G 5022

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Civil Engineering

CE 010 406—CIVIL ENGINEERING DRAWING (CE)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours

Maximum : 100 Marks

Select suitable scale for drawing indicating the same.
Assume suitable data wherever neccessary.

Part A

Answer any **one** *questions.*

1. Draw the plan and cross sectional elevation of a RCC dog legged stair to connect between two floors of 3.3 m height difference in a stair room of size 3 m × 6 m.

Or

2. Draw the elevation and details at support of a steel roof truss of clear span 15 m. Thickness of support is 30 cm. Roof has asbestos roofing of 1 : 5 slope

(1 × 30 = 30 marks)

Part B

3. A 20 m × 25 m site has a 12 m wide PWD road passing the side of 20 m. Plan a residential house in the site with proper ventilation and lighting to satisfy the following requirements.

   Living room = about 16 m^2; Dining room = about 12 m^2

   Sit out = 8 m^2 ; Master bed, toilet attached = 16 m^2

   Guest bed, toilet attached = 16 m^2 ; Kitchen = 9 m^2

   Store room = 6 m^2 ; Rear work area = 6 m^2 ; Car porch = about 18 m^2

   Draw to a suitable scale : (i) Detailed plan ; (ii) Representative cross sectional elevation to give maximum details ; (iii) Front elevation ; (iv) Site plan showing drainage lines, septic tank etc. ; (v) Table of Specifications .

(70 marks)

G 5002 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Civil Engineering

CE 010 404—OPEN CHANNEL FLOW AND HYDRAULIC MACHINES (CE)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Sketch the variation of specific energy with depth of flow showing salient features.

2. What information may be obtained from the following (i) $\frac{dy}{dx} = 0$; (ii) $\frac{dy}{dx} = S_0$ (the bed slope) and (iii) $\frac{dy}{dx} = \infty$; where $\frac{dy}{dx}$ is the slope of the water surface with respect to channel bottom.

3. State the governing principles of fluid flow used for the analysis of hydraulic jump.

4. A Jet of water issues from a nozzle with a velocity of 30 m/s and impinges normally on a flat plate moving away from it at 10 m/s. The cross section area of jet is 0.01 m^2. Determine the force developed on the plate.

5. If two pumps identical in all respects and each capable of delivering a discharge Q against a head H are connected in parallel. Find the resulting discharge and head.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. State the critical flow condition in five different ways.

7. Briefly discuss how the discharge in a river can be estimated using a current mater.

8. Discuss the different types of hydraulic jumps formed in a horizontal floor.

9. A turbine develops 9000 KW when running at 110 r.p.m. If the head is reduced to 20 m, determine the speed and power developed by the turbine.

10. Briefly discuss the working of a reciprocating pump showing the indicator diagram.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

MODULE 1

11. A certain stretch of a lined trapezoidal channel has one vertical side wall and the other 45° sloping wall. If it is to deliver water at 30 cumecs with a velocity of 1.2 m^3/s, compute the bed width and flow depth for minimum lining area.

Or

12. A wide rectangular channel carries a discharge of 2.8 m^3 /s per metre width, with a depth of flow of 1,5 m. Calculate the minimum rise in floor at a section required to produce the critical flow condition. What is the corresponding fall in water level ?

MODULE 2

13. A rectangular flume of 2m width is laid at a bed slope of 1 in 2500, carries a discharge of 2 nr/s. At a certain section the depth of flow is 1 m. Calculate the distance of the section downstream where the depth of flow is 0.9 m. Identify the type of profile. Take Manning's n = 0.014. Use single step method.

Or

14. Derive the dynamic equation for Gradually Varied flow indicating the assumptions. Also show that for gradually varied flow in a wide rectangular channel water surface slope can be expressed as :

$$\frac{dy}{dx} = S_0 \frac{1 = \left(y_n / y\right)^{10/3}}{1 = \left(y_c / y\right)^3}$$

where S_0 is the bed slope, y the depth of flow, y_n the normal depth and y_c the critical depth of flow.

MODULE 3

15. In a hydraulic Jump occurring in a horizontal rectangular channel the Froude number before the jump is 10, and the energy loss in The jump is 3.2 m. Estimate the (i) sequent depths of flow (ii) discharge intensity and (iii) Froude number after the jump.

Or

16. (a) Comment on hydraulic jump as a energy dissipater making use of a stilling basin. (5 marks)

(b) A hydraulic Jump occurs in a rectangular channel and the depth of flow before and after the jump are 0.5 m and 3.0 m respectively. Calculate (i) critical depth of flow and (ii) Power lost per metre width of channel.

(7 marks)

MODULE 4

17. A jet of water moving at 10 m/s impinges on a concave shaped vane to deflect the jet through 120 degree when stationary. If the vane is moving at 6 m/s find the angle of jet so that there is no shock at the inlet. Also compute the magnitude and direction of absolute velocity of jet at exit and the work done per unit time. Assume smooth vanes.

Or

18. A reaction turbine works at 440 r.p.m under ahead of 100 m. The diameter of the inlet is 1.2 m and the flow area is 0.4 m^2. At the inlet the absolute and relative velocities make angles of 20 degree and 60 degree respectively with the tangential velocity. Determine (i) Power developed and (ii) hydraulic efficiency. Assume the velocity of whirl at the outlet as zero.

MODULE 5

19. A centrifugal pump impeller has an outer diameter of 30 cm and inner diameter of 15 cm. The pump runs at 1250 r.p.m. The impeller vanes are set at a blade angle of 28 degree at the outlet. If the velocity of flow is constant at 2.1 m/s, determine (i) velocity and direction of water at the outlet (ii) the head developed by assuming a manometric efficiency of 0.82 (iii) blade angle at the inlet.

Or

20. A single acting reciprocating pump has a stroke length of 45 cm and a cylinder diameter of 30 cm. The suction pipe is 6 m long and has a diameter of 15 cm. The water level in the sump is 3 m below the cylinder. Calculate the maximum speed of the pump if separation is known to occur at 2.5 m of water (absolute). If an air vessel is fitted on the suction side at a length of 2 m from the cylinder, calculate admissible maximum speed and the percentage change in the discharge. Take Darcy-Weisbach friction factor f = 0.02. Assume atmospheric pressure as 10 m of water (absolute).

[5 × 12 = 60 marks]

G 4936 (Pages : 3) Reg. No. 4th sem Civil

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Engineering Mathematics—III (CMELRPTANSUF)

(Old Scheme—Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Answer **one** *full question from each module.*
Each full question carries 20 *marks.*
Use of statistical tables is permitted.

MODULE 1

1. (a) Solve $\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = 0$, given that when $t = 0$, $y = 0$ and $\frac{dy}{dt} = 0$. (5 marks)

(b) $2(y + z)\,dx - (x + z)\,dy + (2y - x + z)\,dz = 0$. (5 marks)

(c) A particle of mass 4 gram vibrates through one centimeter on each side of the middle point of its making 330 complete vibrations per minute. Assuming its motion to be SHM, show that the maximum force upon the particle is $484\pi^2$ dyne. (10 marks)

Or

2. (a) Solve $(D^3 - 6D^2 + 11D - 6)\,y = e^{-2x} + e^{-3x}$. (6 marks)

(b) Solve $\frac{dx}{dt} + 5x - 2y = t$, $\frac{dy}{dt} + 2x + y = 0$; given that $x = y = 0$ when $t = 0$. (8 marks)

(c) Solve by the method of variation of parameters $y'' - 2y' + y = e^x \log x$. (6 marks)

MODULE 2

3. (a) Form partial differential equation by eliminating the arbitrary functions

$$z = f(x + ay) + g(x - ay).$$

(5 marks)

(b) Solve $pz - qz = z^2 + (x + y)^2$. (5 marks)

(c) A bar 10 cm. long, with insulated sides, having its ends A and B maintained at temperatures 50° C. and 100° C. respectively, until steady-state conditions prevail. The temperature at A is suddenly raised to 90° C. and at the same time that at B is lowered to 60° C. FInd the temperature distribution in the bar at time t. (10 marks)

Or

Turn over

4. (a) Solve by Charpit's method $(p^2 + q^2)\, y = qz$. (10 marks)

(b) Solve $\frac{\partial^2 z}{\partial x^2} + 2\frac{\partial^2 z}{\partial x\, \partial y} + \frac{\partial^2 z}{\partial y^2} = x^2 + xy + y^2$. (10 marks)

MODULE 3

5. (a) Find the Fourier sine and cosine transforms of $f(x) = \begin{cases} 1, & 0 \le x < a \\ 0, & x \ge a \end{cases}$. (12 marks)

(b) Solve the integral equation $\int_0^\infty f(x)\cos \lambda x\, dx = e^{-\lambda}$. (8 marks)

Or

6. (a) Express $f(x) = \begin{cases} 1, & 0 \le x < \pi \\ 0, & x \ge \pi \end{cases}$ as a Fourier sine integral and hence evaluate

$$\int_0^\infty \frac{1 - \cos \pi\lambda}{\lambda} \sin \lambda x\, d\lambda.$$

(10 marks)

(b) Find the Fourier Sine Transform of e^{-ax} and hence find the Fourier Sine Transform of $\frac{x}{x^2 + a^2}$.

(10 marks)

MODULE 4

7. (a) The following data are the number of seeds germinating out of 10 on damp filter for 80 sets of seeds. Fit a binomial distribution to this data :

x :	0	1	2	3	4	5	6	7	8	9	10	Total
f :	5	18	22	10	8	8	7	2	0	0	0	80

(10 marks)

(b) The incidence of occupational disease in an industry is such that the workmen have a 10% chance of suffering from it. What is the probability that in a group of 8, six or more will suffer from it ?

(10 marks)

Or

8. (a) It is known from the past experience that the number of telephone calls made daily in a certain community between 4 p.m. and 5 p.m: have a mean of 350 and a standard deviation of 30. What percentage of the time will there be more than 400 telephone calls made in this community between 4 p.m. and 5 p.m.?

(10 marks)

(b) The probability that a man aged 45 years will die before reaching the age of 50 years may be taken as 0.019. Out of a group of 500 men, now aged 45 years, what is the probability that 2 men will die within the next 5 years?

(10 marks)

MODULE 5

9. (a) Two random samples are drawn from two normal populations, gave the following results :

Sample 1	:	20	17	25	29	24	20	18	19
Sample 2	:	19	21	18	17	27	26	25	19

Test whether the two samples have the same variance at 5% of level of significance.

(10 marks)

(b) A set of 5 similar coins is tossed 320 times and the result is :

No. of heads	:	0	1	2	3	4	5
Frequency	:	5	28	75	115	68	31

Test the hypothesis that the data follow a Binomial distribution for V = 5, $\chi^2_{0.05} = 11.07$.

(10 marks)

Or

10. (a) If the mean of an infinite population is 550 with standard deviation 8.1, how large a sample must be used in order that there be one chance in 100 that the mean of the sample is less than 547?

(10 marks)

(b) The standard deviation calculated from two random samples of sizes 9 and 13 are 2.1 and 1.8 respectively. May the samples be regrated as drawn from normal populations with the same standard deviation?

(10 marks)

[5 × 20 = 100 marks]

20 (i) Fit a normal curve and test the goodness of fit for :

x :	0	1	2	3	4	5	6	7	8
f :	2	4	10	15	19	12	8	7	1

(6 marks)

(ii) Test if the means are significantly different :

	Size	*Mean*	S.D.
Sample 1 :	5	11.4	2.65
Sample 2 :	7	14.4	4.37

(6 marks)

[5 × 12 = 60 marks]

G 4984 (Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

EN 010 401—ENGINEERING MATHEMATICS—III

(Regular/Improvement/Supplementary—New Scheme)

[Common for all Branches]

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Find a_0 from $f(x) = \begin{cases} -\pi, & \text{if } -\pi < x < 0 \\ x, & \text{if } 0 < x < \pi. \end{cases}$

2. Find the Fourier cosine transform of $f(x) = \begin{cases} 1, & 0 < x < 1 \\ 0, & x \geq 1. \end{cases}$

3. Solve $zp = -x$.

4. Find E (x) from

x :	0	1	2	3
$p(x)$:	·1	·2	·4	·3

5. What do you mean by Hypothesis ? Write its types.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Obtain Fourier expansion for sin ax in the interval $-l < x < l$.

7. Find the Fourier cosine transform of $x e^{-ax}$.

8. Form a partial differential equation by eliminating the arbitrary function ϕ from $\phi\left(x + y + z, x^2 + y^2 - z^2\right) = 0$.

9. Derive the mean of binomial distribution.

10. Write the working rule for testing the hypothesis ?

(5 × 5 = 25 marks)

Turn over

Part C

Each full question carries 12 marks.

11. (i) If $f(x) = \sqrt{1-\cos x}$, $0 \le x \le 2\pi$. Obtain the Fourier expansion and hence deduce that

$$\sum_{n=1}^{\infty} \frac{1}{4n^2-1} = \frac{1}{2}.$$

(8 marks)

(ii) Prove that for values of x in the range $(-\pi, \pi)$

$$\frac{1}{2}x = \sin x - \frac{\sin 2x}{2} + \frac{\sin 3x}{3} - \ldots\ldots$$

(4 marks)

Or

12. (i) Obtain the Fourier series expansion for $f(x) = \begin{cases} x + \pi/2, & -\pi < x \le 0 \\ \pi/2 - x, & 0 \le x < \pi. \end{cases}$ (6 marks)

(ii) Prove that in the interval $-\pi < x < \pi$, $x \cos x = -\frac{1}{2}\sin x + 2\sum_{n=2}^{\infty} \frac{n(-1)^n}{n^2-1} \sin nx$.

(6 marks)

13. Find the Fourier transform of $f(x) = \begin{cases} a - |x|, & |x| \le a \\ 0, & |x| > a > 0. \end{cases}$ (12 marks)

Or

14. (i) Evaluate $\int_0^{\infty} \frac{dx}{(x^2+a^2)^2}$ using Parseval's identity. (6 marks)

(ii) Find the Fourier Cosine transform of $f(x) = e^{-ax}, a > 0$. (6 marks)

15. (i) Solve : $(D^2 - 2DD' + D'^2)z = \tan(y+x)$. (6 marks)

(ii) Solve : $(D^2 - 2aDD' + a^2 D'^2)z = f(y+ax)$. (6 marks)

Or

16. (i) Solve : $(D^2 - D')z = xe^{ax} + a^2 y$. (6 marks)

(ii) Solve : $(D - 3D' - 2)^2 z = 2e^{2x} \tan(y + 3x)$. (6 marks)

17. Find the variance of : $f(x) = \begin{cases} \frac{1}{16}(x+3)^2, & -3 \le x < -1 \\ \frac{1}{16}(6 - 2x^2), & -1 \le x < 1 \\ \frac{(3-x)^2}{16}, & 1 \le x \le 3. \end{cases}$ (12 marks)

Or

18. (i) Fit a normal distribution for :

x :	1	3	5	7	9
f :	1	2	3	2	1

(6 marks)

(ii) There are 2 urns containing 4 white 6 Red and 15 black balls and 10 white 8 red and 12 black balls respectively. One ball is taken out from each urn. What is the probability that both are red ?

(6 marks)

19. (i) Test if the means are significantly different for

	n	*mean*	S.D
gp 1 :	50	181.5	3.0
gp 2 :	75	179	3.6

(6 marks)

(ii) Comment on the following :

Mathematical ability	*General ability*	*Good*	*Fair*	*Poor*
GOOD	:	44	22	5
Fair	:	265	257	178
Poor	:	41	91	98

(6 marks)

Or

G 4987 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Civil Engineering

CE 010 402 – CONSTRUCTION ENGINEERING AND MANAGEMENT

(New Scheme – Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

Write short notes on :

1. Admixtures in Concrete.
2. Intelligent buildings.
3. Shortcomings of bar charts in project planning.
4. Resource leveling.
5. Safety in construction industry.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

Briefly explain the following :

6. Types of joints with purpose used in construction.
7. Modem Construction materials (any *three* with specific purpose).
8. Comparison of CPM and PERT.
9. Effect of duration of project on Direct and Indirect Project costs.
10. Concept of Workers participation in management with merits.

(5 × 5 = 25 marks)

Turn over

Part C

Each full question carries 12 marks.

MODULE 1

11. What is meant by Workability? List the factors affecting workability. Explain any *two* tests for estimation of workability.

(12 marks)

Or

12. (a) Briefly explain the procedure adopted for laying marble flooring.

(b) Discuss the methods of Damp Proofing of floors.

(6 + 6 = 12 marks)

MODULE 2

13. (a) Briefly explain the concepts and practices to implement building automation.

(b) Discuss the principles of functional planning of buildings.

(6 + 6 = 12 marks)

Or

14. (a) List the various types of earth moving and handling equipments indicating the specific purpose to which it caters to.

(b) What is a mass diagram? How is it helpful in construction planning?

(7 + 5 = 12 marks)

MODULE 3

15. (a) Discuss the following terms used in CPM analysis : Activity, Event, Dummy Activity, Network, Critical Activities.

(b) A father notes that his teenage daughter uses the telephone. She takes less than 5 minutes for a call and some times as much an hour. Fifteen minute calls are more frequent than calls of any other duration. If daughter's phone calls were an activity in PERT project : (i) What would be phone calls expected duration? (ii) What estimate would you give for its variance? (iii) In scheduling the project, how much time would you allocate for the phone call?

(5 + 7 = 12 marks)

Or

16. Determine (a) The expected completion time ; (b) Variance for the following project ; and (c) Critical path :

Activity	A	B	C	D	E	F	G	H
Predecessors	-	-	A	B	A	C, D	C, D, E	F
Optimistic time	1	1	3	1	1	2	2	6
Most likely time	4	5	6	2	2	4	9	6
Pessimistic time	7	9	9	3	9	6	10	6

(12 marks)

MODULE 4

17. The following are the information available about various activities of a network. The project overhead costs are at Rs. 20,000 per week. Determine (a) The cost duration relationship ; (ii) Total cost duration relationship. Also draw the least cost network.

Activity	Normal duration (weeks)	Normal Cost (Rs.)	Crash Duration (weeks)	Crash Cost (Rs.)
1–2	4	40000	3	70000
1–3	8	50000	7	80000
2–3	5	80000	3	100000

Or

18. Discuss in brief the resources allocation problem with emphasis to construction industry. What are the methods for solving the problem?

(12 marks)

MODULE 5

19. Discuss the payment of Wages act and Minimum wages act, narrating its usefulness to labourers in construction industry.

Or

20. Comment on the Importance of Labour Welfare Schemes and Social Security issues. Discuss the role of State/Government agencies in Labour Welfare and Social Security.

[5 × 12 = 60 marks]

MODULE 5

19. A rectangular block of material is subjected to a tensile stress of 120 N/mm^2 on one plane and a tensile stress of 50 N/mm^2 on a plane at right angles to it, together with shear stresses of 60 N/mm^2 on the same planes. Find (i) magnitudes of the principal stresses (ii) direction of principal planes (iii) magnitude of the greatest shear stress and its direction.

Or

20. (a) Discuss the computation of bending stress at a given point in the section due to a given bending moment, using the concept of product of inertia. (7 marks)

(b) Write short notes on : Maximum Principal strain theory. (5 marks)

[5 × 12 = 60 marks]

G 4993

(Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Fourth Semester

Branch : Civil Engineering

CE 010 403—MECHANICS OF SOLIDS—II (CE)

(New Scheme—Regular/Improvement/Supplementary)

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. State the differential equation of the elastic curve of a beam.
2. State Bette's theorem and its use.
3. Give the concept of "equivalent uniformly distributed load".
4. State Eddy's theorem.
5. Illustrate the concept of unsymmetrical bending. Give an example situation.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Determine the maximum slope and deflection on a cantilever beam subjected to a couple M at the free end.
7. Using Castigliano's first theorem, find the deflection at the free end of a cantilever beam carrying a concentrated load at the free end.
8. Draw the Influence Line Diagram for Bending moment and Shear force at any point of a simple supported beam.
9. A cable loaded with 12 kN per horizontal metre of span is stretched between two supports in the same horizontal line 240 m. apart. If the central dip is 12 m, find the maximum and minimum pulls in the cable.
10. Explain the principle of minimum potential energy

(5 × 5 = 25 marks)

Turn over

Part C

Each full question carries 12 marks.

MODULE 1

11. Find the slope at A and B and deflection at C and D for the beam shown in Figure 1. Use Conjugate beam method, Take E = 2×10^5 N/mm^2. and I = 2×10^7 mm^4.

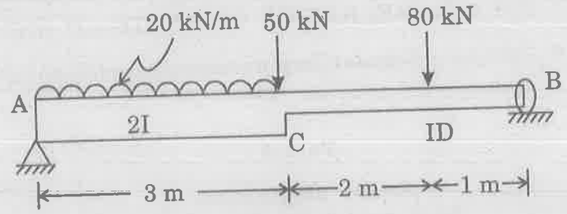

Figure 1

Or

12. Determine the equation of the deflection curve for the simple supported beam with overhang for the loading shown in Figure 2. Find the slopes at A and B and deflection at C. Also find the maximum deflection and its location. Use Macaulay's method. Take E = 200 kN/mm^2 and I = 7×10^8 mm^4.

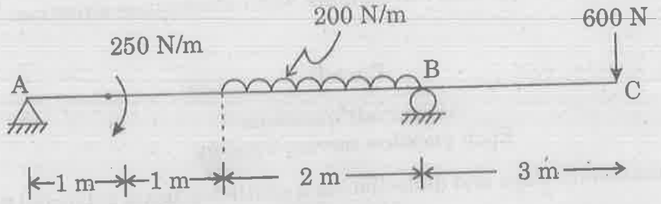

Figure 2

MODULE 2

13. Determine the vertical deflection of the point D in the truss shown in Figure 3. The cross sectional area of all the members is 100 mm^2. Take E = 2×10^5 N/mm^2.

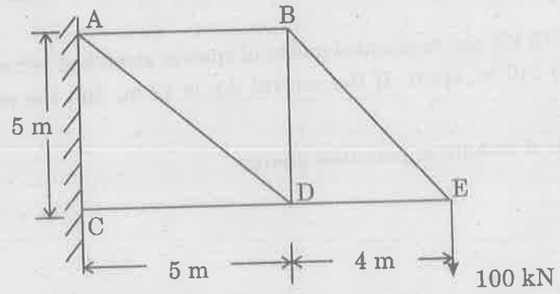

Figure 3

Or

14. Determine the horizontal and vertical displacement at the free end D of the frame shown in Figure 4, Take EI 15 × 10^{10} kN.mm^2.

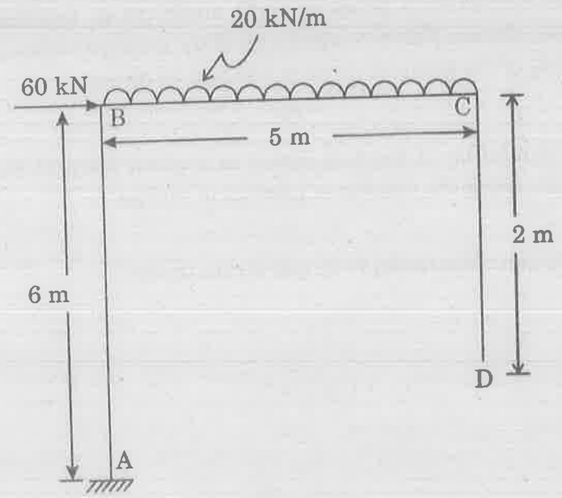

Figure. 4

MODULE 3

15. Four point loads of 120, 160, 160 and 80 kN spaced equally apart at a distance of 2 m. between the consecutive loads, roll over a girder of 25 m. span, from left to right with 120 kN load leading. Calculate the maximum shear force and bending moment at 8 m. from the left end. Also calculate the maximum shear force and absolute maximum bending moment.

Or

16. A uniform load of 30 kN/m, 6 m. long crosses a girder of 24 m. span from right to left. Calculate the maximum shear force and bending moment at sections 6 m. and 12 m. from the right hand support. Also sketch the maximum shear force and bending moment diagrams.

MODULE 4

17. A three hinged parabolic arch has a span of 22 m. and a rise of 4.5 m. It carries a point load of 120 kN at 5 m. from the left end and a uniformly distributed load of 2 kN/m. over the right half of the span. Find the bending moment, normal thrust and radial shear at a section 4m. from the right end.

Or

18. A flexible cable weighing 10 N/m hangs between two supports 40 m horizontally apart. The right hand support is 8 m below the left support. The cable also supports a point load of 300 kN at a point 12 m horizontally and 2.5 m below the right support. Assuming the weight of the cable is uniformly distributed over the horizontal span, find the maximum, tension on the cable and its location.