250}. **14**

11. Design a reinforced concrete cantilever slab projecting 1.5 m from column support. Live load on slab is $2\,kN/m^2$. 20 mm. thick tile flooring is provided. There is a parapet wall of 115 mm thick brick masonry of 0.75 m height, unit weight of which is $19\,kN/m^3$. Use concrete of grade M_{20} and steel of grade Fe_{500}. Take width of support 300 mm. **13**

OR

12. A rectangular beam of effective size 250 x 500 mm is simply supported over a span of 5.5 m and is provided with 4 numbers 16 mm ϕ bars in tension side with effective cover of 40 mm. The beam carries a udl of $25\,kN/m$ over entire span inclusive of self wt. Check the beam for deflection if 60% of the load is permanent. Use M_{15} grade concrete and Fe_{415} grade steel. **13**

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B.E. (Civil Engineering) Fifth Semester (C.B.S.) Winter 2022

Fluid Mechanics-I

P. Pages : 2 **SPM/KW/22/2163**

Time : Three Hours Max. Marks : 80

* 0 0 1 2 *

Notes :
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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) Explain, why viscosity of liquids decreases with increase in temperature where as viscosity of gases increase with increase in temperature. **6**

b) A 240 N cubical block of side 100 mm slides down an inclined lubricated plane, inclined at 30º to the horizontal. The thickness of oil film between the block and plane is 1.2 mm. The velocity of the block is 1.5 m/sec. Determine the viscosity of oil. **7**

OR

2. a) Differentiate, gauge pressure, absolute pressure and atmospheric pressure. **5**

b) A cylindrical tank open at the top, contains an oil of sp. gr. = 0.8 for a depth 1.2m, a liquid of sp. gr 1.2 for a depth of 0.9 m and water for a depth of 2.0 m. A pr. gauge attached at the bottom of the tank at a height of 0.10 m from its bottom. Calculate the pressure gauge reading, if manometric liquid is mercury. **8**

3. a) Prove that for a vertical plate submerged in a liquid, centre of pressure always lying below the centre of gravity of the plate. **6**

b) A circular plate of 4.0 m diameter is submerged in water such that its greatest and least depth in 3. 5 m and 2.8 m respectively. Calculate the total pressure and position of centre of pressure. **7**

OR

4. a) What are various conditions of stability for **6**
i) A fully submerged body ii) A partially submerged body

b) A wooden cylinder of 1.2m diameter and1.0 m length submerged in water. The sp. gr. of woods 0.8. Determine its depth of submergence and comments on its stability. **7**

5. a) Differentiate **6**
i) Steady and unsteady flow ii) Uniform and non uniform flow
iii) Rotational and irrotational flow

b) For a three dimensional steady flow the velocity components $u = 2xy + 4yz$ $\nu = 4yz - 2xz$, determine the third component of the velocity. Which equation is used for this purpose. **7**

OR

6. a) Prove that stream function and velocity potential function are orthogonal functions. **6**

b) For a two dimensional steady flow the velocity component are given by **7**

$u = 5xy - 4x^2y$

$\nu = 8xy^2 - 4xy$

Determine the value of stream function and state that flow is rotational & irrotational.

7. a) State Bernoulli's theorem? What are its applications in the filed of fluid mechanics what are its limitations. **6**

b) A pipe line of diameter 200 mm carrying water with the rate of flow 200 lit /sec. It is load with an upward slope of 20º with the horizontal. Pressure at the lower and upper sections are 90.1 kPa and 101 kPa. The distance between both the section in 100m. Determine he direction of flow through the pipe **7**

OR

8. a) What are various discharge measuring devices used for a pipe line. Make a difference between them. **6**

b) Derive an expression for discharge for a venturimeter. **7**

9. a) Make a difference between small orifice and large orifice. **4**

b) Explain why coefficient of discharge for a mouthpiece is more than that of an orifice meter. **6**

c) Show that pressure inside an extend mouthpiece is less than atmospheric pressure. **4**

OR

10. a) Explain Cipolletti weir? What is its significance. **5**

b) Derive an expression for discharge for a triangular notch. **5**

c) Explain. **4**

i) Sharp crest notch ii) Board crested weir.

11. a) What do you mean by dimensional homogeneity check whether the equation for discharge through a rectangular notch. **6**

$Q = \frac{2}{3} Cd\, L \sqrt{2g} H^{3/2}$

is a dimensional homogenear eq^n.

b) Discharge through a triangular notch Q depends on head over the notch H, density of liquid ρ, viscosity of liquid μ, acceleration duet to gravity of, surface tension of liquid σ. Establish an expression for discharge in terms of dimensionless parameters. **8**

OR

12. a) What are various dimensionless numbers explain about Reynolds number and frauds number. **7**

b) Explain Reynolds experiments and for what purpose its is performed. **7**

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B.E. (Civil Engineering) Fifth Semester (C.B.S.) Winter 2022

Geotechnical Engineering-II

P. Pages : 3 | **SPM/KW/22/2164**

Time : Three Hours | Max. Marks : 80

* 0 0 1 3 *

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11. Use of non programmable calculator is permitted.

1. a) What are different types of Soil Samplers? Explain any one. **6**

b) What are different methods of Boring? Explain Percussion Boring. **7**

OR

2. a) Compute the area ratio of a thin walled tube sampler having an external diameter of 63 mm and wall thickness of 2.25 mm. Do you recommended this samplers to obtain undisturbed samples? Why? **6**

b) Explain any one geophysical method of exploration with its limitations. **7**

3. a) A new canal is excavated to a depth of 5 m below ground level, through a soil having the following characteristics, $c = 14\,kN/m^2$, $\phi = 15^o, e = 0.8$ and $G = 2.70$. The slope of banks is 1 in 1. Calculate the factor of safety with respect to cohesion when the canal runs full. If it is suddenly and completely emptied, what will be the factor of safety? Assume Sn = 0.083 & Sn = 0.122 for submerged and drawdown case respectively. **7**

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

OR

4. a) Explain Taylors Stability Number. **6**

b) In order to find the factor of safety of downstream slope of an earth dam, during steady seepage, the section of the dam was drawn to a scale of 1cm = 5cm and the following results obtained on a critical slip circle: **7**
Area of N-rectangle = 14.8 sq.cm, Area of T-rectangle = 6.9 sq.cm.
Area of U-rectangle = 7.2 sq.cm and Length of arc = 12.6 cm.
Laboratory tests have furnished values of 26 for effective angle of shear resistance and $19.5\,\text{kN}/\text{m}^2$ for cohesion. Determine the factor of safety of the slope.
Unit wt. of soil = $19\,\text{kN}/\text{m}^3$.

5. a) State the assumptions made in Rankines Earths Pressure Theory. **6**

b) A retaining wall 6 m high, has a smooth vertical back. The backfill has a horizontal surface in level with the top of the wall. There is uniformly distributed surcharge load of $42\,\text{kN}/\text{m}^2$ intensity over the backfill. The unit weight of the backfill is $18\,\text{kN}/\text{m}^3$, its angle of shearing resistance is 30 and cohesion is zero. Determine the magnitude and point of application of active pressure per metre length of the wall. **8**

OR

6. a) Explain in brief: **6**
i) Active Earth Pressure
ii) Passive Earth Pressure
iii) Earth Pressure at Rest.

b) A retaining wall 4 m high, with vertical back supports a backfill with horizontal ground surface. The soil has unit weight of $18\,\text{kN}/\text{m}^3$ and angle of internal friction of 35. The angle of wall friction may be taken as 20. A footing, running parallel to the retaining wall and carrying a load intensity of 18 kN/m, is to be constructed. Find the safe distance of the footing from the face of the wall so that there is no increase in lateral pressure on the wall due to the load of footing. **8**

7. a) Write short note on Reinforced Earth. **6**

b) What do you mean by soil improvement? Give brief description of the available methods of soil improvement. **7**

OR

8. a) Explain with sketch Vibrofloatation Technique? **6**

b) Explain characteristics of geosynthesics in geotechnical construction. **7**

9. a) A strip footing is to be designed to carry a gross load of 900 kN/m at a depth of 1 m is a gravelly mud. The appropriate shear strength parameters are C = 0, and $\phi = 38$. Determine the width of the footing if a factor of safety of 3 against shear failure is to be assured. Water table is found to be at the foundation level. Above the water table, the unit weight is $17\,\text{kN}/\text{m}^3$ and below the water table the saturated unit weight is $20\,\text{kN}/\text{m}^3$. Bearing capacity factors are Nq = 49 and Nr = 67. Unit weight of water is $9.8\,\text{kN}/\text{m}^3$. **8**

b) Explain plate load test with its limitations. **6**

OR

10. a) Explain types of failures with sketch. **6**

b) Using Terzaghis theory, determine the ultimate bearing capacity of a strip footing 1.5 m wide resting on a saturated clay ($cu = 30\,kN/m^2$, $\phi = 0$ and $rsat = 20\,kN/m^2$), at a depth of 2 m below ground level. The water table is also at a depth of 2 m from the ground level. If the water table rises by 1 m, Calculate the percentage reduction in the ultimate bearing capacity. **8**

11. a) Explain the phenomenon of negative skin friction. **6**

b) In a 25 pile group, the pile diameter is 45 cm and centre to centre spacing of the square group is 1.5 m. If $C = 50\,kN/m^2$, determine whether the failure would occur with the piles acing individually, or as a group? Neglect bearing at the tip of the pile. All piles are 10 m long. Take m = 0.7 for shear mobilization around each pile. **7**

OR

12. a) A reinforced concrete pile weighing 30 kN (inclusive of helmet and dolly) is driven by a drop hammer weighing 40 kN and having an effective fall of 0.8 m. The average set per blow is 1.4 cm. The total temporary elastic compression is 1.8 cm. Assuming the coefficient of restitution as 0.25 and a factor of safety of 2, determine the ultimate bearing capacity and the allowable load for the pile. **7**

b) Explain under – reamed pile foundation. **6**

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B.E. (Civil Engineering) Fifth Semester (C.B.S.) Winter 2022

Hydrology and Water Resource (HWR)

P. Pages : 2 **SPM/KW/22/2165**

Time : Three Hours Max. Marks : 80

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10. Diagrams and chemical equations should be given whenever necessary.
11. Illustrate your answers whenever necessary with the help of neat sketches.
12. Use of non programmable calculator is permitted.

1. a) Describe Hydrological cycle with neat sketch. **7**

b) Describe various factor affecting the precipitation. **6**

OR

2. a) Explain different types of precipitation. **6**

b) There are five rain gauge stations existing in the catchment area of the river. The mean rainfall at these stations are 980, 878, 794, 830 and 698 mm respectively. The error in the mean value of rainfall is 10%. Determine the optimum number of rain gauges required in the catchment. Also write optimum number of rain gauges required or not? **7**

3. a) Define Infiltration. Explain various factors affecting infiltration. **7**

b) The rainfall rate for successive 30 minute span of a 4 Hr are 25, 50, 110, 75, 40, 85 and 30 mm/hr If net rainfall during the storm is 80 mm. Find the value of ϕ index and w – index. **7**

OR

4. a) Explain the various pans used for the measurement of evaporation. Explain floating pan with neat sketch. **7**

b) Explain the following.

i) Infiltration curve. **4**

ii) W-index. **3**

5. a) What is Runoff? Explain various factors Affecting it. **6**

b) The clean monthly temperature over the basin of a 12 months period from June to may are 30, 15, 25, 28, 29, 32, 30, 27, 22, 27, 30 & 32ºC respectively. The observed rainfall In mm in the corresponding months are 186, 210, 190, 125, 100, 90, 30, 20, 10, 5, 0 & 2. Determine the annual runoff from the basin using Khosla's Formula. **7**

OR

6. a) What is Runoff? What are the different factors affecting it? **6**

b) The ordinate of 4 Hr. unit Hydrograph of basin are 300 km^2 at 1 hr interval are 6, 36, 66, 91, 106, 93, 79, 68, 58, 49, 41, 34, 27, 23, 17, 13, 9, 6, 3 & 1.5 m^3/s respectively. Obtain the ordinate of 3Hr U.H for the basin using s-curve technique. **7**

7. a) For a river, the estimated Hood peaks for two return period by using Gumbel's method as follows. **7**

Return period (in years)	Peak flood (m^3/s)
100	475
50	375

What flood discharge in this river will have return period of 100 years?

b) Explain in brief **6**

i) Risk of project ii) Return period.

OR

8. a) Define flood? What are the different factors affecting flood. **6**

b) The mean annual flood of river is 600 m^3|s & the standard deviation of the annual flood series is 150 m^3|s. What are the probability of flood of magnitude 100 m^3|s occurring in the river within next 5 years? Use Gumbel's method & assume the sample size to be very large. **7**

9. a) Define the following **6**

i) Aquifer & Aquitard
ii) Water table & piezometric surface
iii) Confined and unconfined Aquifer.

b) The discharge from fully penetrating well operating under steady state in a confined Aquifer of 40m thickness is 3100 lit/min. The drawdowns observed at two observation well located at 19 m & 160 m from the well are 3.9m & 0.38 respectively determine the transmissibility and the permeability of the aquifer. **7**

OR

10. a) Define Aquifer? Explain the behaviour of water level in well of confined Aquifer due to changes in atmospheric **7**

b) Define **6**

i) Porosity
ii) Per-mability
iii) Specific yield.

11. a) Explain various methods of ground water recharging. **7**

b) Explain with neat sketch "Roof Top rain water Harvesting". **7**

OR

12. Write short note on **any three** of following **14**

i) Inter basin transfer.
ii) Watershed management
iii) Sunshine recorder.
iv) Importance of water resource planning.

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Hydraulics Engineering

P. Pages : 2 **SPM/KW/22/2612**

Time : Three Hours Max. Marks : 70

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Notes :
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11. Use of non programmable calculator is permitted.

1. a) Derive Hagen – Poiseuille equation and write the assumption made in it. **6**

b) Calculate the diameter of a parachute to be use for dropping an object weighing 980 N so that the maximum terminal velocity of dropping is 5m/sec. The drag coefficient for the parachute which may be treated as hemispherical is 1.3. The density of air is 1.22 kg/m^3. **8**

OR

2. a) What od you mean by coefficient of drag and coefficient of lift? **6**

b) Find the displacement thickness, the moment thickness for the velocity distribution in the boundary layer is given by $\frac{u}{U} = \frac{y}{d}$, where u is the velocity at the distance y from the plate and $u = U$ at $y = d$, where $\delta =$ boundary layer thickness. Also, calculate the value of $\frac{\delta^*}{\theta}$. **8**

3. a) Explain the term total energy line and hydraulic grade line. **7**

b) Two Reservoir are connected by a pipe line, consisting of two pipes in series, one of 15 cm diameter and 6m long and another of 22.5 cm diameter and 15 m log. If the difference in water levels of the reservoir 6.0 m. Find the discharge considering all losses f = 0.02. **7**

OR

4. Three Reservoir A, B, C are connected at a junction point 'J' with water level 30,20 and 10m. The details regarding diameter, length and friction factor given in table. Determine discharge through each pipe. **14**

Pipe	Dia (m)	Length (m)	F
AJ	1m	3000	0.015
BJ	0.5m	600	0.024
CJ	0.6m	1200	0.020

5. a) Derive the condition for most economical section of the trapezoidal channel. **6**

b) Determine the dimension of most economical triangular section to carry discharge of $8.2 m^3/sec$ at bed slope of $1/2000$ with manning's constant N = 0.016. **8**

OR

6. a) Derive the condition for critical flow for any shape of channel **6**

$$\frac{Q^2}{9} = \frac{A3}{T}$$

b) The rectangular channel carrying discharge of $15\,m^3/\sec$ at depth of 1.2 m with bottom width 8m. Determine the following **8**

i) Critical depth ii) Critical velocity

iii) Minimum sp. Energy. iv) Sp. Energy at given depth.

7. a) Derive the expression for GVF in the form **7**

$$\frac{dy}{dx} = \frac{S_o - S_e}{1 - F_r{}^2}$$

With usual notation.

b) A discharge through a rectangular channel 1.2 m wide & rate of flow is 0.85m. Examine how the depth will vary in the bed slope of 1/1000, 1/700, 1/500. If the depth of flow = 0.6 m & Chazy's constant = 57. **7**

OR

8. a) Show that for a hydraulic jump in a rectangular channel. **7**

$$Fr_2^2 = \frac{8Fr_1^2}{\left[\sqrt{1+8Fr_1^2} - 1\right]^3}$$

When, Fr_1 and Fr_2 are Froude number before and after the jump respectively.

b) A rectangular channel has to carry a discharge of $12m^3/\sec$ and velocity of $7m^3/\sec$. Determine . **7**

i) Whether hydraulic jump will occurs or 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, it width of channel is 7m.

9. a) Differentiate impulse and reaction Turbines. **5**

b) What are the various efficiencies applicable for a turbine. Explain briefly. **5**

c) Define specific speed of turbine and give its important. **4**

OR

10. a) What are the different part of centrifugal pump. Explain with the help of sketches. **6**

b) A single acting reciprocating pump running at 50 rpm delivers $0.00736\,m^3/\sec$ of water. The diameter of piston is 200 mm and stoke length 300 mm. The suction & delivery head are 3.5 m & 11.5m. determine **8**

i) Theoretical Discharge. ii) Cd

iii) % slip iv) Power required to run the pump.

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Reinforced Cement Concrete (RCC) Designs

P. Pages : 2 **SPM/KW/22/2613**

0038

Time : Four Hours Max. Marks : 70

Notes :
1. Solve Question 1 OR Questions No. 2.
2. Solve Question 3 OR Questions No. 4.
3. Solve Question 5 OR Questions No. 6.
4. Solve Question 7 OR Questions No. 8.
5. Solve Question 9 OR Questions No. 10.
6. Assume suitable data whenever necessary.
7. Illustrate your answers whenever necessary with the help of neat sketches.
8. Use of non programmable calculator is permitted.
9. Use of IS 456:2000 is permitted. Use of SP16 Interaction charts are permitted.

1. a) Write down the merits and demerits of working stress method. **6**

b) Analyse a rectangular beam section 250mm wide and 450mm deep effective to determine the moment of resistance. The beam is reinforced with $4 \times 16\,\text{mm}\ \phi$ steel bars. Consider concrete of grade M20 and steel of grade Fe415. **8**

Also find its superimposed load carrying capacity if its effective span is 6m. Consider effective cover of 35mm.

OR

2. a) Explain Pre-tensioning and post-tensioning methods of pre-stressing. **4**

b) Write down the advantages of pre-stressing. **4**

c) Draw well labelled sketches of post-anchorages proposed by Magnel Blaton, Freyssinet and Gifford udall. **6**

3. a) Derive design stress block parameters using limit state method. **4**

b) A reinforced concrete beam of rectangular section 230mm wide and 300mm deep is reinforced on tension side with 3 bars of 12mm diameter. Calculate the ultimate moment of resistance of the section considering M20 grade concrete and Fe415 grade steel. Also find maximum point load it can carry at its mid span. Consider effective spem of 4m. **10**

OR

4. Analyse a T-beam for the following data **14**
- width of flange = 1500mm
- depth of flange = 100mm
- total depth of beam = 600mm
- width of web = 300mm
- effective cover = 40mm
- area of tension reinforcement $5 \times 25\text{mm}\ \phi$
- concrete grade M20 & steel grade Fe500.

5. A short axially loaded rectangular column is loaded by ultimate load of 1500kN. Considering concrete of grade M25 and steel of grade Fe415, design the section provide lateral ties. **14**

OR

6. Design a short helically reinforced circular column to carry a factored load of 2000kN. Assume concrete grade M25 and steel grade Fe500. **14**

7. Design a simply supported slab for a span of 3.5m to carry live load of $2\,kN/m^2$ and floor finish of $0.75\,kN/m^2$. Width of supporting wall is 250mm. Concrete and steel grades used are M20 and Fe500 respectively. **14**

OR

8. Design a floor slab for a hall of clear dimensions $9 \times 6m$ to carry a live load of $3\,kN/m^2$ and a floor finish of $1.0\,kN/m^2$. The slab is to be continuous over two beams spanning across short spans of the hall. Assume walls and beams 300mm wide. Use concrete of grade M20 and steel of grade Fe500. **14**

9. Design a reinforced concrete rectangular footing for a column of section $300mm \times 450mm$ which is subjected to a load of 1200kN at service state. Consider allowable bearing capacity of soil as $150\,kN/m^2$. Concrete grade M20 and steel of grade Fe415. **14**

OR

10. Design a roof slab panel for a room of clear dimensions $4150 \times 4800mm$, continuous on one of the longer sides and simply supported on walls on the other three sides. Consider width of beams and walls as 300mm. Assume live load of $3kN/m^2$ including floor finish. Provide concrete of grade M20 and steel grade Fe500. **14**

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Civil Engineering Materials Testing and Evaluation

P. Pages : 2 | **SPM/KW/22/2614**

* 0 0 3 9 *

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.

1. a) Describe the classifications, properties and uses of four important types of water proofing agent in civil engineering work. **6**

b) Explain in short: **8**

i) Grouts

ii) Calcium silicate bricks

iii) Strength of timber

iv) Glass fibres

OR

2. a) Difference between wetting agent and water proof agent. **6**

b) Describe various types of cements briefly. **8**

3. a) Describe the qualities of good timber briefly. Write about seasoning of timber and illustrate the important qualities of timber. **7**

b) Explain thermal conductivity and its effect on construction. **7**

OR

4. a) Explain various Nano – materials used in civil engineering construction. **5**

b) Elaborately discuss the engineering properties of civil engineering materials such as concrete, steel, stone and timber that are considered for selecting these materials. **9**

5. a) Discuss the properties and applications of fibre reinforced concrete. How does bulking of sand affect concrete mix? **7**

b) What is 3D printing in construction? States its benefits and explain how 3D printing is cost – effective. **7**

OR

6.	a)	Explain in brief wood – glass epoxy composites.	**7**
	b)	Explain various composite materials used in civil engineering.	**7**
7.	a)	Briefly describe any three methods of non-destructive tests for concrete.	**7**
	b)	List and explain different types of fracture mechanics. Write a brief note on fracture mechanics and its applications.	**7**

OR

8.	a)	List different types of bricks used in construction. Briefly explain the testing of bricks to determine its strength.	**7**
	b)	Explain briefly about various impact tests to be conducted on metal.	**7**
9.	a)	State the various factors affecting selection of material in view of quality control.	**7**
	b)	State the methods for interpretation the final results.	**7**

OR

10. Explain in details code practices and guidelines in regards for **any four**. **14**

i) Cement

ii) Aggregate

iii) Bitumen

iv) Timber

v) Structural Steel

vi) Soil

vii) Concrete

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Professional Practice, Law and Ethics

P. Pages : 2 **SPM/KW/22/2615**

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. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Define human values. State the features and need of human values in the field of professionalism. **5**

b) Define ethics. Explain how work ethics is related to progress of an organization. **5**

c) Write a note on **any one-** **4**
i) Types of integrity
ii) Honesty and courage.

OR

2. a) Explain why it is essential to understand civic virtues as a professional. **5**

b) What are morals? Explain how morals are guiding factors in onei life. **5**

c) Write a note on **any one-** **4**
i) Respect for others
ii) Caring and sharing

3. a) Define engineering ethics. What do you mean by sense of engineering ethics? **5**

b) State the varieties of moral issues arises in profession. Give two examples of it. **5**

c) Write a note on **any one.** **4**
a) Types of inquiry
b) Moral Autonomy.

OR

4. a) Highlight the complexities involved in moral dilemma. **5**

b) State Kohlberg's theory on moral autonomy. **5**

c) Highlight Gilligan's theory which differ from Kohlberg's theory on moral autonomy. **4**

5. a) Highlight the salient features of The industrial Dispute Act 1947. **5**

b) Engineering is an experiment. Discuss. **5**

	c)	Write a note on- RERA Act -2017.	**4**

OR

6.	a)	Explain the legislative measures of the workmen compensation Act 1923.	**5**
	b)	What are the four general features of morally responsible engineers.	**5**
	c)	Write a note on- NBC Act 2017	**4**
7.	a)	Discuss the concept of safety and Risk.	**5**
	b)	What is collective bargaining? State the types of collective bargaining.	**5**
	c)	Write a note on- Professional rights	**4**

OR

8.	a)	Highlight the various methods of reducing risk and suggest examples to improve it.	**5**
	b)	State the difference between assessment of safety and Risk.	**5**
	c)	Write a note on- Employee rights	**4**
9.	a)	What are Global issues? State any one global issue in detail.	**5**
	b)	"When in Rome, do as Romans do"- Discuss briefly it as applicable to multinational corporations.	**5**
	c)	Write a note on- Environmental issues.	**4**

OR

10.	a)	What is Corporate Social Responsibility? State the types of it.	**5**
	b)	Explain how professionals can play their role in a better way as consulting engineers.	**5**
	c)	Write a note on Engineers as managers	**4**

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

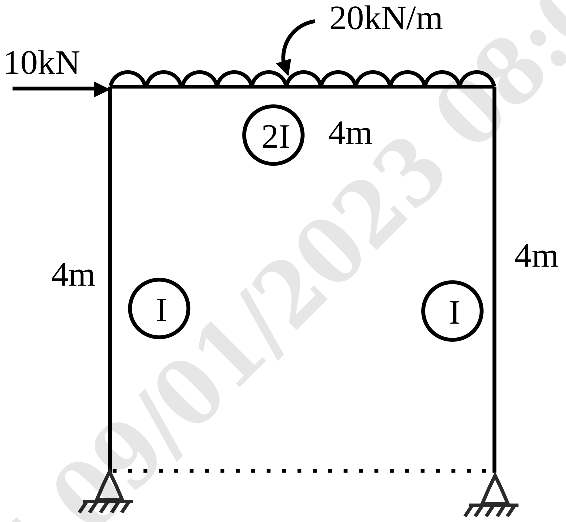
Elective-I : Advanced Structural Analysis

P. Pages : 3 **SPM/KW/22/2616**

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. Assume suitable data whenever necessary.
8. Use of non programmable calculator is permitted.

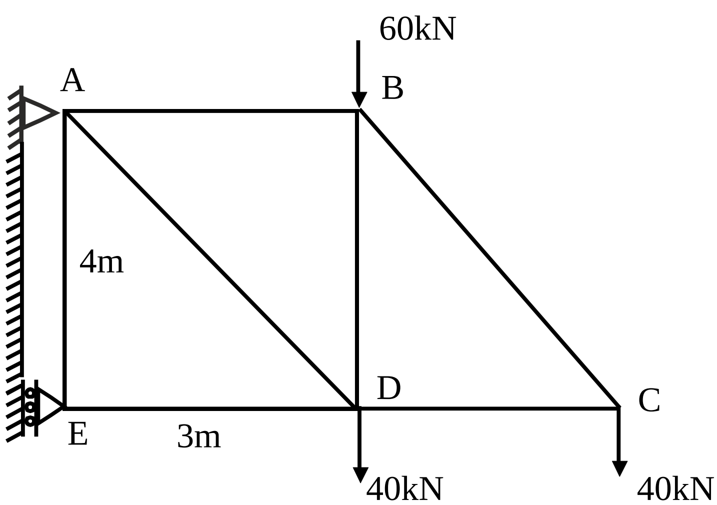
1. Analyze the frame shown in fig by strain energy method and draw BMD. **14**



OR

2. Find the vertical deflection of the joint C of the loaded truss shown in fig. The sectional area of member are as follow. **14**

Horizontal member: $3000\,mm^2$, vertical member = $4000\,mm^2$, Inclined member $5000\,mm^2$. Take $E = 200\,kN/mm^2$



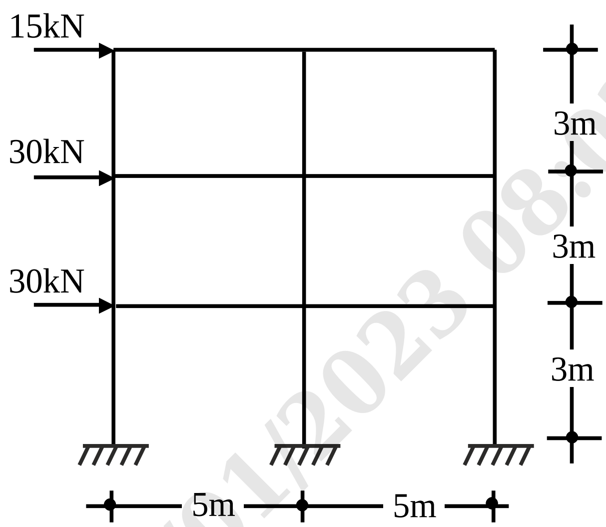
3. a) Derive from the first principle, Euler's crippling load for the column for length t. With one end fixed and other end free **7**

b) Derive the Rankine's formula for buckling of column and clarify the statement "Rankine's theory for determining load carrying capacity of column. **7**

OR

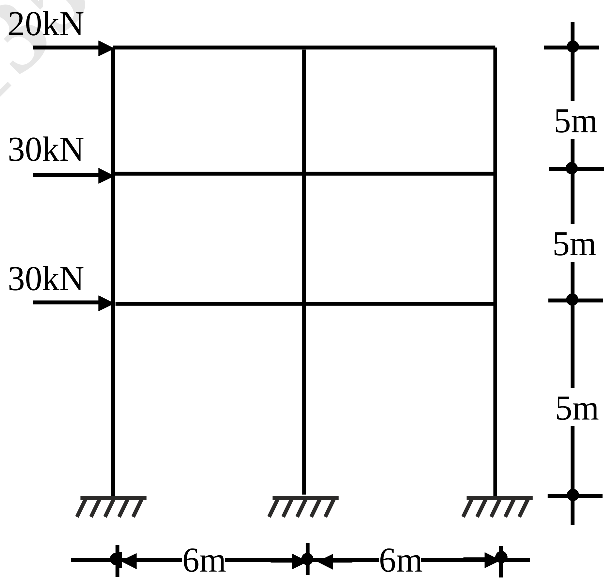
4. Two hinged parabolic arch with 35m span and 8m rise is subjected to udl of 10 kN/m over left of arch. Find the reaction at support, normal thrust and radial shear at a section 12m from left support. Take $I = I \operatorname{cosec}\theta$ with usual notation? **14**

5. Analyze the frame shown in fig by cantilever method and draw BMD of beam and column. **14**

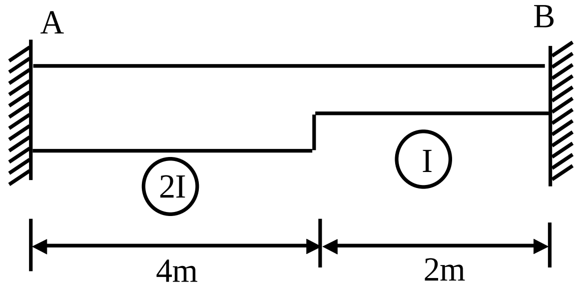


OR

6. Analyze the frame shown in figure by portal method and draw BMD. **14**

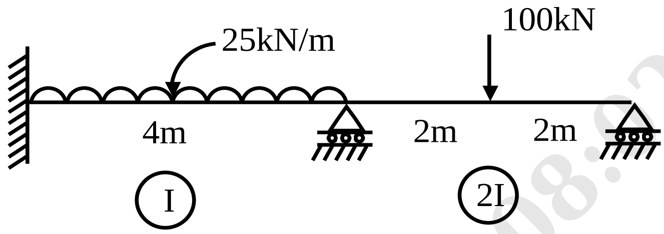


7. Determine the stiffness at A & B and carry over factor from A to B and from B to A of the beam shown in fig. by column analogy method. **14**



OR

8. Analyze the beam shown in fig by flexibility method & draw BMD. **14**



9. Explain **any three**. **14**

a) Natural frequency

b) Single Degree of Freedom

c) O'Alembert principle

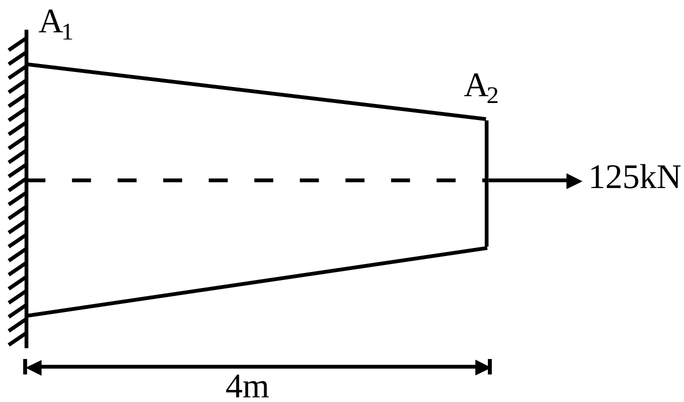
d) Damping

OR

10. Find out the displacement of tapered bar shown in figure by finite element method. Cross sectional area of the bar at **14**

$A_1 = 450 mm^2$ and at $A_2 = 250 mm^2$

Take $E = 2 \times 10^5 N/mm^2$



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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Elective-I : Ground Water Hydrology

P. Pages : 2 **SPM/KW/22/2617**

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 in detail Role of groundwater in the hydrologic cycle. **7**

b) Explain in detail rock properties affecting groundwater. **7**

OR

2. a) Derive Dupuit's equation with assumptions. **8**

b) Define Aquifer & Explain the classification of Aquifers. **6**

3. a) Derive the equation of unsteady state flow of Groundwater. **8**

b) Discuss different types of well construction along with their suitability. **6**

OR

4. a) Describe with neat sketches, radial flow to wells in both confined & unconfined aquifers. **8**

b) Explain the aquifer parameters by Jacob's method. **6**

5. a) Write a short notes on- **6**
i) Electrical resistivity Method
ii) Seismic Refraction Method

b) Discuss the necessity, concept & different methods of artificial groundwater recharge. **8**

OR

6. a) Explain details Recharge mounds & induced recharge method. **6**

b) Explain in details- **8**
i) Ground water level measurement
ii) Geophysical Exploration.

7. a) What are the various sources of groundwater pollutions? Write the causes of pollution. **8**

b) What are the various parameters of analysis of groundwater? Explain in details. **6**

8. Write a short notes on- **14**

i) Ground water salinity.

ii) Measures of groundwater quality.

iii) Potential Evaluation of Pollution.

iv) Ground water Development.

9. a) What are the various Groundwater modelling techniques? Explain in detail. **8**

b) What are the various Groundwater management techniques? Explain any one in detail. **6**

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

i) Digital Computer Models.

ii) Ground water basin management.

iii) Ground water basin Investigations.

iv) Safe yield of Aquifers.

v) Stream-aquifer Interaction.

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Elective-I : Geo Environmental Engineering

P. Pages : 2 **SPM/KW/22/2618**

Time : Three Hours Max. Marks : 70

Notes :
1. Solve Question 1 OR Questions No. 2.
2. Solve Question 3 OR Questions No. 4.
3. Solve Question 5 OR Questions No. 6.
4. Solve Question 7 OR Questions No. 8.
5. Solve Question 9 OR Questions No. 10.
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.

1. a) Geo environmental engineering is multidisciplinary. Justify your ans. **7**

b) With neat sketch explain the multiphase behaviour of soil. **7**

OR

2. a) Explain the classification of solid waste. **7**

b) List out the important mechanisms of soil – water interaction. **7**

3. a) What are the impacts of waste dump and it's remedial measures? **7**

b) Explain the significance of soil sorption behaviour in waste management. **7**

OR

4. a) Distinguish between the waste disposal facilities, gasification and refuse derived fuel. **7**

b) Explain the ill – effects of uncontrolled dumping of wastes. **7**

5. a) What is leachate? How the quantity can be estimated. **7**

b) Explain the issues to be overcome by an efficient sanitary landfill. **7**

OR

6. a) Write the selection criteria of soil for a linear system. **7**

b) Give your comment on environmental monitoring of landfill. **7**

7. a) List out the advantages of phytoremediation process. **7**

b) Discuss in details electro kinetic remediation of contaminated soil. **7**

OR

8. a) What are the important data required for planning contaminated site remediation. **7**

b) List out the important points to be kept in mind for contamination assessment. **7**

9. a) In relation to soil – water – contaminant interaction explain the possible variations of geotechnical properties given below. **14**

i) Permeability characteristics

ii) Atterberg limits

iii) Shear strength

OR

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

i) Electro kinetic remediation

ii) Pump & treat method

iii) In situ and exit remediation

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Elective-I : Geo Synthetics Engineering

P. Pages : 2 **SPM/KW/22/2619**

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) How will you determine hydraulic properties of Geotextiles? Explain with any one of the test. **7**

b) What are the Functional Requirements of Geosynthetics? **7**

OR

2. a) What are the functional requirement of Geosynthetics and explain minimum values specified by regulatory authorities IS code provisions. **7**

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

3. a) What are the mechanism of erosion control with reinforced vegetation. **7**

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

OR

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

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

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

b) Write down Geotextile filter mechanism and filter criteria. **7**

OR

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

b) What are the Result of Experimental investigation for optimizing the parameters of Reinforced soil fed. **7**

7.	a)	Explain Reinforced Retaining Wall, its types and their applications.	**7**
	b)	Explain failure mechanism and analysis of Reinforced Retaining Wall Design.	**7**

OR

8.	a)	Explain Design procedure of Reinforced Retaining Wall.	**7**
	b)	Explain construction sequence of Geotextile Reinforced Wall.	**7**
9.	a)	Write down the uses of Geomembrane for lining application management and maintenance.	**7**
	b)	What is Double composite linear system for MSW landfill.	**7**

OR

10.	a)	Explain Reinforced soil Embankment with its application and advantages.	**7**
	b)	How Geotextiles are used in Municipal solid waste (MSW) landfills with single composite liner system.	**7**

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Elective-I : Advanced Surveying

P. Pages : 2 **SPM/KW/22/2620**

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. Illustrate your answers whenever necessary with the help of neat sketches.
8. Use of non programmable calculator is permitted.

1. a) What is Remote Sensing? & Explain Principle of Remote Sensing. **7**

b) Explain principles of visual interpretation & its uses. **7**

OR

2. a) Write short note on Thermal remote sensitize & microwave remote sensing. **7**

b) Explain- **7**
   a) Aerial photograph
   b) Sensors
   c) Remote sensing platforms

3. a) What are the types of Drone and explain its common applications. **7**

b) Explain how the Generation of 3D data done from Drone technology. **7**

OR

4. a) What are the types of LiDAR technology and its applications. **7**

b) Explain how the data prepared in DSM, DTM from LiDAR. **7**

5. a) Explain the Principles of image interpretation in details. **7**

b) Explain varies stages in digital image processes. **7**

OR

6. a) Explain in details multi date and multi band images image interpretation. **8**

b) Write a short note on- **6**
   i) Image enhancement techniques
   ii) Digital image classification

7.	a)	What is Geographic Information System & explain concepts and terminology of GIS.	**8**
	b)	What are the components of Geographic Information System.	**6**

OR

8.	a)	Distinguish in between Raster and vector formats.	**6**
	b)	Write a short note on- i) Remotely sensed image ii) Scanners iii) Digitizers.	**8**
9.	a)	Distinguish in between GPS and DGPS.	**6**
	b)	Explain in details working of DGPS Technique.	**8**

OR

10.	a)	Explain how the ground control points are locate using DGPS technique.	**6**
	b)	Distinguish in between PPK and RTK Survey.	**8**

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Elective-I : Advanced Building Materials

P. Pages : 2 **SPM/KW/22/2621**

Time : Three Hours Max. Marks : 70

* 0 0 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. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Illustrate in detail about recycling and reuse of the construction and demolition waste. **7**

b) Explain in detail about various engineering properties of construction materials. **7**

OR

2. a) Explain in detail about various major and minor components of building materials which are categories as a building waste. **7**

b) Explain in brief about the thermos physical properties of building materials. **7**

3. a) Explain in detail about various engineering properties of lime. **7**

b) Write a short note on- **7**

i) Surkhi

ii) Fly Ash

OR

4. a) What are various types of cement? **7**

b) What do you mean by an admixture? Write any three application of admixture. **7**

5. a) Write a short note on- **7**

i) Glass

ii) Glass Wool

b) Explain in detail about STUCCO (plaster) as a fire resistant building materials. **7**

OR

6.	a)	What do you mean by Refractory? Explain in brief.	**7**
	b)	Explain in detail about various engineering properties of ceramic materials.	**7**
7.	a)	Explain in detail about various engineering properties of Rubber & plastic.	**7**
	b)	Write a short note on- i) Special Steel ii) Alloy Steel	**7**

OR

8.	a)	Explain in detail about polymerization mechanism.	**7**
	b)	Write the engineering application of Rubber & plastic.	**7**
9.	a)	Define the term Green building & List various system used for rating of Green building in India.	**7**
	b)	Explain the principle of Green building.	**7**

OR

10.	a)	What are the basic requirement of Rain water harvesting System (RWHS) for buildings of different climatic regions.	**7**
	b)	Explain in detail about Environmental friendly & cost effective building technologies.	**7**

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Elective-II : Climate Change and its Mitigation

P. Pages : 2 | **SPM/KW/22/2622**

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) What is climate? Explain the brief history of climate change and trend shows the effects of climate change? **7**

b) What is atmosphere? Explain the layers of atmosphere? **7**

OR

2. a) Explain in brief about carbon cycle and state its important? **7**

b) Explain in detail about climate fragility Risks in India. **7**

3. a) What are the sources and sinks of CO_2? What is meant by balancing the sources and sinks of CO_2? **7**

b) Explain in brief Green house gases cycle in atmosphere. **7**

OR

4. a) Briefly Explain Instruments used for quantification of green houses gases. **7**

b) What is Radiative forcing? Explain in brief. **7**

5. a) Explain the direct and indirect impact of global warming on forest. How forest acts as carbon sink? **7**

b) Explain in brief Traditional practices to cope with climate change impacts? **7**

OR

6. a) What are the climate change risks on the agriculture and food security? **7**

b) What are the likely impact of climate change on health? Suggest actions for national and local policy makers for mitigating health impacts of climate change. **7**

7.	a)	What are the alternate sources of energy to combat with climate change? Explain any one of them in brief.	**7**
	b)	How does segregation help in bio-medical waste? What precaution should be taken while handling the bio medical waste?	**7**

OR

8.	a)	What is clean technology? Explain examples of future clean technologies.	**7**
	b)	What is Municipal Solid Waste (MSW) ? Explain collection and disposal of municipal solid waste (MSW)	**7**
9.	a)	Discuss the need for mainstreaming adaptation strategies.	**7**
	b)	Discuss the mitigation and adaptation in changing climate.	**7**

OR

10.	a)	What are the Role of fossile fuels in climate change? Explain its effect on climate change.	**7**
	b)	Write notes on- i) Role of Government in climate change ii) Role of Industries and Individuals in climate change.	**7**

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Elective-II : Advanced Concrete Structures

P. Pages : 2 **SPM/KW/22/2623**

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. Use of non programmable calculator is permitted.
9. Use of IS 456 : 2000 and IS 3370 is permissible.

1. Design a biaxially loaded R.C.C. column subjected to ultimate load of 500 kN, ultimate moment of 75 kN-m about major axis and 60 kN-m about minor axis. The unsupported length of column is 4 m. The size of column is 350 x 450 mm. Use M-20 grade concrete and Fe – 415 grade steel. **17**

OR

2. Design an isolated rectangular footing for a rectangular column of size 450 x 350 mm with ultimate load of 1150 kN and also carries ultimate moment of 55 kN-m. The column is reinforced with 6 bars of $12\,\text{mm}\,\phi$. Use M-20 grade of concrete and Fe 415 grade of steel. The safe bearing capacity of soil is $150\,\text{kN}/\text{m}^2$. Draw detail diagram of reinforcement. **17**

3. A circular water tank of capacity 450000 litres on a firm ground and having rigid joint at the base. The depth of water is 4 m, including a free board of 250 mm. Design top dome, ring beam and circular wall of tank. Use M-20 grade of concrete and Fe-415 grade steel. **18**

OR

4. Design dug legged stair case (waist type slab) for an office building 2.5 m x 4.0 m to suit the following data. **18**

Height between the floors = 3.6 m

Provide 100 mm bearing at each end.

Live load $= 4\,\text{kN}/\text{m}^2$, Floor finish $= 1\,\text{kN}/\text{m}^2$

One end of flight is resting on plinth beam and other on the lending beam at the end of the flight. Use M20 grade concrete and Fe 415 grade steel.

5. Design a cantilever retaining wall having stem 4 m. high. It retains earth up to top with base slab 2.5 m wide. Toe projection is 800 mm. With the thickness of base slab as 400 mm. Take density of soil $18\,\text{kN}/\text{m}^3, \phi = 30^\circ$ and SBC $= 200\,\text{kN}/\text{m}^2$ **18**

Use M-20 grade concrete and Fe 415 grade steel.

OR

6. A counter fort retaining wall to retain 7 meter high embankment above ground level. The foundation is to be taken 2.5 m below ground level where the bearing capacity of soil may be taken $180\,kN/m^3$. The back fill is horizontal and soil has density of $18\,kN/m^3$ with an angle of internal friction 30º. Coefficient of friction between concrete and soil may be taken as 0.5. Design the stem of counterfort retaining wall. Use M-20 grade of concrete and Fe 415 grade of steel. Draw reinforcement details also. **18**

7. An assembly hall 20 m long and 12 m wide between the centre of columns is supported by a hinge base portal frame spaced at 4 m c/c, the height of column up to centre of beam is 5.5 m. Analyse one intermediate portal frame taking live load as $1.5\,kN/m^2$, floor finish as $0.75\,kN/m^2$. Design M-20 grade of concrete and Fe 415 steel. Design the column and hinge of portal frame only, **17**

OR

8. Design a rectangular combined footing for two column of size 800 x 800 mm and 600 x 600 mm carrying load of 1500 kN & 1000 kN. The column has placed 4 m c-c with S.B.C. of soil as $160\,kN/m^2$. Use concrete M-20 and Fe 415 steel. Width of footing restricted to 2.2 m. **17**

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Elective-II : Advanced Concrete Technology

P. Pages : 2 **SPM/KW/22/2624**

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 different types of cement and grades of cement. **7**

b) What are the different Chemical composition of cement. **7**

OR

2. a) Explain the term moisture content and water absorption of aggregate. **7**

b) Explain effect of geometry & texture of aggregate on strength of concrete. **7**

3. a) Explain effect of Silica Fume on Strength of Concrete. **7**

b) Write short note on autoclave aerated concrete. **7**

OR

4. a) Explain the term ultra rapid hardening concrete. **7**

b) Explain Fiber reinforced concrete, what are the different types of FRP used. **7**

5. a) Explain the different steps involved in Mix design as per Indian Standard Method. **7**

b) Comparison with British Method of Mix Design and American Method of Mix Design. **7**

OR

6. Design a concrete Mix for M40 grade of concrete with the following data. **14**

a) Type of cement – OPC 43 grades

b) Maximum size of Aggregate – 20mm

c) Exposure condition – severe (RCC)

d) Workability – 125mm Slump

e) Minimum Cement content – 320 Kg/m^3

f) Maximum W/C ratio – 0.45

g) Method of placing concrete- Pumping.

h) Degree of supervision – Good.

i) Type of Aggregate – Crushed Angular Aggregate.

j) Specific gravity of coarse aggregate – 2.80

k) Specific gravity of fine aggregate – 2.70

l) Grading of coarse aggregate confirming to table 2 of IS383

m) Grading of fine aggregate confirming to grading zone-I.

7. a) Explain Shrinkage and factors affecting and control of Shrinkage. **7**

b) Explain with neat sketch stress-strain relation & modulus of elasticity of concrete. **7**

OR

8. a) Explain effects of temperature on Strength of Concrete. **7**

b) Explain Compressive Strength and Factors influencing strength of concrete. **7**

9. a) Classification and Causes of Concrete Deterioration. **7**

b) Explain Freezing and Thawing of Concrete. **7**

OR

10. a) Explain the concept of Pull Out Test. **7**

b) What do you mean by Core Test of concrete. **7**

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Elective-II : Earth Retaining Structures

P. Pages : 2 **SPM/KW/22/2625**

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) Discuss the Culmanns Graphical method. **6**

b) Determine the active earth pressure for retaining wall of 6m high of dry cohesionless soil with density $r = 19 kN/m^3$ and $\phi = 30^\circ$. Also determine the change in active earth pressure when it is subjected to surcharge of $30 kN/m^2$. **8**

OR

2. a) Give the critical comparison of coulomb and Rankine earth pressure theory mentioning the assumptions in both the theories. **6**

b) Explain the following **8**
i) Earth pressure at rest
ii) Active earth pressure
iii) Passive earth pressure

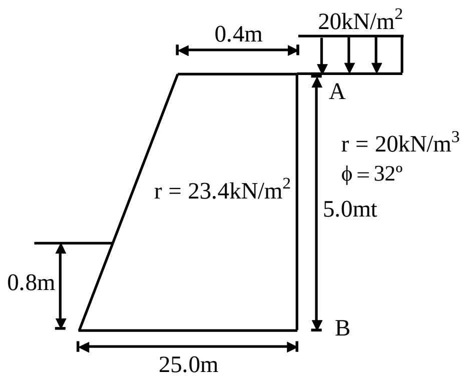
3. a) Define Retaining wall, Enlist the types of retaining wall and Describe the Counter fort Retaining wall with sketch. **8**

b) Explain advantages, disadvantages and type of soil nailing. **6**

OR

4. a) Write a note on Geotextile Reinforced wall with its advantages and disadvantages. **6**

b) A masonry gravity wall as shown in figure is designed to support cohesionless soil. The unit weight of masonry wall is $23 kN/m^3$The soil at the front and back of the wall is the same and have the same properties as given in fig. Calculate the F.O.S. of wall against overturning assuming 50% of the passive resistance is mobilized. **8**



5. a) Write a note on cantilever sheet Pile in Detail. **8**

b) Write a note on cofferdam with sketch. **6**

OR

6. a) Explain sheet pile with its uses, application, advantages and disadvantages. **6**

b) What are the different types of sheet piles and describe any one in detail. **8**

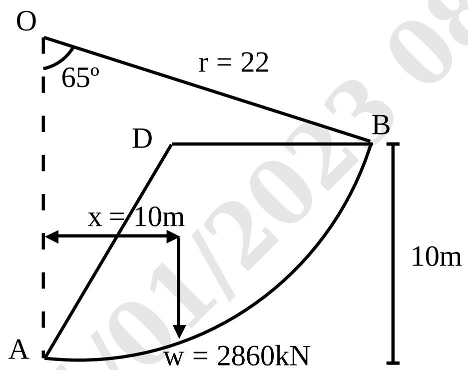
7. a) Explain the various method of improving stability of slopes. **7**

b) Derive an equation for the factor of safety of an infinite slope in a cohesive soil. What is critical height. **7**

OR

8. a) Explain different types of slope failure with sketch. **7**

b) An unsupported slope is shown in figure. Determine the F. O.S. against sliding for the trial slip surface, Take $C = 45 kN/m^2$ and $\phi = 0$. The weight of the wedge ABD is 2860kN and acts at a Horizontal distance of 10m from the vertical AO. **7**



9. a) Explain the use of stability charts. **8**

b) Explain **any one**. **6**

i) Tension crack

ii) Stability of upstream slope during drawdown.

OR

10. a) Explain **any one** **6**

i) Stability of downstream slope during steady seepage.

ii) Stability of upstream and downstream slopes during and immediately after construction.

b) In order to find the F. O. S. of d/s slope of an earth dam, during steady seepage, the section of the dam was drawn to a scale of 1cm = 5cm and the following results obtained on a critical slip circle Area of N – rectangle = 14.4 sq. cm, Area of T rectangle = 6.4 sq.cm, Area of U-rectangle 6.9 sq. cm & Length of Arc = 12.6 cm laboratory tests have furnished value of 26º for effective angle of shear resistance and $19.5 kN/m^2$ for cohesion. Determine the F.O.S. of the slope Take $r = 19 kN/m^3$ **8**

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Elective-II : Flood Control Drainage Engineering

P. Pages : 1 **SPM/KW/22/2626**

Time : Three Hours Max. Marks : 70

Notes :
1. All questions carry marks as indicated.
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3. Solve Question 3 OR Questions No. 4.
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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.

1. a) Explain in brief Flood management measures. **7**

b) Define flood? What are the various causes of flooding Explain. **7**

OR

2. a) What are the various flood control strategies Explain. **7**

b) Explain various Environmental and economic losses due to flood. **7**

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

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

OR

4. a) What is flood frequency? Explain in brief gumballs method. **7**

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

5. a) Explain advance warning systems for Risk Management. **7**

b) What do you understand by Risk assessment Risk Reduction and Management. **7**

OR

6. a) Explain applications of remote sensing and GIS in RISK management. **7**

b) Explain the Role of Information Technology in natural Hazards mitigation management. **7**

7. a) Explain effect and consequence for drainage due to urbanisation. **7**

b) Explain the necessity of land drainage system. **7**

OR

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

b) Explain in brief various types of land drainage system. **7**

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

b) Explain Drainage criteria formulation for off Season drainage. **7**

OR

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

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

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B.Tech. (Civil Engineering) Fifth Semester (C.B.C.S.) Winter 2022

Elective-II : Railway Engineering

P. Pages : 2 **SPM/KW/22/2627**

Time : Three Hours Max. Marks : 70

Notes :
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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. Illustrate your answers whenever necessary with the help of neat sketches.
8. Use of non programmable calculator is permitted.

1. a) What do you understand by permanent way & Discuss the requirements of ideal permanent way. **7**

b) Define Gauge of railway track. What are the factor which affect the selection of a gauge. **7**

OR

2. a) Discuss the various types of rail failure with sketches. **7**

b) Explain tracks and truck stresses & Discuss. **7**

3. a) What are the possible causes of creep? Discuss in brief. **7**

b) A 5º 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 is restricted to 40 kmph determine the restricted speed on the main line. **7**

OR

4. a) What do you mean by coning of wheels? Explain. **6**

b) Using the sleeper density of n+6.2. Calculate the number of sleepers required for construction a railway track 1280m long (BG. track) **8**

5. a) Draw a neat sketch of various types of crossing in use of Indian railways. Explain in brief. **8**

b) What is the necessity of track maintenance? Discuss. **6**

OR

6. a) Draw a neat diagram of left hand turnout and show its various components parts. **7**

b) What are the construction steps of railway tracks? Discuss in brief. **7**

7.	a)	What are the modern methods of track maintenance? Explain.	**8**
	b)	Explain in brief techniques of track rehabilitation.	**6**

OR

8.	a)	Enumerate and explain the various resistance that have to be overcome by a moving train.	**7**
	b)	Discuss the marshalling yard and its types.	**7**
9.		Write notes on **any three.**	**14**

1) Heel divergence
2) Throw of switch
3) Tongue rail
4) Objects of signaling
5) Interlocking

OR

10.		Write note on **any three.**	**14**

1) Check rail
2) Home signal
3) Starter signal
4) Marshaling yards
5) Semaphore signal

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