



**MGM University**  
**Aurangabad-431003**  
**Second Term Exam A.Y. 2021-22**

Program: Civil Engineering  
Course: Surveying-II  
Course Code: 20UCI404D

Sem -IV  
Marks: 60

**Instructions to the students**

1. Each question carries 10 marks.
- 2 All questions are compulsory
3. Illustrate your answers with neat sketches, diagram etc wherever necessary
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

Question No.		Marks
1	<b>Solve any Two</b>	
	a) Explain principle of stadia method	5
	b) To find the elevation of the top (Q) of a hill, a flag staff of 2 m height was erected and observations were made from two stations P and R, 60 meters apart. The horizontal angle measured at P between R and the top of the flat staff was $60^{\circ} 30'$ and that measured at R between the top of the flag staff and P was $68^{\circ} 18'$ . The angle of elevation to the top of the flag staff was measured to be $10^{\circ} 12'$ at P. The angle of elevation to the top of the flag staff was measured to be $10^{\circ} 48'$ at R. Staff readings on B.M. when the instrument was at P = 1.965 m and that with the instrument at R = 2.055 m. Calculate the elevation of the top of the hill if that of B.M. was 435.065 m.	5
2	c) Explain the procedure for determining the tacheometric constants.	5
	<b>Solve any Two</b>	
	a) Explain the parts of the total station	5
	b) Explain the procedure of temporary adjustment of a total station	5
	c) Explain the procedure of setting out of a building using a total station	5
3	<b>Solve any Two</b>	
	a) Explain with a neat sketch the procedure for setting out of simple curve by Rankine's method	5
	b) Two tangents intersect at chainage 250 m, the deflection angle being $30^{\circ} 30'$ . Compute the necessary data for setting out a 100m radius curve to connect the two tangents if it is intended to set out the curve by offsets from chords produced method. Take the length of the normal chord as 30 m.	5
	c) Enlist types of vertical curve with a neat sketch	5
4	<b>Solve any Two</b>	

- a) What are Towers and signals in geodetic surveying? 5
- b) Explain Colby apparatus in detail 5
- c) Observations were made from instrument station A to the signal at B. The sun makes an angle of  $62^\circ$  with the line BA. Calculate the phase correction if: 5
- The observation was made on the bright portion
  - The observation was made on the bright line
- The distance AB is 9500m. The diameter of the signal is 13cm.

5

**Solve any Two**

- a) Briefly explain the law of weights. 5
- b) The telescope of a theodolite is fitted with stadia wires. It is required to find the most probable values of the constants C and K of tacheometer. The staff was kept vertical at three points in the field and with of sight horizontal the staff intercepts observed was as follows. 5

Distance of staff from tachometer D(m)	Staff intercept S(m)
150	1.500
200	2.005
250	2.507

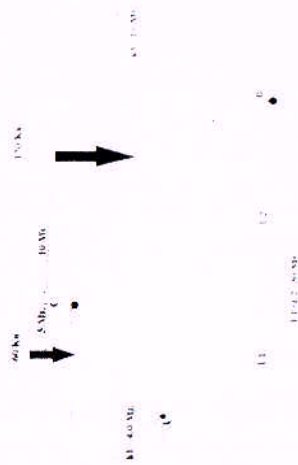
- c) Explain the principle of least squares 5
- Solve any Two**

6

- a) Write a short note on Global Positioning System. 5
- b) What do you mean by remote sensing? State the meaning of active and passive systems. 5
- c) A line AB lies on a terrain having an average elevation of 400m above mean sea level. It appears to be 8.72cm on a photograph for which focal length is 24 cm. The same line measures 2.18 cm on a map which is to a scale of 1/40000. Calculate the flying altitude of the aircraft above mean sea level, when the photograph is taken 5

-----\*\*\*\*-----END-----\*\*\*\*-----

- b) A three hinged parabolic arch has a span of 30 meter and a rise as shown calculate support reactions & horizontal thrust. (10)



Q6. Solve any one

- a) A cable of span 150 Mtr and dip 15 Mtr carries a load of 6kN/M run on horizontal span. Find maximum tension in the cable and inclination of the cable at the support if force transmitted to the supporting pier is a) Cable is passed over smooth rollers on the top of piers. b) The cable is clamped to a saddle with smooth rollers resting on the top of pier.

For each of above case anchor cable is at  $30^\circ$  to the horizontal if supporting Pier is 20 Mtr high. Find the bending moment of Pier for case a. (10)

- b) The three hinged stiffening girder of suspension bridge of span 120 Mtr is subjected to two point loads of 240 Kn & 300 Kn at a distance of 25Mtr & 80 Mtr from the left end. Find the shear force and bending moment for the girder at a distance of 40 Mtr from left end. The stiffening girder has the central dip of 12Mtr. Also find the maximum tension in the cable and draw the bending moment diagram for girder. (10)

End of Paper

## Second Term Exam A.Y. 2021-22 (May-Jun 22)

Program: Civil Engineering  
Examination  
Course Code: 20UC1402D  
Structure  
Duration: 3hrs  
4th Semester  
Name of Course: Analysis of  
Maximum Marks: 60

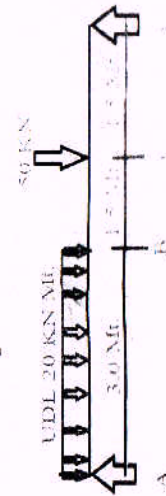
Instructions to the students

1. Each question carries 10 marks.
2. All questions are compulsory.
3. Illustrate your answers with neat sketches, diagram etc wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

Q1. Solve any one

- a) Determine maximum deflection of given Beam.

(10)



- b) Determine the Magnitude of deflection at C in the beam AE loaded as shown in Fig below.

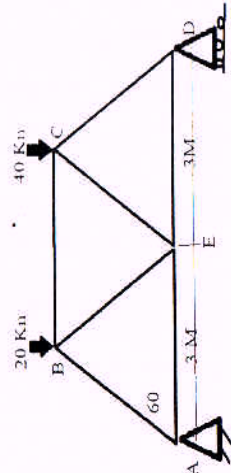
(10)



Fig. 1

Q2. Solve any one

- a) Determine vertical & horizontal deflection of joint E of the truss as shown below the sectional area of each member is  $1500 \text{ mm}^2$ . Take  $E = 200 \text{ Kn/mm}^2$ . (10)





## Second Term Exam A.Y. 2021-22 (May-Jun 22)

Program: Civil Engineering

4<sup>th</sup> Semester

Examination

Course Code: 20UCI402D

Name of Course: Analysis of

Structure

Maximum Marks: 60

Duration: 3hrs

Instructions to the students

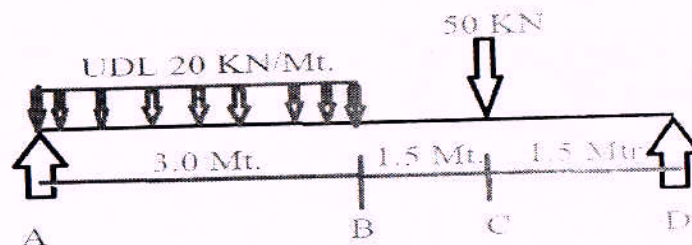
1. Each question carries 10 marks.
2. All questions are compulsory
3. Illustrate your answers with neat sketches, diagram etc wherever necessary
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

Marks

Q1. Solve any one

a) Determine maximum deflection of given Beam.

(10)



b) Determine the Magnitude of deflection at C in the beam AE loaded as shown in Fig below.

(10)

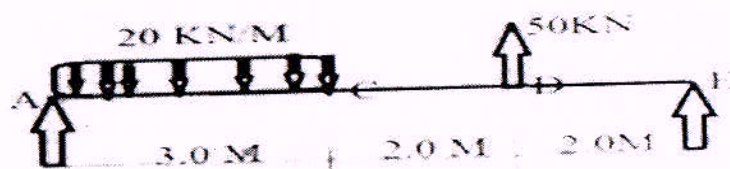
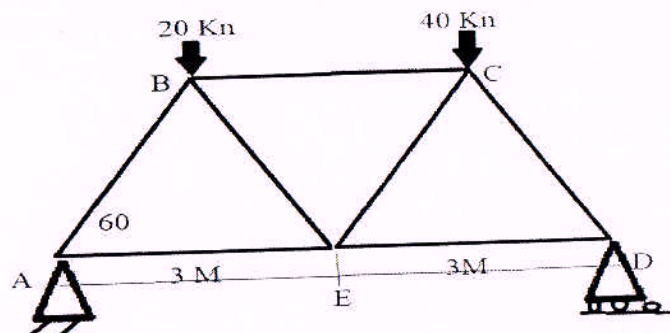


Fig. 1

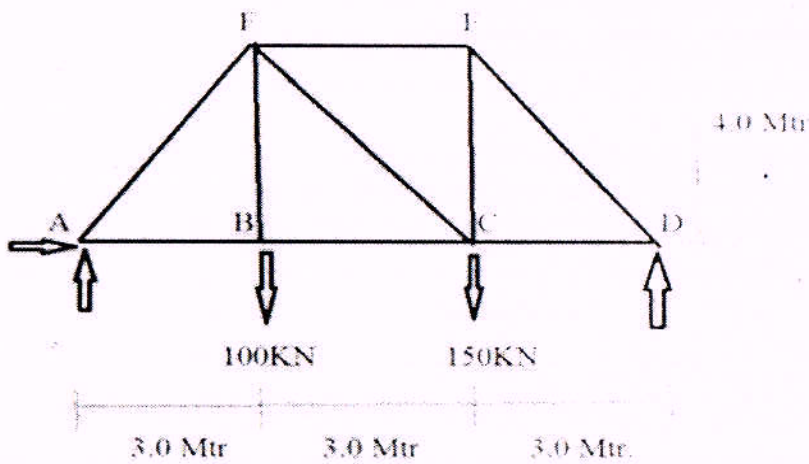
Q2. Solve any one

a) Determine vertical & horizontal deflection of joint E of the truss as shown below the sectional area of each member is  $1500 \text{ mm}^2$ . Take  $E = 200 \text{ kN/mm}^2$ .

(10)

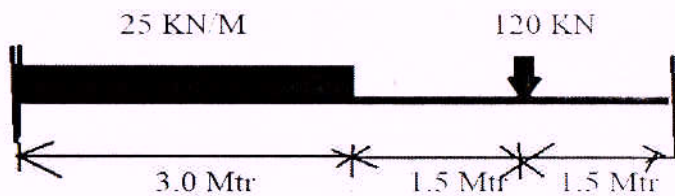


- b) Determine vertical & horizontal deflection of joint C of the truss as shown below the sectional area of each member is  $1000 \text{ mm}^2$ . Take  $E = 200 \text{ KN/mm}^2$ . (10)

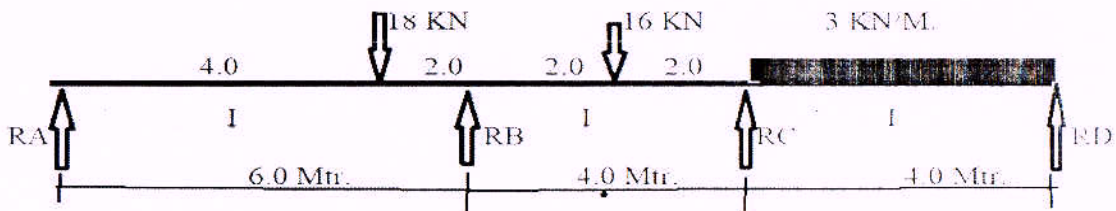


**Q3. Solve any one**

- a) A fixed beam of span 7.0 mtr carries UDL of  $25 \text{ KN/M}$  over a distance of 3.0 Mtr and Point load of 120 kN at 4.5 Mt from left support. Find fixed end moments and reactions at support. Draw BM & SF diagrams. (10)



b)

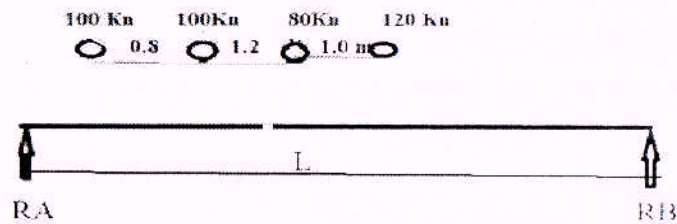


Analyse the continuous beam as shown above by using Theorem of Three Moments and draw Bending moment & Shear force Diagram.

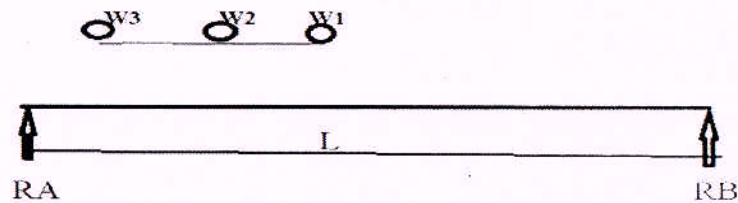
(10)

**Q4. Solve any one**

- a) The load system shown in fig below moves from left to right on a girder of 10 meters. Find the absolute maximum bending moment for the girder. (10)

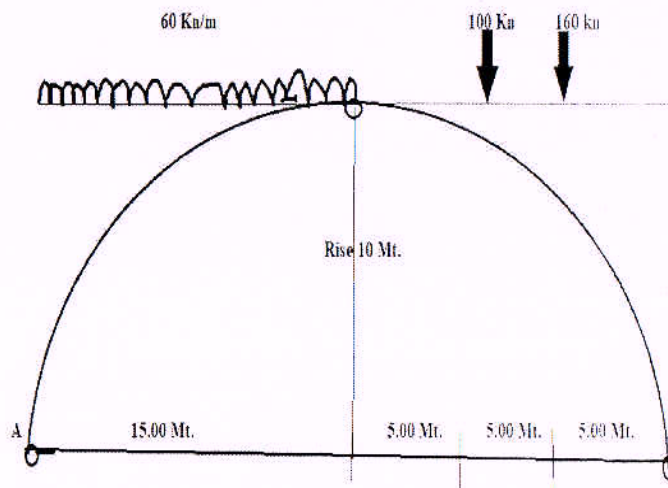


- b) Calculate maximum  $R_A$  &  $R_B$  for the rolling load  $W_1 = 250 \text{ kN}$ ,  $W_2 = 150 \text{ kN}$ ,  $W_3 = 400 \text{ kN}$ , distance between  $W_1$  &  $W_2$  is  $0.8 \text{ m}$ ,  $W_2$  &  $W_3$  is  $1.0 \text{ m}$ . Over the span of  $12 \text{ m}$ . (10)

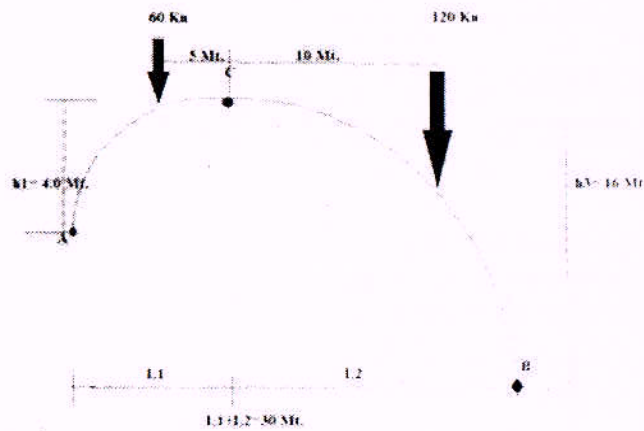


**Q5. Solve any one**

- a) A three hinged arch has a span of  $30 \text{ m}$  and a rise of  $10 \text{ m}$ . The arch carries a uniformly distributed load  $60 \text{ kN per meter}$  on left half of its span, It also carries two concentrated loads of  $160 \text{ kN}$  and  $100 \text{ kN}$  at  $5 \text{ m}$  and  $10 \text{ m}$  from the right end. Determine the horizontal thrust at each support. (10)



- b) A three hinged parabolic arch has a span of 30 meter and a rise as shown calculate support reactions & horizontal thrust. (10)



**Q6. Solve any one**

- a) A cable of span 150 Mtr and dip 15 Mtr carries a load of 6Kn/M run on horizontal span. Find maximum tension in the cable and inclination of the cable at the support if force transmitted to the supporting pier is a) Cable is passed over smooth rollers on the top of piers. b) The cable is clamped to a saddle with smooth rollers resting on the top of pier.

For each of above case anchor cable is at  $30^\circ$  to the horizontal if supporting Pier is 20 Mtr high. Find the bending moment of Pier for case a. (10)

- b) The three hinged stiffening girder of suspension bridge of span 120 Mtr is subjected to two-point loads of 240 Kn & 300 Kn at a distance of 25Mtr & 80 Mtr from the left end. Find the shear force and bending moment for the girder at a distance of 40 Mtr from left end. The supporting cable has the central dip of 12Mtr Also find the maximum tension in the cable and draw bending moment diagram for girder. (10)

End of Paper



## Second Term Exam A.Y. 2021-22 (May-June 22)

Program: Civil Engineering

Course Code: 20UCI403D

Max. Marks: 60

Sem.: IV

Course: Building Planning and Drawing

Duration: 3 hours

Instructions to the students

1. All questions are compulsory.
2. Illustrate your answers with neat sketches, diagram etc wherever necessary.
3. Assume suitable data if required and mention it clearly.
4. Figures to right indicate maximum marks.

### Q1. Solve any one

- A. Write short note on orientation of building. (7m)
- B. Enlist the principles of building planning and explain roominess and privacy in detail.

### Q2. Solve any one

- A. Write short note on occupancy certificate. (7m)
- B. Write note on Principles of Architectural Composition.

### Q3. Solve any one

- A. Write note on requirement of public building. (7m)
- B. Explain the guidelines for planning, designing of residential building in detail.

### Q4. Solve any one

- A. Write a short note on wiring installation. (7m)
- B. What is rain water harvesting? Give its need and scope.

### Q5. Solve any one

- A. What is air conditioning? State its purpose. (7m)
- B. What are the principles of day lighting?

### Q6. Solve any one

- A. Write note on fire resistance in building. (7m)
- B. What are the conditions of good acoustics?

### Q7. Solve any one

(18m)

- A) Considering principle of planning and building bye-laws plan and design residential bungalow for a family in new Aurangabad town using following data:

1. Plot Size 10m x 12m
2. Scale 1:50
3. Plinth Height 0.9m
4. Required components: Veranda, living room, bed room, separate W.C., bath, kitchen room and dog-legged staircase

Draw:

1. Working Plan (5m)
2. Elevation (4m)
3. Section through staircase and sanitary block (5m)
4. Schedule of opening (2m)
5. Area statement (2m)

- B) By assuming suitable data and standard norms draw the plan of Rural Bank.

Requirement:

Entrance, waiting hall, Managers cabin, Cashiers cabin, counters, store room, toilet and staircase

Draw:

1. Working Plan (6m)
2. Elevation (4m)
3. Section through staircase and sanitary block (6m)
4. Area Statement (2m)

-----End of paper-----



**MGM University, Aurangabad**  
**Second Term Examination A. Y. 2021-22 (May-June 22)**  
**B. Tech. 4<sup>th</sup> Sem Examination**

Course Code : 20UCH404D  
 Max Marks: 60

Name of Course : Industrial Pollution Control  
 Duration:- 03 Hr.

- Instructions:
- 3. Solve total Six Questions.
- 2. Solve any Two Questions from the each.

Q. No. Questions

Q. No.	Questions	CO	BL	Mark														
1 (a)	Compare the functions of Central and State Pollution Control Board in the area of air pollution control.	CO1	L4	5														
1 (b)	Discuss in brief about Air Act.	CO1	L5	5														
1 (c)	State the purpose of air quality monitoring.	CO1	L2	5														
2 (a)	Define plume rise and explain Effective stack Height.	CO2	BL1	5														
2 (b)	Explain with neat sketch the types of Plume behavior.	CO2	BL2	5														
2 (c)	Determine the effective height of a stack from the following data. Wind velocity=3m/sec. Air Temperature = 21°C Physical Stack =200 m with 0.98 inside diameter. Atmospheric pressure= 1000 mili bars. Stack gas velocity = 11.2 m/sec. Stack gas temperature = 160°C.	CO2	BL3	5														
3 (a)	Summarize the advantages of gravitational settling chamber.	CO3	BL2	5														
3 (b)	Explain with neat sketches about the principle and working of Cyclone Separator.	CO3		5														
3 (c)	Design a parallel plate type ESP with 10 channels to handle 10000 m <sup>3</sup> /hr of gas for efficiency of 90%, 99% and 99.9%.	CO3	BL6	5														
4 (a)	Explain TDS in detail.	CO3	L5	5														
4 (b)	Explain Oxygen Sag curve with neat figure.	CO3		5														
4 (c)	Calculate the reaction rate constant K <sub>1</sub> ' and the ultimate BOD Lu for the following BOD results for a sample of raw sewage at 20° C.	CO3	L6	5														
<table border="1"> <thead> <tr> <th>T days</th> <th>0</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Y (BOD mg/l)</td> <td>0</td> <td>65</td> <td>109</td> <td>137</td> <td>159</td> <td>171</td> </tr> </tbody> </table>					T days	0	1	2	3	4	5	Y (BOD mg/l)	0	65	109	137	159	171
T days	0	1	2	3	4	5												
Y (BOD mg/l)	0	65	109	137	159	171												
5 (a)	Explain with neat figure the working of Activated Sludge Process.	CO4	L3	5														
5 (b)	What are the various adsorbents in adsorption unit?	CO4	L2	5														
5 (c)	Describe Sludge Treatment process.	CO4	L3	5														
6 (a)	Explain with neat figure the removal of Chromium from wastewater by adsorption.	CO4	L4	5														
6 (b)	Explain with neat figure the removal of Phenol from wastewater.	CO4	L4	5														
6 (c)	Design a effective method of lead removal from wastewater and explain.	CO4	L6	5														

## Second Term Exam A.Y. 2021-22 (May-June 22)

Program : Civil Engineering

Course Code : 20UCI405D

Max. Marks : 60

Sem – IV

Course : Hydraulics II

Duration : 3 hours

### Instructions to the students

1. Each question carries 10 marks.
2. All questions are compulsory.
3. Illustrate your answers with neat sketches, diagram etc wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

	Marks
<b>Q.1 Solve any TWO</b>	
a) Explain briefly the following – i) Uniform and Non-uniform flow ii) Laminar and turbulent flow iii) Steady and unsteady flow iv) Subcritical and supercritical flow	5
b) Derive an expression for the discharge over a rectangular notch or weir.	5
c) Find the discharge through a trapezoidal notch which is 1 m wide at the top and 0.4 m at the bottom and is 0.3 m in height. The head of the water on the notch is 0.2 m. Assume $C_d$ for rectangular portion = 0.62 while for triangular portion = 0.6	5
<b>Q.2 Solve any TWO</b>	
a) What is Chezy's formula ? How is it derived?	5
b) What do you mean by Most economical section of an open channel? How is it determined?	5
c) An irrigation channel of trapezoidal section having sides slopes $3h:2v$ is to carry a flow of 10 cumecs on longitudinal slope of 1 in 5000. The channel is to be lined, for which the value of friction coefficient in Manning's formula is 0.012. Find the dimensions of most economical section of the channel.	5
<b>Q.3 Solve any TWO</b>	
a) What is mean by hydraulic jump in a open channel?	5
b) Derive an expression for loss of energy head for a hydraulic jump.	5
c) Determine the length of back water curve caused by an afflux of 2 m in a rectangular channel of width 40 m and depth 2.5 m. The slope of bed is given as 1 in 11000. Take Manning's constant $N = 0.03$ .	5
<b>Q.4 Solve any TWO</b>	
a) Derive an expression for force exerted by a jet on stationary curved plate when jet strikes at the centre of plate.	5
b) Derive an expression for the force exerted by jet of fluid on a moving flat plate when the plate is normal to the jet.	5
c) A nozzle of 50 mm diameter delivers a stream of water at 20 m/s perpendicular to plate that moves away from the jet at 5 m/s, find (i) The force on the plate (ii) The efficiency of the jet	5
<b>Q.5 Solve any TWO</b>	
a) Write a short note on efficiencies of hydraulic turbine.	5
b) Write a short on on Slip and negative slip with respect to reciprocating pump.	5
c) A pelton wheel is to be designed for the following specifications – Shaft power = 11772 kW, head = 380 m, speed = 750 rpm, overall efficiency = 86%, jet diameter is not to exceed one sixth of wheel diameter. Determine – (i) The wheel diameter (ii) The diameter of the jet (iii) Number of jets required. Take coefficient of velocity = 0.985 and speed ratio = 0.45	5



## Second Term Exam A.Y. 2021-22 (May-June 22)

Program: Civil Engineering Sem –IV

Course Code: 20UCI406D

Max. Marks: 60

Course: Concrete Technology

Duration: 3 hours

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### Instructions to the students

1. Each question carries 10 marks.
  - 2 All questions are compulsory.
  3. Illustrate your answers with neat sketches, diagram etc wherever necessary.
  4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.
- 

Marks

#### Q1. Solve any two

- a) Define cement. What are the ingredients of cement? Describe role of each ingredient. (5)
- b) Explain in brief the hydration of cement (5)
- c) Explain wet process of manufacturing Portland cement with flow chart. (5)

#### Q2. Solve any two

- a) What is workability of concrete? Discuss the factors affecting workability of concrete (5)
- b) Explain the requirements of concrete in fresh state (5)
- c) What is segregation? Discuss the causes and prevention of segregation. (5)

#### Q3. Solve any two

- a) What is gel/space ratio? How does it influence the strength of concrete? (5)
- b) Why is compressive strength usually considered being most important in concrete design? (5)
- c) Discuss the factors affecting strength of concrete. (5)

#### Q4. Solve any two

- a) State the importance of Non-destructive testing (5)
- b) Write short note on Schmidt's rebound hammer. (5)
- c) Write short note on Ultra sonic pulse velocity test. (5)

#### Q5. Solve any two

- a) Describe the procedure of concrete mix proportioning using IS 10262:2019. (5)
- b) What are trial mixes and how do they help in achieving the objective of mix design. (5)
- c) Enlist the factors governing the design of concrete mix. Describe the influence of workability and durability (5)

#### Q6. Solve any two

- a) Discuss the properties of structural light weight concrete and its applications. (5)
- b) What is ferrocement? Describe briefly its properties and applications. (5)
- c) What is fibre reinforced concrete? What are its advantages? (5)

End of paper





MGM UNIVERSITY

**MGM University, Aurangabad-431003**

**End Semester Examination – December 2021**

**Third Term Exam A.Y. 2021-22**

**Program:** B. Tech in Civil Engineering

**Marks:** 60

**Course:** Mechanics of Solids

**Semester:** III

**Course Code:** 20UCI303D

**Duration:** 3 Hours

**Instructions to the Students:**

1. Each question carries 10 marks.
- 2 All questions are compulsory
3. Illustrate your answers with neat sketches , diagram etc. wherever necessary
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should.

**QUESTIONS**

**Marks**

**Q.1 Attempt ANY TWO**

**10**

A Define the following terms

**5**

- i) Strain
- ii) Hooke's law
- iii) Poisson ratio
- iv) Modulus of Rigidity
- v) Bulk modulus

B The 100 KN force acts on the 10 mm diameter bar, if the modulus of elasticity of bar is  $2 \times 10^5$  MPa, Determine

**5**

- i) Stress
- ii) Strain
- iii) If the length of bar is 3 m determine change in length

C A steel rod of cross section area  $300 \text{ mm}^2$  connect two parallel wall 6 m apart when the rod is heated to  $100^\circ \text{C}$ . Calculate the pull extension of bar on cooling to temperature stresses at  $20^\circ \text{C}$

**5**

- i) If the rod are prevented

$\alpha = 12 \times 10^{-6} / ^\circ \text{C}$  and  $E = 2.1 \times 10^5 \text{ MPa}$

**Q.2 Attempt ANY TWO**

**10**

A Draw SFD and BMD for a simply supported beam of length "L" carrying a point load "W" KN at the centre.

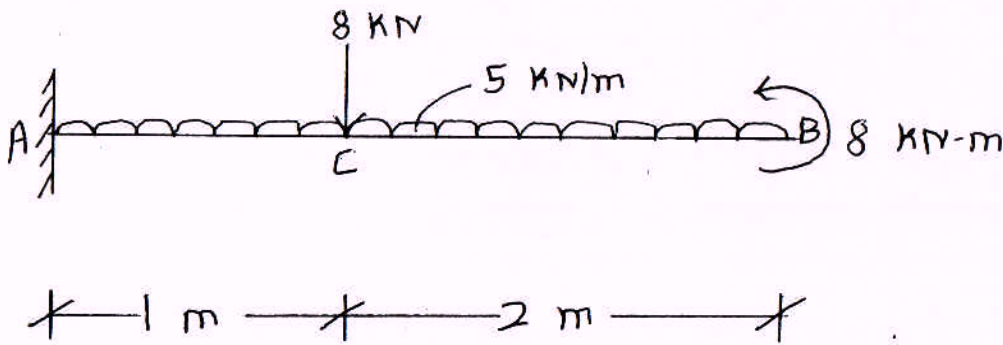
**5**

B Derive relation between load intensity, shear force and bending moment.

**5**

Draw Shear force diagram for a beam as shown in figure.

5



### 3 Attempt ANY TWO

10

Mentions the assumption in the theory of simple bending.

5

Calculate the diameter of steel bar use as a beam over a span of 2 m carrying a uniformly distributed load of 1.5 N/mm. If the bending stress is not exceed 200 MPa

5

The T cross section of beam with flange 150 x 50 mm, web 50 x 150 mm is subjected to vertical force of 240 kN. Calculate the shear stress at the junction of web and flange.

5

### 4 Attempt ANY TWO

Define Principal Plane and principal stresses

5

At a point the principal stresses are 140 MPa and 75 MPa. Find the normal and tangential stresses on a plane inclined at  $30^\circ$  to the axis of major principal stress.

5

Find the eccentricity equation of a rectangular section.

5

### 5 Attempt ANY TWO

10

A composite shaft is composed of a 1 m length of a solid copper 150 mm in diameter joined to a 2 m length solid steel shaft 200 mm diameter. A torque of 26 kN-m is applied at the end of shaft in opposite direction. Find the maximum shear stress in each materials. Take  $G_c = 30 \times 10^3$  MPa and  $G_s = 85 \times 10^3$  MPa

5

A composite shaft consist of copper rod of 30 mm diameter enclosed in a steel tube of external diameter 40 mm diameter. A shaft is required to transmit a torque of 500 Nm. Determine the torque developed in the copper and steel, if both the shaft have equal length and welded to a plate at each other.

5

- C A solid round bar 3 m long and 6 cm in diameter is use as a column. Determine the Euler's critical load for the following condition, if  $E = 2 \times 10^5$  MPa 5
1. one end fixed and other hinged
  2. one end fixed and other free

**Q. 6 Attempt ANY TWO 10**

- A Define Resilience, Proof Resilience, Modulus of resilience, impact load, Gradually applied load 5

- B A load of 100 N falls through a height of 20 mm on a roller rigidly attached to lower end of vertical bar 1.5 m long and  $150 \text{ mm}^2$  in cross section. Determine 5
1. Stress induced in vertical bar
  2. Elongation
  3. Strain energy stored in vertical bar

Take  $E = 2 \times 10^5$  MPa

- C A steel rod 50 mm in diameter is 3 m long, find the maximum instantaneous stress and strain induced when the load of 100 KN is applied 5
1. Gradually applied load
  2. Suddenly applied load
- Take  $E = 2 \times 10^5$  MPa

\*\*\*\*\*Best of Luck\*\*\*\*\*