

Visvesvaraya Technological University, Belagavi

MODEL QUESTION PAPER

5th Semester, B.E (CBCS) CV

Course: 15CV51 – Design of RC Structural Elements

Time: 3 Hours

Max Marks: 80

Note: (i) Answer Five full questions selecting any one full question from each Module.

(ii) Question on a topic of a Module may appear in either its 1st or 2nd question.

III) Use of IS 456- 2000 and SP -16 is Permitted.

Module 1			
1	(a)	Differentiate between working stress method and limit state method of RCC design.	5
	(b)	Explain the following i)Partial safety factor for loads and materials ii)Characteristics load iii)Characteristic strength	6
	(c)	Calculate the crack width directly under the bar on tension face at the location of max bending moment in the beam of b=300mm, D=600mm, off cover on comp. side (d') =37.5mm, Reinforcement -3 bars of 20mm dia bars. M=200 kN-m, Ast=1855mm ² .	5
OR			
2	(a)	Derive the expression for stress block parameter for compressive force C _u and Tensile force T _u and locate a depth of neutral axis y= 0.42 x _u from top	5
	(b)	Briefly explain under reinforced, over reinforced and balanced sections with sketch.	4
	(c)	A reinforced concrete beam of cross section 300mmx600mm overall is reinforced with 3 bars of 20mm HYDS bars of Fe415 grade on tension side with an effective cover of 50mm. compute short term deflection of the beam at mid span, consisting of service load of 20kN/m and concentrated load of 25kN at the center of span. The beam is simply supported over a span of 5m. Use M20 grade concrete and Fe415steel.	7
Module 2			
3	(a)	Define Singly reinforced beam and doubly reinforced beam. List the situation which requires the adoption of the same.	6
	(b)	A singly reinforced beam 250mmx450mm deep up to center of reinforcement Effective cover 50mm Effective span 6m using M20 concrete and Fe500 steel. Determine the central point load that can be supported in addition to self weight. When i)3-16mm dia bars ii) 3-20mm dia bars are used as reinforcement.	10
OR			
4	(a)	Determine the moment of resistance of a T-beam for the following data Breadth of the flange=740mm; Effective depth=400mm; Breadth of web=240mm; Tensile reinforcement =5-20Φ; Depth of flange =110mm: Adopt M20 grade concrete and Fe415 grade steel.	8

	(b)	A doubly reinforced beam section is 250mm wide and 450mm deep to the centre of the tensile reinforcement. It is reinforced with 2#16Φ as compression reinforcement at an effective cover of 50mm and 4#25Φ as tensile steel. Using M15 concrete and Fe250 steel. Calculate the ultimate moment of resistance of the beam section.	8						
Module 3									
5	(a)	A rectangular RC beam of size 250mm * 600 mm of effective simply supported span of 7 m has a support service load of 26.25 kN/m excluding self-weight. The effective cover = 50 mm Design the beam for flexure and shear. Check the beam depth for control of deflection using empirical method. Design the stress value for different strain in steel is given below <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Strain</th> <th>Stress (N/mm²)</th> </tr> </thead> <tbody> <tr> <td>0.00276</td> <td>351.8</td> </tr> <tr> <td>0.00380</td> <td>360.9</td> </tr> </tbody> </table>	Strain	Stress (N/mm ²)	0.00276	351.8	0.00380	360.9	9
Strain	Stress (N/mm ²)								
0.00276	351.8								
0.00380	360.9								
	(b)	A reinforced concrete beam is to be designed over an effective span of 5m to support a service load of 8 kN/m . Adopt M20 grade concrete and Fe 415 steel. Design a beam to satisfy the collapse and serviceability limit states.	7						
OR									
6	(a)	A hall of 16 m * 6m supported by beams spaced 4 m C/C thickness of slab is 120 mm UDL 4 kN/m .Design a T beam using M20 Concrete and Fe 415 steel for flexure and shear . Take bearing as 500 mm. Also show check for deflection and bond	8						
	(b)	A doubly reinforced concrete beam 250 mm wide 500mm deep is required to support 40 kN/m including self-weight with effective span 5m .Effective cover of 50 mm using M20 concrete and Fe 415 steel find steel for flexure and shear	8						
Module 4									
	(a)	Distinguish between one way slab and Two way slab	4						
	(b)	Explain Importance of Bond , Anchorage length	4						
7	(b)	Design a slab for a room 5m x 10m live load 4kN/m ² . Use M20 concrete and Fe415 steel. Also check for bond length deflection and shear. Assume corners are held down, bearing 300mm. Sketch the reinforcement details.	7						
OR									
	(a)	What is development length? Obtain the expression for development length in tension?	3						
	(b)	Design a two way slab 5m x 6m. Live load is 3kN/m ² . M20 concrete Fe415 steel. Also check for bond length and shear. Assume corners are held down, bearing 300mm.	6						
8	(b)	Design the middle flight of a open well type stair case to be provided for a stair hall of size 3.25m x 3.25m. Size of open well = 1.25m x 1.25m. Floor to floor height = 3.6m. Size of landing at each corner = 1m x 1m. Stair had to be provided along all the four walls of hall. Thickness of stair hall is 230mm. the stair slab is embedded in to the wall by 200mm. The service live load is 3kN/m ² .	7						

Module 5

9	(a)	What is necessity of transverse reinforcement in columns	3
	(b)	Design RCC column having unsupported length 2.75 m to support a load of 2000 KN using M20 concrete and Fe 415 steel	6
	(b)	A square column 400mm sides carries a load of 900kN. Design a footing SBC of soil 100kN/m ² . Adopt M20 concrete Fe415 steel. Check the necessary conditions.	7
OR			
10	(a)	i) Explain difference between short column and long column ii) What are the advantages of Providing pedestal to columns	3
	(b)	A column 300mm x 400mm is to support a ultimate load of 1200kN and Mu 200kN-m. Find steel using M20 concrete Fe415 steel, assuming effective cover 50mm. Sketch the reinforcement details.	6
	(b)	Design a rectangular isolated footing of uniform thickness for a column 400 mm*600 mm to support a load of 600 kN, SBC of soil is 120 kN/m ² . Adopt M20 concrete and Fe 415 steel. Consider the size of footing 2.5 m* 2.3 m. Also check the requirement with all necessary checks	7

Model Question Paper (CBCS Scheme)

Fifth Semester B.E. Degree Examination (CIVIL) Analysis of Indeterminate Structures (15CV52)

Time: 3 Hours

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each Module.

Module -1

1. A horizontal beam ABCD is loaded as shown in Fig. Q1. Plot SFD and BMD. Use slope deflection method. Support B settles by 10mm. $E = 2 \times 10^5 \text{ N/mm}^2$ $I = 2.4 \times 10^6 \text{ mm}^4$.

(16 marks)

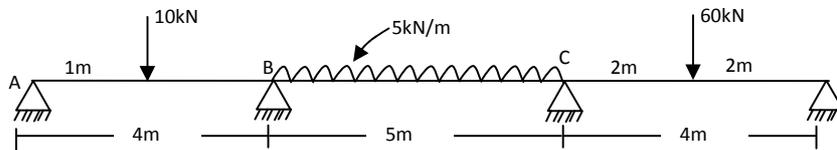


Fig. Q.1

OR

2. Analyze the frame shown in Fig. Q2 using slope deflection method. Draw BMD.

(16 marks)

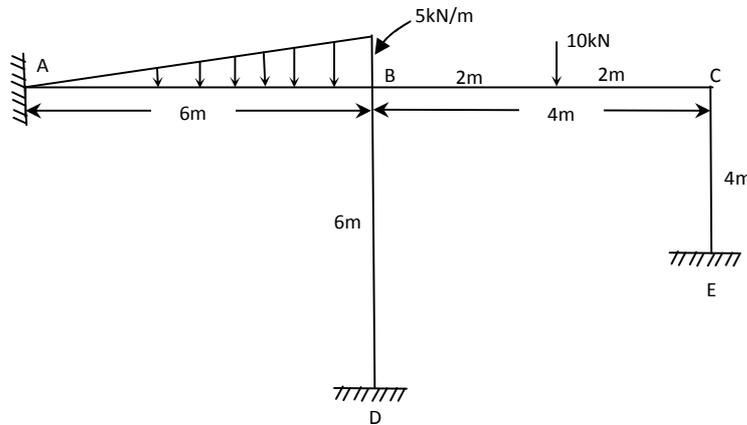


Fig. Q.2

Module -2

3. Analyze the portal frame shown in Fig. Q3 using moment distribution method. Draw BMD

(16 marks)

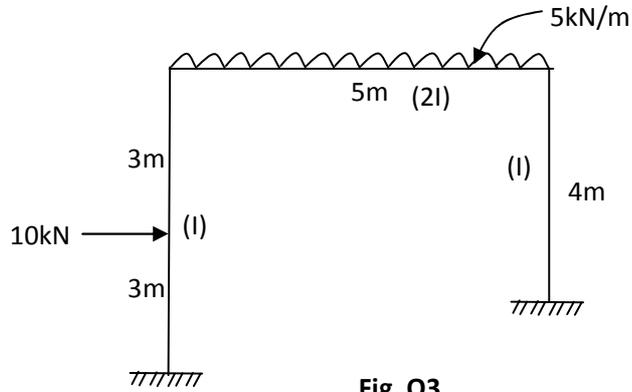


Fig. Q3

OR

4. Analyze the continuous beam shown in Fig.Q4 using moment distribution method. Draw SFD and BMD.

(16 marks)

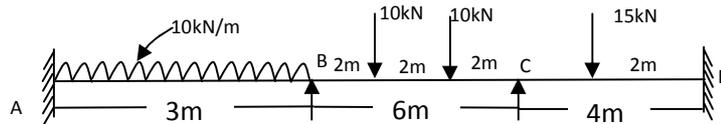


Fig.Q4

Module -3

5. Analyze the frame shown in Fig. Q5 using Kani's method taking advantage of symmetry. Draw BMD

(16 marks)

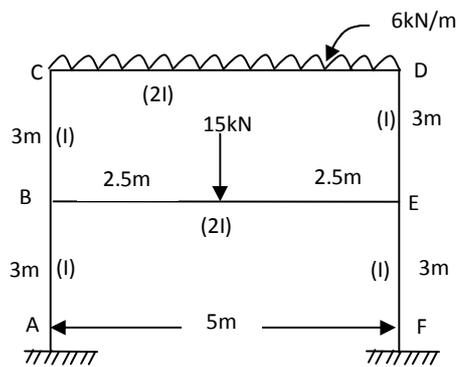


Fig.Q5

OR

6. Analyze the beam shown in Fig.Q6 using Kani's method. Draw BMD and elastic curve.

(16 marks)

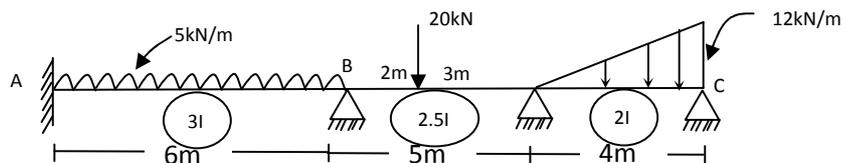


Fig.Q6

Module -4

7. Using flexibility matrix method, analyze the beam shown in Fig. Q7. Sketch SFD and BMD (16 marks)

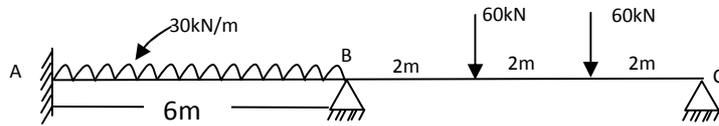


Fig.Q7

OR

8. Analyze the frame shown in Fig. Q8 using matrix flexibility method. Draw BMD (16 marks)

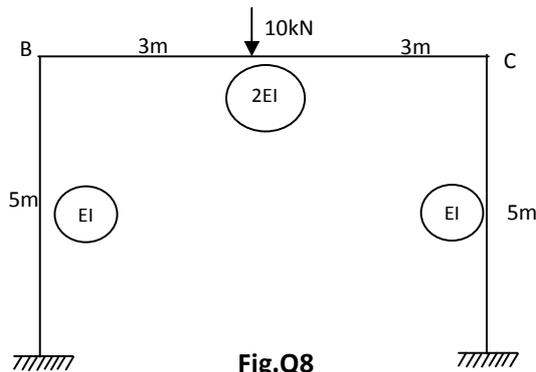


Fig.Q8

Module -5

9. Using stiffness method, determine forces in the members AB and BC of a pin jointed frame given in Fig. Q9. The cross sections are indicated in the brackets against each member. $E = 2 \times 10^5 \text{ N/mm}^2$ (16 marks)

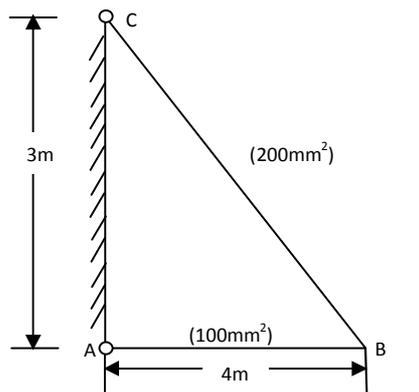


Fig.Q9

OR

10. Analyze the frame shown in Fig. Q10 using stiffness method. Draw BMD

(16 marks)

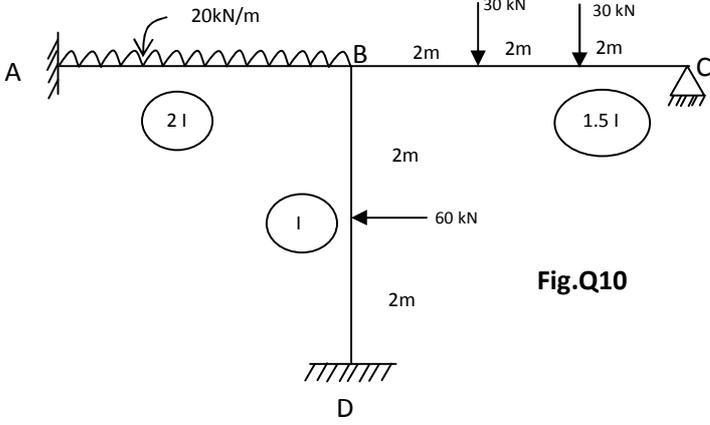


Fig.Q10

Model Question Paper (CBCS Scheme)

Fifth Semester B.E. Degree Examination (CIVIL) Applied Geotechnical Engineering (15CV53)

Time: 3 Hours

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each Module.

Module -1

1.
 - a. List and explain various types of samplers (6 Marks)
 - b. Explain seismic refraction method of soil exploration with neat sketch (6 Marks)
 - c. A sampling tube has inner diameter of 70mm and cutting edge of 68mm. its outside diameters are 72 mm and 74mm respectively. Determine area ratio, inside clearance, outside clearance of the sampler. This tube is pushed at the bottom of the borehole to a distance of 580mm with length of sample recorded being 520mm. find the recovery ratio. (4 Marks)

OR

2.
 - a. What are the objectives of subsurface exploration? (4 Marks)
 - b. List out the methods of dewatering. Explain any two method of dewatering with neat sketch (6 Marks)
 - c. Estimate the ground water level by Hvorslev's method using the data given. Depth up to which water is bailed out is 30m, rise in water level after first day is 2.2m, second day 1.8m and on third day it is 1.5m. (6 Marks)

Module -2

3.
 - a. Explain a 2V:1H approximate method to determine stress at a depth Z below the footing of rectangular shape of size B x L. (4 Marks)
 - b. List the components of settlement. Give expressions to calculate each one of them, clearly specifying what the notations stand for. (6 Marks)
 - c. A structure is supported by ring foundation of outer inner diameters 8m and 5m respectively. If the foundation transmits contact pressure of 200kN/m², compute the stress 3m below the center of the foundation. (6 Marks)

OR

4.
 - a. A footing of rectangular shape 6m x 8m is uniformly loaded with 180kN/m² at the ground level. Newmark's chart of influence factor 0.004 is used to find the stress at a certain depth. It that found that 24 elements of the chart are covered by the loaded area. Determine the stress. (4 Marks)
 - b. Explain with sketches various types of settlements. Comment on the sustainability of these types of settlements and functional utility of the structure. (4 Marks)
 - c. A soft clay layer is 5m thick and lies under newly constructed building. The effective pressure due to overlying strata is 300kN/m² and new construction increased the overburden by 120kN/m². If liquid limit is 80%, natural water content of the clay layer is 43% and G=2.70. Dry density of the clay is 18kN/m³. Compute the settlement. (8 Marks)

Module -3

- 5.
- Explain what is meant by active and passive states of plastic equilibrium with sketch. (4 Marks)
 - An embankment is made of soil having $C=25\text{kN/m}^2$ and $\phi=20^\circ$ and unit weight $\gamma=19\text{kN/m}^3$. The slope is 1.5H: 1V and has 9m height. Determine the factor of safety along a slip circle passing through toe. The center of slip circle is located at Fellinius angles $\alpha=26^\circ$ and $\beta=35^\circ$. Use method of slices and analyze. (12 Marks)

OR

- 6.
- Derive an expression for factor of safety for infinite slope (6 Marks)
 - A retaining wall is 9.0m high, retains cohesion-less backfill. The top 3m of fill has unit weight $\gamma=18\text{kN/m}^3$ with $\phi=32^\circ$. The rest has unit weight $\gamma=22\text{kN/m}^3$ with $\phi=22^\circ$. Determine the active earth pressure on the wall and its position. (10 Marks)

Module -4

- 7.
- Define
 - Safe bearing capacity
 - Allowable bearing capacity (4 Marks)
 - What will be the net safe bearing pressure of sand having $\phi=36^\circ$, take effective unit weight of soil as 19kN/m^3
 - 1.2m wide strip footing
 - 1.2m wide square footing. (6 Marks)
 - Write a note on how bearing capacity changes with respect to water table level. (6 Marks)

OR

- 8.
- When there is need of combined footing, explain with sketches (6 Marks)
 - Design a square footing to carry a safe load of 2400kN on a sandy soil at a depth of 1.5m below GL with factor of safety of 3. Given $\gamma_{\text{sat}}=21\text{kN/m}^3$ with $N_c = 25$, $N_q = 34$ and $N_\gamma = 32$. Permissible settlement is 40mm. water table may rise up to the base of the footing. (10 Marks)

Module -5

- 9.
- Write a note on classification of piles (6 Marks)
 - What is meant by efficiency of pile group, explain Feld's rule. (4 Marks)
 - A group of nine piles with three piles in a row was driven into soft clay extending from ground level to a great depth. The diameter and length s of the piles were 30cm and 10m respectively. The cohesion $C = 35\text{kN/m}^2$. If the piles were spaced at 90cm c/c, compare the bearing load on the pile group on the basis of shear failure criterion for a factor of safety of 2.5. Neglect bearing at the tip of the piles. Take $m=0.6$ for shear mobilization around each pile. (6 Marks)

OR

- 10.
- Explain static formula for the design of piles (6 Marks)
 - Draw atypical arrangement of under reamed pile with proportion of diameter of pile, bulb and spacing (6 Marks)
 - Write a note on pile load test (4 Marks)

Model Question Paper (CBCS Scheme)

Fifth Semester B.E. Degree Examination (CIVIL) Computer Aided Building Planning and Drawing (15CV54)

Time: 3 Hours

Max. Marks: 80

Note: Answer any TWO full questions, assume any missing data suitably.

Q1. A square RCC column 500X500 mm is resting on a sloped RCC square footing. The depth of foundation is 1.5 m below the ground level. The depth of footing is reduced to 750 mm at the face of column to 300 mm at the edge of the footing. The column reinforcement consists of 8 bars of 20mm dia, with 2-legged 8 mm dia stirrups at 200 mm c/c and the footing reinforcement consists of 12 mm dia bars @ 150 mm c/c, both ways. Draw to scale the following

- Plan of the footing showing the reinforcement details.
- Vertical section of the column with footing
- Cross section of column.

(30 Marks)

OR

Q2. Draw the cross section and Plan of a RCC dog-legged stair for a building having the following details.

Clear stair hall size 2.5X4.5m, width of landing 1.2m, width of each flight 1.2 m, Rise=150mm, Tread=150mm, Thickness of waist slab = 150mm Floor to floor height 3.6m.

(30 Marks)

Q3. The line diagram of a residential building is given in **Fig Q.3**. Draw to scale the following:

- Plan at sill level.
- Front elevation.
- Section along XX.
- Schedule of openings.

(50 Marks)

Q4. The line diagram of an Executive Engineers office building is given in **Fig Q.4**. Draw to scale the following:

- Plan at sill level.
- Front elevation.
- Section along XX.
- Schedule of openings.

(50 Marks)

FIG NO Q3

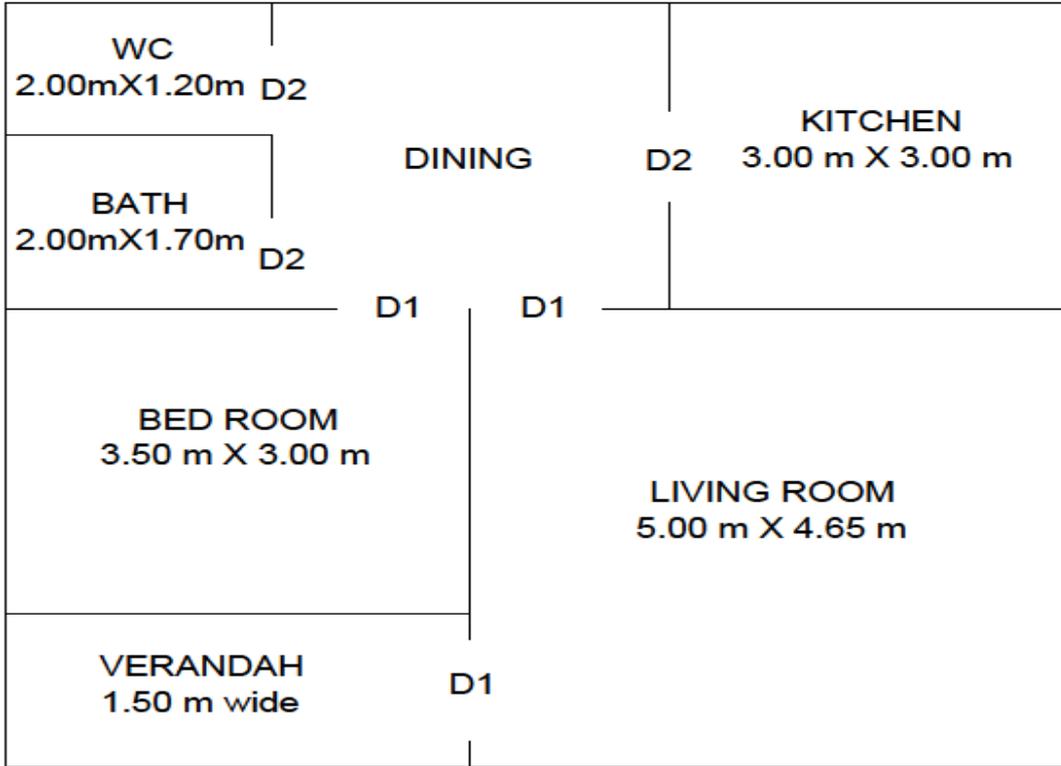
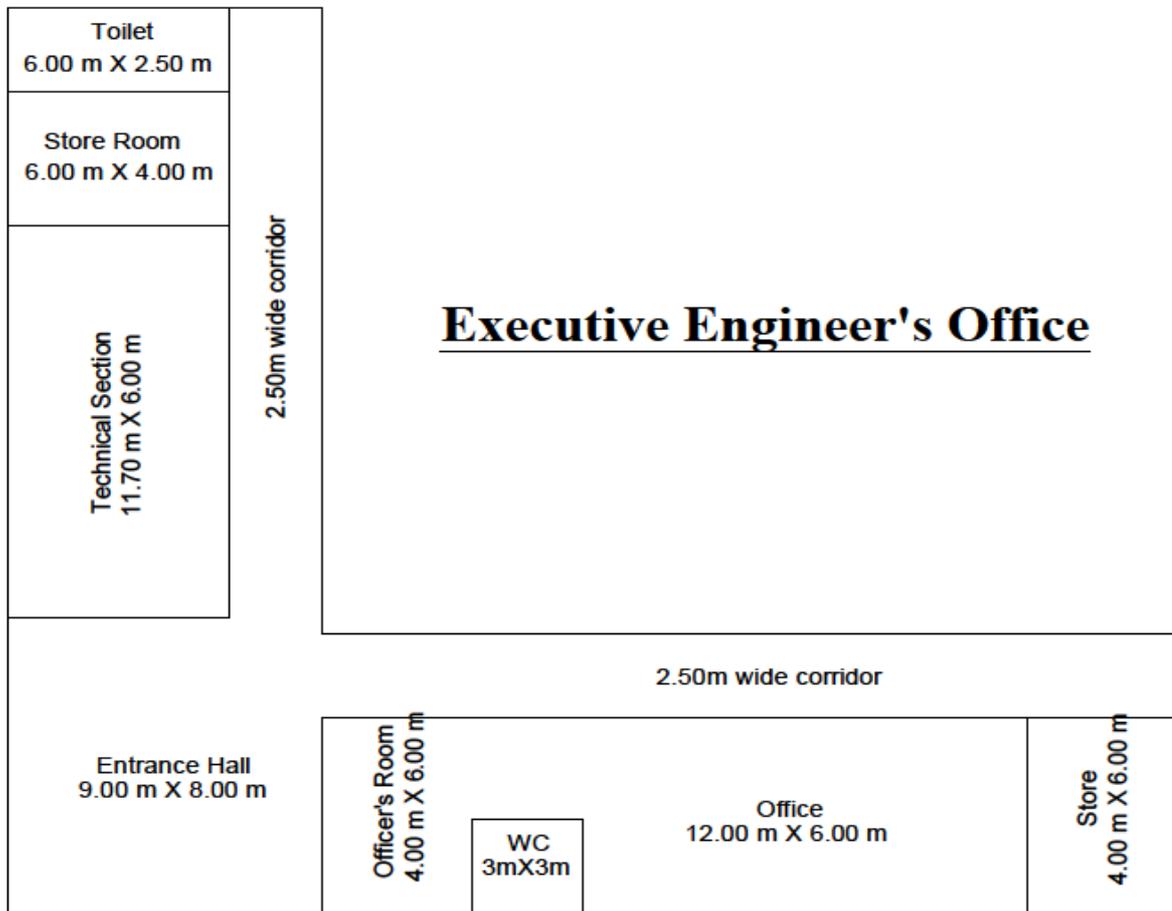


FIG NO Q4



Model Question Paper (CBCS)

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15CV551

Fifth Semester B.E. Degree (CBCS) Examination

Air Pollution and Control

Time: 3hours

Max Marks: 80

Note:- Answer Any Five full questions choosing one from each module

Module -1

- 1 a. Define air pollution. Explain primary and secondary air pollutants (08 marks).
b. Explain the sources and consequence of air pollutants for the following
(i) Sulphur-di-oxide (ii) Ozone (iii) Dust (iv) Fumes (08 marks).

OR

- 2 a. Enumerate the effects of the air pollution on human health and vegetation. (08 marks).
b. Define inversion. Briefly explain the different types of inversion with the aid of neat sketch. (06 marks)
c. Write a short note on photo-chemical smog (02 marks)

Module -2

3. a. Explain the structure and the composition of atmosphere (08 marks)
b. With a neat sketch Explain the Plume behaviour for the different atmospheric conditions (08 marks)

OR

4. a. Explain the Gaussian plume dispersion equation for the gaseous pollutants (06 marks)
b. A coal fired power plant releases from the stack SPM at the rate of 2.3g/s. The stack height is 60m while the temperature of the stack gases is 160⁰c and the ambient air temperature is 30⁰ C. the wind velocity at the stack height is 2.5m/s, while the stack gas velocity is 5.0m/s. The stack diameter is 3.5m. The atmosphere pressure is 1.005 bar. The wind speed at 10m height from the ground is 1.95 m/s. Estimate the ground level concentration for 1 and 2 km downwind distance take the standard deviations for 1km as $\sigma_y = 34$, $\sigma_z = 14$; for 2km $\sigma_y = 63$, $\sigma_z = 22$ respectively. (10 marks)

Module -3

5. a. What is meant by air sampling? Explain non-isokinetic, isokinetic sampling and sampling train (08 marks)
b. Explain any one method for measuring the concentration of the oxides of nitrogen in stack (08 marks)

OR

6. a. With the help of the neat sketch explain high volume air sampler for measurement of particulate matter. (10marks)
- b. What is meant by air quality monitoring? Explain any four methods of calculation of air pollution indices for monitoring of air pollutants. (06 marks)

Module -4

7. a. Explain the factors affecting the selection of the particulate air control devices. (08 marks)
- b. Briefly explain the particulate matter removal by gravity settler with the neat sketch. (08 marks)

OR

8. a. With the neat sketch explain the working principle of Cyclone separator. (08 marks)
- b. A cement plant was emitting flue gas at the rate of $20,000\text{m}^3/\text{h}$. Assuming inlet gas velocity of 2m/s , design a tubular ESP with 0.20 diameter with 7 cylinders to achieve the efficiency of a) 90%
b) 95% (08marks)

Module -5

9. a. Explain briefly the emission of the gasoline driven vehicles and diesel driven vehicles (08 marks)
- b. Define Noise pollution. Explain the sources and different methods to control the noise pollution (08 marks)

OR

10. a. Enumerate the following
i) Acid rain and its effects ii) Bhopal gas tragedy (08 marks)
- b. Write short notes on
(i) Air quality standards
(ii) noise pollution standards
(iii) Environmental policy
(iv) Kyoto Protocol (08 marks)

MODEL QUESTION PAPER

FIFTH SEMESTER B.E. DEGREE EXAMINATION

SUB: RAILWAYS, HARBOURS, TUNNELING AND AIRPORT ENGINEERING

SUB CODE: 15CV552 (CBCS scheme)

Time: 3 hrs

Max Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module

MODULE-1

- 1 (a) What do you understand by a permanent way? Mention the requirements of an ideal permanent way. (8 Marks)
- (b) What is creep of rail? Explain briefly the causes, effects and prevention of creep. (8 Marks)

OR

- 2 (a) What are the requirements of a good ballast? Mention the different types of ballast used in permanent way. (8 Marks)
- (b) A 5 degree curve diverges from a 3 degree main curve in reverse direction in the layout of a B.G yard. If the speed on branch line is restricted to 35 kmph, determine the restricted speed on the main line. (8 Marks)

MODULE-2

- 3 (a) what are the functions of a railway station? Discuss the various requirements of a railway station. (8Marks)
- (b) Explain briefly the different types of station yards. With a neat sketch, explain the functioning of a marshalling yard. (8 Marks)

OR

- 4 (a) Explain the necessity of maintaining railway track. List the various items of maintenance. (8 Marks)
- (b) Why it is necessary to provide adequate drainage facilities for a railway track? Mention the requirements of a good drainage system. (8 Marks)

MODULE-3

- 5 (a) Explain the components of a harbor. Give neat sketches of the layouts of an artificial harbor and road shed. (8 Marks)
- (b) With a neat sketch explain needle beam method of tunneling in soft soils. (8 Marks)

OR

- 6 (a) Explain with a neat sketch the layout and components of an artificial harbor. (8 Marks)
- (b) Write short notes on i) tunnel lining ii) tunnel drainage. (8 Marks)

MODULE-4

- 7 (a) list the various elements of an airport and explain them with a neat sketch. (8 Marks)
- (b) Explain the various factors considered in selection of an airport site. (8 Marks)

OR

- 8 (a) What are the components of an ideal airport layout? Sketch typical layout of an airport showing essential components. (8 Marks)
- (b) Describe any four major elements influencing the planning of airports. (8 Marks)

MODULE-5

9 (a) Explain the procedure for orienting runway using wind rose diagram of type I. (8 Marks)

(b) Determine the turning radius of taxiway for a subsonic aircraft of the following characteristics. The coefficient of friction is 0.13 and taxiway width is 22.5 M. (8 Marks)

- a. Wheel base = 15.85 M
- b. Wheel tread = 6.05 M
- c. Turning speed = 40 Kmph

OR

10 (a) Explain the various types of airport marking. (8 Marks)

(b) An airport is planned at an elevation of 380 m above MSL. The monthly mean of maximum and average daily temperatures for the hottest month at the site are 40 degree and 28 degree centigrade respectively. The effective gradient is 0.18%. Determine the length of the runway required at the proposed site if the basic runway length is 1900m. (8Marks)

CBCS Scheme

USN

15CV553

Fifth Semester B. E. Degree Examination Masonry Structures

Time: 3hrs

Max Marks: 80

- Note: 1) Answer FIVE full questions, choosing one full question from each module.
2) Use of IS 1905-1987 is permitted.
3) Assume missing data if any, suitably.

Module - 1

- Discuss different types of classification of bricks. (05 Marks)
 - Explain in detail the properties of mortar. (05 Marks)
 - Explain qualities of good building stones with required standard values. (06 Marks)

OR

- State and briefly explain the factors affecting the compressive strength of masonry. (06 Marks)
 - The typical floor plan of a building is shown in Fig Q2b.
i) Floor to floor clear height is 3.0m ii) Slab thickness is 150mm
Find the effective thickness, effective height, effective length and slenderness ratio for walls A, B and C. (10 Marks)

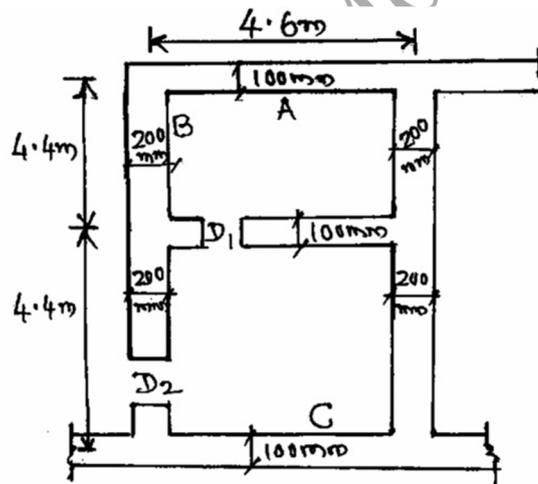


Fig.Q2(b)

Module - 2

- Explain following terms as applied to masonry structures:
i) Permissible compressive strength
ii) Stress reduction factor
iii) Shape reduction factor (06 Marks)
 - Design an interior wall of a two-storey building to carry 100mm thick RCC slab with 3.0m ceiling height. The wall is unstiffened and it supports a 2.65 m wide slab.
Live load on the roof = 1.5kN/m² Live load on floor = 2.0 kN/m²
Weight of terrace = 1.96 kN/m² Wt of floor finish = 0.8 kN/m² (10 Marks)

OR

4. a. With suitable values explain the following:
 i) Effective height ii) Effective length iii) Effective thickness
 iv) Slenderness ratio (08 Marks)
- b. An interior solid cross wall of a two-storey building is 100mm thick with a ceiling height of 3.0m. It is constructed with a brick of compressive strength 10 N/mm^2 and M1 type mortar. The walls are fully restrained both at top and bottom. Determine:
 i) Effective thickness ii) Effective height iii) Slenderness ratio
 iv) Stress reduction factor assuming eccentricity $e = 0$ and v) Permissible compressive stress. (08 Marks)

Module – 3

5. a. Explain the steps involved in consideration of loads and design of masonry wall with openings. (06 Marks)
- b. Design an interior solid wall of a two-storey building of storey height of each floor of 3.0m. The wall is stiffened by 100mm thick intersecting walls at 3.6m centre to centre. Also the wall has a door opening of size 900mm x 2000mm at a distance of 200mm from one of the walls. Assume the loading as follows:
 i) Roof loading = 15 kN/m ii) Floor Loading = 12.5 kN/m (10 Marks)

OR

6. a. Briefly discuss the steps involved in the design of axially loaded solid wall. (08 Marks)
- b. Design an interior cross wall of a two-storey building to carry 100mm thick RCC slab with 3m ceiling height. The wall is unstiffened and it supports a 2.65m wide slab. Live load on the roof = 1.5 kN/m^2 , Live load on floor = 2 kN/m^2 .
 Weight of 80mm thick terrace = 1.96 kN/m^2 , Weight of floor finish = 0.2 kN/m^2 . (08 Marks)

Module - 4

7. a. What are in-filled frames? Explain in brief. (06 Marks)
- b. A wall 20cm thick using modular bricks carries at the top a load of 80 kN/m , having a resultant eccentricity ratio of $1/12$. Wall is 5m long between cross walls and is of 3.4m clear height between RCC slabs at top and bottom. What should be the strength of brick and grade of mortar? Assume the joints are not raked. (10 Marks)

OR

8. a. A wall 200mm thick carries an eccentric load of 90 kN/m at the top. The eccentricity ratio is $1/10$. The wall is 5.0m long between the cross walls. The clear height between RC slabs is 3m. Design the masonry. (10 Marks)
- b. Explain with neat sketches different modes of failure of in-filled walls. (06 Marks)

Module - 5

9. a. Explain the design criteria of walls subjected to transverse loading. (06 Marks)
- b. Design a reinforced brick masonry lintel subjected to triangular loading for a window opening of span 1.8m. The thickness of the wall is 220mm and the height of the brickwork above the lintel is 1.1m. Length of the wall on either side of the lintel is more than half the span of the lintel. Use brickwork having characteristic strength of 10 N/mm^2 and mild steel bars. (10 Marks)

OR

10. a. Give the assumptions and limitations of reinforced masonry. (06 Marks)
- b. Design a compound wall for the data given below:
 Ht of wall = 1.7m Coping at top = 400mm x 100mm
 Assume the wind pressure is equal to 1000 N/m^2 and is uniformly distributed. The SBC of soil is 120 kN/m^2 . (10 Marks)

15CV554

Visvesvaraya Technological University, Belagavi

MODEL QUESTION PAPER

5th Semester, B.E (CBCS) CV

Course: 15CV554 – Theory of Elasticity

Time: 3 Hours

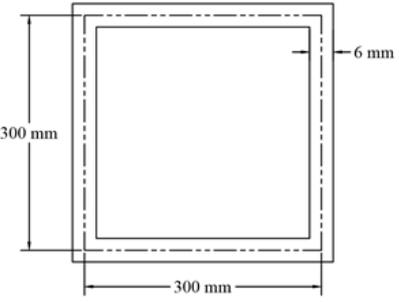
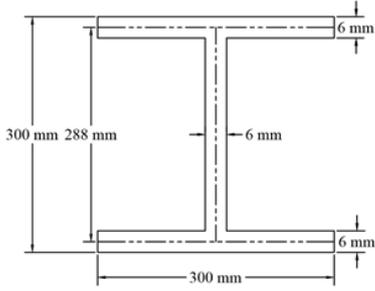
Max Marks: 80

Note: (i) Answer Five full questions selecting any one full question from each Module.

(ii) Question on a topic of a Module may appear in either its 1st or 2nd question.

Module 1															
1	(a)	Define body force and surface force	3												
	(b)	Derive the equations of equilibrium in three dimensions	5												
	(c)	<p>The state of stress at a point is given by following</p> $\begin{pmatrix} 9 & 6 & 3 \\ 6 & 5 & 2 \\ 3 & 2 & 4 \end{pmatrix} \text{ Mpa}$ <p>Determine principal stress and principle direction.</p>	8												
OR															
2	(a)	What are the assumptions made in theory of Elasticity	4												
	(b)	Derive the equation of compatibility for strain in three dimensions	4												
	(c)	<p>The following strains have been measured at a point on the unloaded surface of a body</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 5px;">Direction</th> <th style="padding: 5px;">Angle θ</th> <th style="padding: 5px;">Strain</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">1</td> <td style="text-align: center; padding: 5px;">0</td> <td style="text-align: center; padding: 5px;">0.002</td> </tr> <tr> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">120</td> <td style="text-align: center; padding: 5px;">0.002</td> </tr> <tr> <td style="text-align: center; padding: 5px;">3</td> <td style="text-align: center; padding: 5px;">240</td> <td style="text-align: center; padding: 5px;">-0.001</td> </tr> </tbody> </table> <p>Determine the principal strain and the direction of principal planes?</p>	Direction	Angle θ	Strain	1	0	0.002	2	120	0.002	3	240	-0.001	8
Direction	Angle θ	Strain													
1	0	0.002													
2	120	0.002													
3	240	-0.001													
Module 2															
3	(a)	With examples explain Plane stress and Plane strain problems.	4												
	(b)	Write a short note on i) Generalized Hook's law ii) Membrane analogy	4												
	(b)	<p>Show that $\phi = \frac{q}{8c^3} x^2 (y^3 - 3c^2 y + 2c^3) - \frac{1}{5} y^3 (y^2 - 2c^2)$</p> <p>Is a stress function and find what problem it can solve, the when applied to region included $y = \pm c, x = 0$ on the Side x Positive.</p>	8												

OR			
4	(a)	Write a short note on i) Uniqueness theorem ii) St.Venant's Principle .	4
	(b)	Explain the Airy's stress function Derive the biharmonic stress function in Cartesian coordinate for a two dimensional stress state	5
	(c)	Given the stress function $\phi = -\frac{E\alpha y^2}{h^3}(3h - 2y)$. Determine the stress components and sketch the variations in a region included $y=0, y=h, x=0$ on the side X positive.	7
Module 3			
5	(a)	A rectangular cantilever concrete beam of depth d and width b is having span L measured from the free end. It carries a vertical downward load of P at free end. Derive the expressions for stresses at any point using stress function approach	9
	(b)	Given the following stress function $\phi = \frac{Pr\theta \cos\theta}{\pi^3}$ determine the stress component σ_r, σ_θ and $\tau_{r\theta}$	7
OR			
6	(a)	Show that for simply supported beam having length 2L ,depth 2H and unit width ,loaded by a concentrated load at the mid span the stress function satisfying the loading condition is $\phi = \frac{b}{6}xy^3 + cxy$. Treat the concentrated load as a shear stress suitably distributed to suit the function, so that $\int_{-h}^{+h} \tau_{xy} = -\frac{w}{2}$ on each half length of beam. Also find stresses in the beam.	8
	(b)	Derive the equations of equilibrium for a two dimensional stress system in cylindrical coordinates.	8
Module 4			
	(a)	Derive the expressions for radial and tangential stress components in rotating disc for i) Solid disc ii) Solid disc with hole	8
7	(b)	Determine the stress in radial and tangential direction for a stress function $\phi = A \log r + Br^2 \log r + Cr^2 + D$ taken for hollow cylinder submitted to uniform pressure	8
OR			
	(a)	Discuss the effect of a circular hole on the stress distribution in an infinite plate subjected to tensile stress in X direction only and hence evaluate the stress concentration factor	9
8	(b)	A steel cylinder which has inside diameter of 1m is subjected to an internal pressure of 8 MPa . calculate the wall thickness if the maximum shearing stress is not exceeds 35 MPa	7

Module 5			
9	(a)	Discuss the torsion of solid circular cross section shaft using a warping function ϕ	3
	(b)	Derive the equations of stresses for rotating disc of uniform thickness	6
	(c)	<p>A Closed square section is subjected to torque of 600 N –m. Find the Maximum shear stress and twist unit length. Given $G = 80000 \text{ N/mm}^2$ and Length = 1200mm</p> 	7
OR			
10	(a)	Prove that the stress function in the torsional problem is equal to the deflection of the membrane	3
	(b)	Explain membrane analogy as applied to torsional members	6
	(c)	<p>Calculate the maximum shear stress and the angle of twist. Twisting moment = 615 N – m, $G=80000 \text{ MN/m}^2$.</p> 	7

15CV563

Remote Sensing and GIS Model question paper

Time -3hrs

V Sem Civil

Max. Marks-80

Note: Answer any Five full questions, choosing one full question from each module

Module-1

1. (a) What is remote sensing ? (02 marks)
- (b) Explain electromagnetic spectrum. (08 marks)
- (c) Explain the advantages and limitations of remote sensing. (06 marks)

OR

2. (a) Explain the elements of visual interpretation techniques. (08 marks)
- (b) With a neat diagram explain the spectral reflectance curves. (08 marks)

Module-2

3. (a) What is resolution of a sensor? Describe all sensor resolutions. (10 marks)
- (b) What are the advantages and disadvantages of various remote sensing platforms. (06 marks)

OR

4. (a) Briefly describe the Indian satellite program. (12 marks)
- (b) Explain systematic correction methods. (04 marks)

Module-3

5. (a) Define GIS. Describe the key components of GIS. (08 marks)
- (b) Explain how spatial data and attribute data integrated to make a GIS. (08 marks)

OR

6. (a) What is a map? Explain the classifications of a map. (06 marks)
- (b) Describe different types of coordinate systems. (10 marks)

Module-4

7. (a) Explain topological model of vector data. (08 marks)
(b) Describe spaghetti, vertex dictionary and DIME . (08 marks)

OR

8. (a) Explain block encoding and quadtree data model. (08 marks)
(b) Explain run length encoding method. (04 marks)
(c) Explain the advantages of raster. (04 marks)

Module-5

9. (a) Explain role of remote sensing to monitor land use changes. (08 marks)
(b) Explain the applications of remote sensing in water resources. (08 marks)

OR

10. (a) Explain the applications of remote sensing in natural resource management. (08 marks)
(b) Explain the following: i. Change detection ii. Remote sensing applications in traffic management (08 marks)

Visvesvaraya Technological University, Belagavi

MODEL QUESTION PAPER- 6th Semester , B.E (CBCS) CV

Course : 15CV61 –Construction Management and Entrepreneurship

Time : 3 hours

Max Marks : 80

Note : (1) Answer any FIVE full questions selecting any one full question from each module.

(2) Assume missing data suitably and clearly mention in the answer script about it

Module-1

1a	Identify the Stake holders in a construction project and Explain the Roles of Contractor and PMC Consultants	08
1b	Define Lag time and Lead Time in a PND ? explain with diagram the different relationship between predecessor and successor activities using this concept	08

OR

2a	Explain the Concept of Work break down Structure with an Example	06
2b	Using CPM Method determine “ Critical activities” and Critical path for the network given below. What is project duration ?	10

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graph LR
    1((1)) -- "A, 12" --> 2((2))
    1 -- "B, 14" --> 3((3))
    2 -- "D, 9" --> 4((4))
    3 -- "C, 8" --> 4
    3 -- "E, 10" --> 5((5))
    4 -- "G, 7" --> 6((6))
    5 -- "H, 4" --> 6
    4 -.- "F, 0" -.- 5
  
```

Module-2

3a	List out various Inventory Control Techniques adopted in Material Management and Explain A-B-C analysis ?	08
3b	For a typical Project of Cost Rs Cr 900 , has its Direct Labour cost of 22% of Gross. Productive labour cost is 35% of labour Cost. By optimization of Work , there was 38% reduction in Labour non Productivity as compared to earlier. Estimate the total Cost of Saving in Labour productivity by above process in terms of Rs Cr and in % wrt Project Cost , Labour Cost and Productive labour Cost	08

OR

4a	List out Factors behind the Selection of Construction equipment's perform assigned tasks / Project's need	04
4b	An Excavator with a bucket capacity is 1.5 cum and rated horse power is 180HP is used for excavation of ordinary soil. Following information is available 1. Capital cost of excavator = Rs80 lakhs , Charged to the project : 2.25% per month of capital cost , 2. Employment hrs / month = 250 hrs ,Technical life 5 yrs , salvage value = 10% of Capital Cost 3. Prime mover = diesel , load factor = 0.85 , crank case capacity = 30 lit. , time between oil change = 100 hours. 4. Operational correction factors = 0.7 , load factor = 0.85 , bucket swing factor = 1.00 , bucket fill factor = 0.9 5. Operational manpower cost = Rs 175 / hr	12

	<p>6. Time cycle for 1 operation of excavator = 45sec for 55 min hour. 7. Routine maintenance and major repair cost = 120% of depreciation cost. 8. Diesel rate = rs 70 / lit and lube rate is rs 200 / lit Estimate :</p> <ul style="list-style-type: none"> • Hourly production rate of the excavator in cum / hr • Cost of ownership and operation in rs/ hr • Unit rate of equipment operation for Excavator in Rs / cum. • Estimate The Number of Excavator needed to do a Job of Earthwork in Sub Grade having a Compacted Volume Quantity of 70,000 Cum , to be executed in 24 days with 10 hrs working per day. <p>Determine the number of dumpers required for transportation if average lead from borrow area to site is 8kms and dumper have a capacity of 12 cum , its forward speed is 15 kmph , backward speed is 30 kmph , unloading time = 4 min , repositioning time = 2 min. performance efficiency factor = 50min hour time</p>	
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Module-3

5a	Briefly Explain the construction Quality process.	06
5b	List out broad principles of quality management systems as outlined under ISO 9000	04
5c	Describe safety measures to be adopted while doing Hot Bituminous Works to avoid accidents	06

OR

6a	Define Values , Morals and Ethics and List out seven ethical principles applicable to construction industry	06
6b	What is importance of tool box meeting and good house keeping in construction safety management?	04
6c	Explain “ Quality Audit and its Process”	06

Module-4

7a	Discuss briefly “ concept of engineering economic study and its principles”	08
7b	What is the Total Capitalized cost of a building which have construction cost Rs 1,50,000/- immediately , Rs 15000 expenses each year for first 5 yrs and annual year end maintenance cost of Rs 5000/- plus the expenditure of Rs 35000 at the end of each 10years period for replacement purpose ? assume rate of interest = 9.5% P.a	08

OR

8a	Cash Flow for two projects X & Y are given below using annual worth method make a selection from following alternatives : assume min attractive rate of return $i^*=10\%$ <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">End of Year</td> <td style="width: 10%;">0</td> <td style="width: 10%;">1</td> <td style="width: 10%;">2</td> <td style="width: 10%;">3</td> <td style="width: 10%;">4</td> </tr> <tr> <td>PRO X</td> <td>-50000</td> <td>5000</td> <td>17500</td> <td>30000</td> <td>42500</td> </tr> <tr> <td>PROJ Y</td> <td>-50000</td> <td>40000</td> <td>15000</td> <td>15000</td> <td>15000</td> </tr> </table>	End of Year	0	1	2	3	4	PRO X	-50000	5000	17500	30000	42500	PROJ Y	-50000	40000	15000	15000	15000	10
End of Year	0	1	2	3	4															
PRO X	-50000	5000	17500	30000	42500															
PROJ Y	-50000	40000	15000	15000	15000															
8b	What is present equivalent money value of Rs 75,000/- (a) 5 years from now (b) 5 years before today , take discounting rate = 12% compounded quarterly	06																		

Module-5

9a	Define Micro , small and medium enterprises ? list and explain characteristics of MSME	08
9b	List and Explain the Different sources of Finance for Entrepreneur	08

OR

10a	What id DPR , Discuss the guidelines for the preparation of model project report for starting new venture	08
10b	Explain the stages in Entrepreneur / entrepreneurial process	08

CBCS Scheme

USN

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15CV62

Sixth Semester B.E. Degree Examinations, _____

Design of Steel Structural Elements

Time: 3hrs.

Max. Marks: 80

- Note: 1. Answer and FIVE full questions, choosing one full question from each module.
2. Use of IS800 & steel table is permitted

Module-1

- List the advantages and disadvantages of steel structures. (10 Marks)
 - List the loads to be considered for design of steel structures with reference codes. (06 Marks)

OR

- Calculate the shape factor of circular section of diameter D . (06 Marks)
 - Calculate M_p for the continuous beam shown in figure, Q2b if load factor is 3.2. (10 Marks)

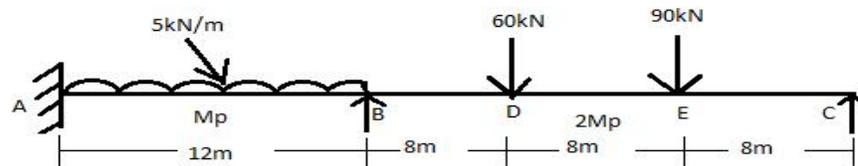


Fig. Q2b

Module-2

- List the types of failures in bolted connection with sketches. (06 Marks)
 - Design the double cover butt joint to be connected by two plates of thickness 10mm and 18mm. Cover plates for butt joint is of 8mm thickness. The load transmitted through the joint is 200kN. (10 Marks)

OR

- List the type of welded joint with sketches. (06 Marks)
 - A tie member of a roof truss consists of 2-ISA 100x75x8 mm. The angles are connected to either side of a gusset plate and the member subjected to a factored load of 450kN. Design the welded connection. Assume the connections are made in the workshop. (10 Marks)

CBCS Scheme

Module-3

5. a. List the failure modes of compression members. (06 Marks)
- b. A column consisting of ISHB 400 @ 759.3 N/m has length of 4.5m. It is hinged at both ends. Determine the axial load carrying capacity of the column. (10 Marks)

OR

6. a Design a laced column with two channels back to back of length 8m to carry an axial factored load of 1000kN. The column is hinged at both ends. (16 Marks)

Module-4

7. a List the factors affecting the strength of tension members. (06 Marks)
- b Design a tie member consisting of a single angle to carry a tensile force of 200kN. The length of tension member is 3.5m and subjected to reversal of stresses due to wind forces. Use 18mm Diameter bolts. (10 Marks)

OR

8. a. A column section ISHB300 @ 577N/m is carrying a factored load of 600kN, a factored moment 30kNm and a factored shear force of 60kN. Design a suitable column splice. (08 Marks)
- b. Design a slab base for a column ISHB300@577N.m carrying an axial factored load of 1000kN. M20 concrete is used for foundation. Provide welded connection between column and base plate. (08Marks)

Module -5

9. a. List the various factor affecting the lateral stability of a beam. (06 Marks)
- b. Design a cantilever beam which is casted monolithic into concrete wall and carrying a Dead load of 25kN/m and Live load of 10kN/m. Span of the beam is 5.0m (10 Marks)

OR

- 10 a. Design a purlin on a sloping roof with the Dead load 0.2kN/m^2 , Live load 2kN/m^2 and wind load of 1kN/m^2 (suction). The spacing of purlin is 2.5m c/c and span of 4m. Assume the ends are simply supported and slope of 25° . Use channel section as purlin. (16 Marks)

CBCS Scheme
Sixth Semester B.E. Degree Model Question Paper
Highway Engineering (15CV63)

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module -1

- 1 a.** Explain the role of transportation in social and economic development of the country. **(08 Marks)**
- b.** The area of a state is 3, 08,000 sq. km. The number of towns as per census are 276, number of villages are 41833. Calculate the length of various categories of road as per third 20-year road plan formulae. **(08 Marks)**

OR

- 2 a.** Explain the principle and application of saturation system in phasing road development. **(08 Marks)**
- b.** Write a note on the following:
- i) IRC
 - ii) CRRI
- (08 Marks)**

Module -2

- 3 a.** Explain obligatory points. With neat sketches, discuss how these control the alignment. **(08 Marks)**
- b.** What is sight distance? Explain with sketches, how restrictions to sight distance occurs on highways. **(08 Marks)**

OR

- 4 a.** What are the conditions which necessitate a realignment project? List the steps involved in realignment of a highway? **(08 Marks)**
- b.** The design speed of overtaking vehicle is 60 Kmph. The rate of acceleration of the above vehicle is 3.6 Kmph/sec. The difference in speed between overtaking and overtaken vehicle is 20 Kmph. Calculate OSD as per IRC guidelines for a road with two way traffic. Draw the sketch of overtaking zone. **(08 Marks)**

Module -3

- 5 a.** What are the desirable properties of bitumen? Explain. **(08 Marks)**
- b.** What is the significance of ESWL in pavement design. Explain the graphical method of determining ESWL in flexible pavements. **(08 Marks)**

OR

- 6 a.** Draw a sketch of flexible pavement cross section and show the component parts. Enumerate the functions of each component of the pavement? **(08 Marks)**
- b.** The properties of subgrade soil are given bellow:
Passing 75 micron IS sieve = 80%

Liquid limit = 58%

Plasticity index = 25%

Determine the group index and Classify the soil by HRB system.

(08 Marks)

Module -4

7 a. Explain briefly the proportioning of soil aggregate mix by Rothfutch's method.

(08 Marks)

b. Explain the functions of prime coat, tack coat and seal coat in bituminous pavement construction?

(08 Marks)

OR

8 a. Explain in detail the requirements, specifications of materials and the construction steps for WMM layer.

(08 Marks)

b. Discuss in brief, the properties of bituminous mixes in pavement construction.

(08 Marks)

Module -5

9 a. Describe the significance of highway drainage. With a neat sketch, explain any one method of subsurface drainage.

(08 Marks)

b. Determine the relative economics of two types of flexible pavements by annual cost method from the following data.

Details	Pavement Type A	Pavement Type B
Total cost per km, Rs. (lakhs)	3.30	6.20
Design life, years	5.00	12.00
Annual rate of interest %	10.00	9.00
Salvage value after design life. Rs. Lakhs	2.10	3.00
Average annual maintenance cost per km, Rs. Lakhs	0.40	0.20

(08 Marks)

OR

10 a. Briefly explain the various highway user costs and benefits.

(08 Marks)

b. The maximum quantity of water expected in one of the open longitudinal drains on clayey soil is $0.9 \text{ m}^3/\text{sec}$. Design the cross section and longitudinal slope of trapezoidal drain assuming the bottom width of the trapezoidal section and cross slope suitably. The allowable velocity of flow in the drain is 1.2 m/sec and Manning's roughness coefficient is 0.02.

(08 Marks)

Model Question Paper (CBCS) with effect from 2015-16

USN

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15CV64

Sixth Semester B.E. Degree (CBCS) Examination

Water supply and Treatment Engineering

Time: 3hours

Max Marks: 80

Note:- Answer Any Five full questions choosing one from each module

Module -1

- 1 a. What are the various types of water demand? Explain them in brief. (08 marks).
b. The census records of a small town is as follows:

Year	1980	1990	2000	2010
Population	9000	13000	17500	23000

Calculate the probable population in 2020, 2030, 2040 by decreasing growth method. (08 marks).

OR

- 2 a. Define per capita demand and design period. Explain the factors governing design period. (08 marks).
b. The census records of a town show the population as follows as follows:

Present population = 50,300
Population before one decade = 46,500
Population before two decades = 43,100
Population before three decades = 40,500

Calculate the probable population after one , two and three decades by using i) Geometrical increase Method ii) Incremental increase method. (08marks)

Module -2

3. a. State the various surface and underground sources of water. (04 marks)
b. What are the objectives of water treatment. (04marks)
c. Give the maximum permissible limits as per the BIS for the following water quality parameters.
i) Fluoride ii) Iron iii) Total hardness iv) Nitrate. Also indicate their health significance.(08marks)

OR

4. a. Suggest the treatment flowchart for treating underground water, highlighting the significance of each unit. (06 marks)
b. what are the objectives of sampling. (04 marks)
c. What is sampling. Explain the different methods of sampling. (06 marks)

Module -3

5. a. Describe the feeding and mixing devices of coagulants. (08 marks)
b. Design a rapid sand filter unit for treating 4.5 MLD of water. (08 marks)

OR

6. a. With the help of the neat sketch explain the working of clariflocculator. (08marks)
b. Explain the basic principles involved in ultra and micro filtration. (08 marks)

Module -4

7. a. Explain RO and nano filtration membranes and elements. (10 marks)
b. Briefly explain the zeolite process of softening of water. (08 marks)

OR

8. a. Explain the methods of disinfection along with its merits and demerits. (10 marks)
b Explain fluoridation and defluoridation. (06marks)

Module -5

9. a. Explain the factors to be considered in selection of intake structures.
Enumerate types of intakes. (08 marks)
b. From a clear water river 3m deep and maximum water level at 30m, water is pumped to an elevated reservoir at 70m at a constant rate of 9 lakh litres/hr and the distance is 1500m. Give the economical diameter of the rising main and the WHP of the pump. Neglect minor losses and take $f=0.01$. (08 marks)

OR

10. a. Enumerate different types of
i) Pipe appurtenances ii) pipe materials (06 marks)
b. Explain the various methods of distribution system. (10 marks)

Model Question Paper
Sixth Semester-Civil Engineering
Subject: Solid Waste Management

Sub Code:15CV651

Max Mark:80

Note: Answer any Five Questions, selecting one full question from each Module.

Module-1

1a. Define the terms: solid waste and solid waste management. (3)

b. Estimate the unit solid waste generation rate for a residential area having 800 dwellings. The observation made at local transfer station for a week time revealed that the waste was carried in self-compacting trucks and flatbed trucks, whose volume is 15m^3 and 1.25m^3 and the density of waste is 295kg/m^3 and 110kg/m^3 respectively. Assume 10 self-compacting truck and 20 flatbed truck loads per week. (6)

b. What are transfer stations? Explain the factors to be considered in the design of transfer station. (7)

OR

2a. Discuss the salient features of the Solid Waste (Management & Handling) Rules, 2000, with 2016 amendments. (8)

b. Estimate the moisture content, density and energy content (on dry basis and on ash free dry basis) of the solid waste sample using the data given below. .

Assume ash content as 5%. (8)

Component	% by mass	Moisture content, %	Density*, Kg/m^3	Energy**, kJ/kg
Food waste	12	70	290	4000
Paper	40	06	85	16000
Card board	08	05	50	16000
Plastics	04	02	65	32000
Grass trimmings	15	60	105	6500
Wood	05	20	240	18000
Tiin cans	16	03	90	700

* Based on 100 kg waste sample, ** Based on 1000 kg waste sample

Module – 2

3a. What is Incineration? With the help of a neat sketch, explain incineration process. (8)

b. Mention the different processing techniques adopted for physical, chemical and biological transformation of solid waste. (4)

c. What is meant by air pollution control? How the pollutants are categorized and mention the common air pollution control devices used in conjunction with incinerator. (4)

OR

4a. Explain the 3Ts of Incineration process. (6)

b. Discuss the governing factors considered in design of an incinerating system. (6)

c. Write an explanatory note on mechanical volume reduction. (4)

Module – 3

5a. Enumerate and discuss the factors affecting aerobic composting. (6)

b. Determine the landfill area required for a population of 50000, given the following data.

i) Solid waste generation: 1.5 kg/person/day

ii) Compacted density of solid waste in landfill: 500kg/m^3

iii) Average compacted depth of solid waste: 3M (6)

c. Explain the area method of landfilling technique. (4)

OR

6a. What is composting? Distinguish between aerobic and anaerobic composting. (6)

b. Write an explanatory note on Vermicomposting. (4)

c. What is leachate? With neat sketch, discuss the control of leachate movement in sanitary landfill sites. (6)

Module – 4

7a. Enumerate the various methods of treating bio-medical waste. Explain any one. (6)

b. Define hazardous waste. Explain the various sources of hazardous wastes. (6)

c. Enumerate the hazardous waste characteristics and explain any one. (4)

OR

8a. What is E-waste? What are the impacts of E-Waste on the environment? (6)

b. What is construction waste? Mention the materials that can be recycled? (6)

C. Write a note on identification and classification of hazardous waste. (4)

Module – 5

9a. What is pyrolysis? With a neat sketch, explain the process of Pyrolysis. (8)

b. List the type of Incinerators. With a neat sketch, explain any one. (8)

OR

10a. With examples, explain the energy recovery technique used in the chemical and biological transformation of wastes. (8)

b. Explain the design criteria for Incineration. (8)

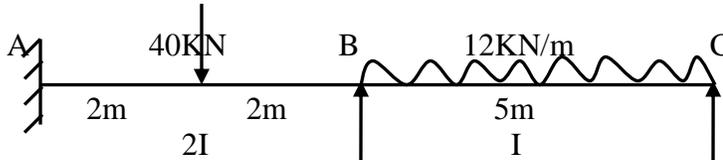
15CV652- MATRIX METHOD OF STRUCTURAL ANALYSIS

Module -1

1. a) Obtain the relation between system stiffness matrix and element stiffness matrix. 05marks
- b) Show that stiffness matrix is inverse of flexibility matrix 05marks
- c) Write the member flexibility matrix for the beam shown in fig. 16marks



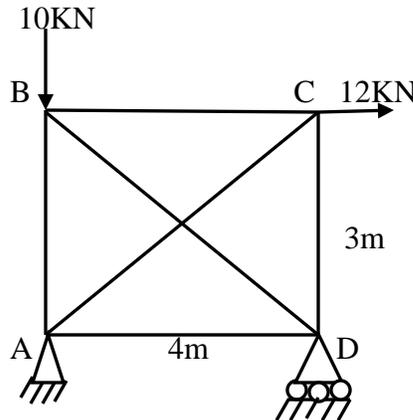
2. a) Define principle of contragradience. 05marks
- b) Write the force transformation matrix for the beam shown in fig. by element approach. 06marks



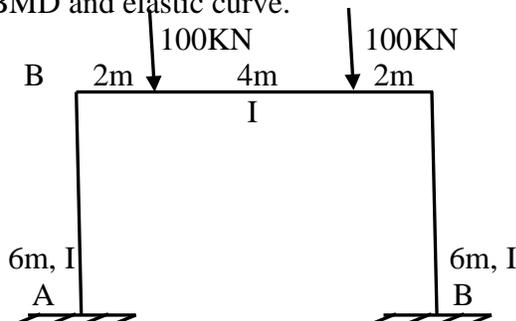
- c) Write a note on system coordinator and element coordinators. 05marks

Module-2

3. Analyse the given truss shown in fig. by flexibility method using force transformation matrix. Draw BMD and elastic curve. Assume $L/AE = 1$ for all the members. 16marks

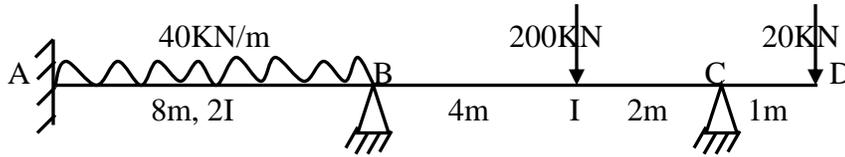


4. Analyse the rigid jointed frame shown in fig. by flexibility method using force transformation approach. Draw BMD and elastic curve. 16marks

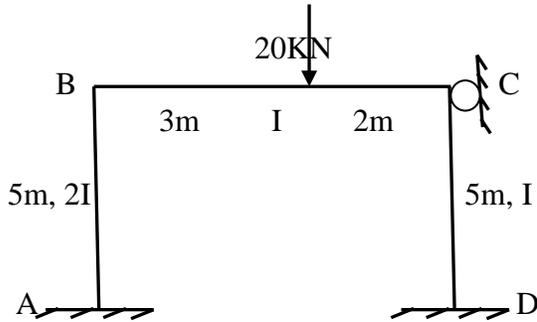


Module -3

5. Analyse the given beam by stiffness method using displacement transformation approach. Draw BMD and elastic curve. 16marks

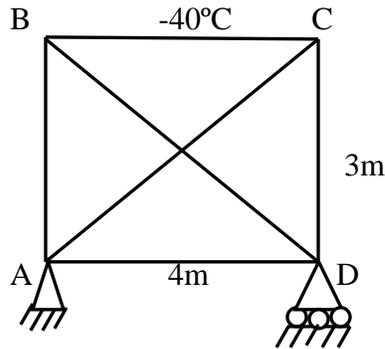


6. Analyse the given frame in fig. by stiffness method. Use element approach. Draw BMD. 16marks

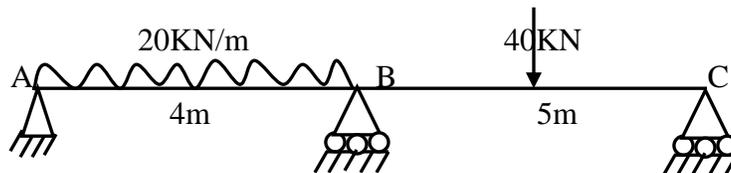


Module-4

7. Analyse the given truss shown in fig. by flexibility method using force transformation matrix. Draw BMD and elastic curve. Area for all the members, $A = 5000\text{mm}^2$, modulus of elasticity, $E = 200\text{ GPa}$, $\alpha = 12 \times 10^{-6}/^\circ\text{C}$, Temperature changes in member BC is -40°C . 16marks



8. Analyse the given beam by force method of analysis, having temperature change in members AB and BC of 15°C . Depth of the beam is 400mm, $\alpha = 10 \times 10^{-6}/^\circ\text{C}$, $E = 30000\text{ N/mm}^2$, $I = 50 \times 10^6\text{ mm}^4$. 16marks

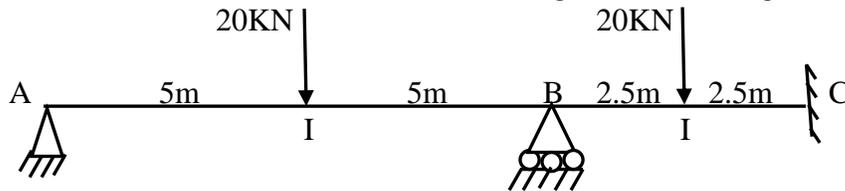


9. a) Explain i) Local coordinates and global coordinates

04marks

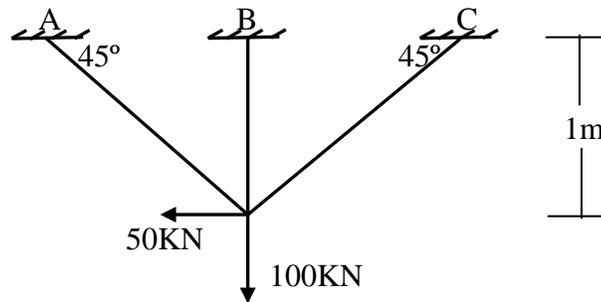
ii) Properties of stiffness matrix

b) Assemble structure stiffness matrix for the given beam in fig. EI is constant.



12marks

10. Analyse the given truss in fig., using direct stiffness method. Take $AE = 1$ for all members.



16marks

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 15CV653

Sixth Semester B.E Degree Examination, June-July2018
Alternative Building Materials

Time -3hrs

Max Marks-80

NOTE: Answer five full questions, choosing one full questions from each module.
Assume any missing data suitably

MODULE -1

1. **a.** Discuss the Energy Embodied In Building Materials and Buildings. (8Marks) **b.** Discuss The Environmental Issues Related To Building Materials.(8Marks)

OR

2. **a.** List the various environmental friendly and cost effective building technologies (8Marks)
b. Explain the role of construction industry in global warming. (8Marks)

MODULE-2

3. **a.** Explain the method of manufacturing the stabilized mud blocks(8Marks)
b. Calculate the energy embodied in a burnt brick wall without plastering in cement mortar CM 1:6 assume the details. (8Marks)

OR

4. **a.** Explain briefly the use of stones and laterite blocks against their compressive strength.(8Marks)
b. A Mangalore tiled roof is used to span a room of size 3m X 6m. The roof slope is 20° and assuming wall thickness of 230mm and roof overhanging of 300mm at both ends of slope. Calculate the energy in the roof per m^2 . Assume energy in one Mangalore tile = 15MJ. (8Marks)

MODULE-3

5. **a.** What is lime- pozzolona cement? Explain the different of blending of lime and pozzolona .(8Marks)

b. Discuss the different sources of lime stones. (8Marks)

OR

6. **a.** Explain the method of manufacture of lime pozzolona cement. (8Marks)
b. What are the different industrial wastes used effectively in construction industry. Explain any 3 materials. (8Marks)

MODULE-4

7. **a.** Write short notes on Ferro cement and Ferro concrete. (8Marks)
b. What are the concept and details of composite beam panel roof?(8Marks)

OR

8. **a.** Explain filler slab blocks of roof construction with a neat diagram using SMB.(8Marks)
b. Explain masonry vaults and domes. (8Marks)

MODULE-5

9. **a.** What is cost effective building design? Explain cost saving techniques. (8Marks)
b. Explain machine used for making stabilized mud blocks. (8Marks)

OR

10. a. Explain with a neat diagram the manufacture of concrete.

(8Marks)

b. Explain how you precast a roof element.

(8Marks)

Sixth Semester B.E. Degree Examination _____

Time : 3Hrs

Max Marks:80

Note: 1) Answer FIVE full questions, choosing one full question from each module.**2) Assume missing data if any, suitably.****Module – 1**

1. a. Explain the various objectives of ground improvement. (08 Marks)
b. What are the factors which govern the choice of method of ground improvement? (08 Marks)

OR

2. a. Briefly discuss the various types of soil deposits in India. (08 Marks)
b. Write a note on field compaction control and specification. (08 marks)

Module - 2

3. a. With the help of neat sketches describe the working of single stage and multi stage well point systems of dewatering (08 marks)
b. Explain different methods of control of seepage of ground water. (08 Marks)

OR

4. a. What are drains? Explain different types of drains. (08 marks)
b. Describe the compaction of embankment by the method of preloading. (08 marks)

Module – 3

5. a. What is cement stabilisation of soils? Explain the procedure of cement stabilisation. (08 marks)
b. Discuss the effect of cement stabilisation on permeability, swelling, shrinkage and strength characteristics of soils. (08 marks)

OR

6. a. What is lime stabilisation of soils? Explain with reactions and write a note on the engineering benefits of it. (08 marks)
b. Write a note on tar or asphalt in stabilisation of soils. (08 marks)

Module – 4

7. a. Describe different methods of vibro-compaction done in cohesion-less soils. (08 marks)
b. Explain the construction sequence of stone columns for ground improvement with the help of neat sketches. (08 marks)

OR

8. a. Explain grouting and its effects on soils. Give applications of grouting. (08 marks)
b. Describe different methods of grouting in brief. (08 marks)

Module –5

9. a. Briefly discuss the applications of geosynthetics. (08 marks)
b. With the help of neat sketches briefly discuss various functions of geosynthetics. (08 marks)

OR

10. a. Explain different types of in-situ columns used to improve the bearing capacity of weak soils. (08 marks)
b. Differentiate between rock anchors, rock bolting and soil nailing. (08 marks)

CBCS SCHEME

MODEL QUESTION PAPER

15CV661: Water Resources Management

Time: 3 hours

Max. Marks: 80

MODULE-1

- 1 a) With a sketch, explain Hydrologic cycle **8Mks**
b) What is water scarcity? What are the contributing factors of water scarcity? **8Mks**

OR

- 2 a) With a sketch, explain confined and un-confined aquifer? **8Mks**
b) A lake has a water surface elevation of 103.2m above datum at the beginning of certain month. In that month the lake received an average inflow of $6.0\text{m}^3/\text{sec}$ from the surface runoff sources. In the same period the outflow from the lake had an average value of $6.50\text{m}^3/\text{sec}$. Further in that month, the lake received a rainfall of 145 mm and the evaporation of the lake surface was estimated as 61 mm. Write the water budget equation for the lake and calculate the water surface elevation of the lake at the end of the month. The average lake surface area can be taken as 5,000 ha. Assume that there is no contribution to and from ground water storage? **8Mks**

MODULE-2

- 3 a) Explain the necessity of water resource planning and management? **8Mks**
b) What are the system components of water resources management? Explain Top down approach and Bottom up approach of integrated management policy? **8Mks**

OR

- 4 a) Explain the Technical, Institutional, Economic and financial aspects of water resources planning and management? **8Mks**
b) Write the description of questions addressed in adaptive integrated policy on activities of water resources planning and management? **8Mks**

MODULE-3

- 5 a) With a sketch containing the components, explain the concept of Integrated Water Resources Management(IWRM)? **8Mks**
b) Explain the guiding principles: Dublin statement and Rio Declaration of Integrated water resources management? **8Mks**

OR

- 6 a) Narrate the sectors benefited by Integrated Water Resource Management(IWRM) **8Mks**
b) Explain the legislative and institutional/organization framework of IWRM? **8Mks**

MODULE-4

- 7 a) Explain the existing legal framework and constitutional provisions for water in India? **8Mks**
b) Explain the necessity of national law on water? **8Mks**

OR

- 8 a) Write a note on National Water Commission (NWC) and it's divisions? **8Mks**
b) What is the scope and functions of Water User's Association (WUA)? **8Mks**

MODULE-5

- 9 a) Explain rain water harvesting and it's components of collection, storage, application and optimum utilization? **8Mks**
b) Explain the different types of lining done to control seepage in ponds? **8Mks**

OR

- 10 a) Explain the different storage structures of water harvesting? **8Mks**
b) Briefly explain the various techniques of rain water harvesting in urban area? **8Mks**

CBCS Scheme

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15CV662

Sixth Semester B.E. Degree Examinations, _____

Environmental Protection and Management

Time: 3hrs.

Max. Marks: 80

Note: Answer any five full questions, choosing one full question from each module.

Module-1

1. a. List the different principles of environmental management and explain the Principle of participation & Polluter pays principle (PPP). (08 Marks)
- b. Write in brief about the organizational drivers to the implementation of environmental management systems. (08 Marks)

OR

2. a. What do you understand by abatement of pollution? What are the ways in which this practice is carried out? (08 Marks)
- b. Write a short note on Charter on corporate responsibility for environmental protection. (08 Marks)

Module-2

3. a. Distinguish between (i) Pollution control and Pollution prevention. (08 Marks)
(ii) Concentration and Mass standards.
- b. What is ISO 14000? Give the benefits of implementing ISO 14000. (08 Marks)

OR

4. a. Write in brief about use of clean technologies as part of EMS in an organization. (08 Marks)
- b. State the objectives and benefits of an environmental performance evaluation program. (08 Marks)

Module-3

5. a. State the benefits of implementing ISO 14001 in an organization. (08 Marks)
- b. What is continual improvement in environmental performance? How can it be planned in an organization? (08 Marks)

OR

6. a. State the requirements and recommended approach to implementing clause 4.2 of ISO 14001 (environmental policy) within an organization. (08 Marks)

CBCS Scheme

- b. Write a note on identifying environmental aspects and impacts within an organizational set up. (08 Marks)

Module-4

7. a. Give the process flow diagram for management of an environmental audit programme. (08 Marks)
- b. Give the contents of Environmental statement Form V. (08 Marks)

OR

8. a. Write a short note on waste minimization planning in an industry. (08 Marks)
- b. Explain in brief about major and minor nonconformities that affect the efficiency of environmental management standards in an industry (08Marks)

Module -5

9. a. What is a waste audit? How do you plan a waste audit in an organization. (08 Marks)
- b. Write in brief about the procedure of conducting a waste audit in an electroplating industry. (08 Marks)

OR

10. a. Write in brief about air and water pollution prevention opportunities in textile industries. (08 Marks)
- b. Write in brief about disposal of hazardous wastes in a landfill. (08 Marks)

CBCS Scheme

Sixth Semester B.E. Degree Model Question Paper Numerical Methods and Applications (15CV663)

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module -1

- 1 a. Using Newton-Raphson method $2x = \cos x + 3$ with initial value of $x = 1.5$. (05 Marks)
b. Solve the following equations by Gauss-elimination method: (06 Marks)
$$x_1 + x_2 + x_3 = 9$$
$$x_1 - 2x_2 + 3x_3 = 8$$
$$2x_1 + x_2 - x_3 = 3$$

c. Solve the following equations by Gauss-Jacobi method: (05 Marks)
$$20x_1 + x_2 - 2x_3 = 17$$
$$3x_1 + 20x_2 - x_3 = -18$$
$$2x_1 - 3x_2 + 20x_3 = 25$$

OR

- 2 a. Use Fixed point iteration technique to solve $\cos x = xe^x$ with initial value of $x = 0.5$. (06 Marks)
b. Solve the following equations by Gauss-Jordan method: (05 Marks)
$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16$$

c. Find the inverse of the matrix using by Gauss-Jordan method: $A = \begin{bmatrix} 2 & 1 & 4 \\ 1 & -3 & -1 \\ 3 & -2 & 2 \end{bmatrix}$ (05 Marks)

Module -2

- 3 a. From the following estimate the number of students who obtained marks between 40 and 45: (05 Marks)

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

- b. Find Lagrangian interpolation polynomial from: $y(1) = -3, y(3) = 0, y(4) = 30, y(6) = 132$.
Find $y(5)$. (06 Marks)
c. Evaluate $f(45)$ from the following data: (05 Marks)

x	10	20	30	40	50
f(x)	46	66	81	93	101

OR

- 4 a. Using Newton's divided difference method evaluate $f(8)$ and $f(15)$ from data: (06 Marks)

x	4	5	7	10	11	13
f(x)	48	100	297	900	1210	2028

b. Fit the cubic spline from the (1, 1), (2, 2), (3, 5), (4, 11). Evaluate $f(1.5)$. (10 Marks)

Module -3

5 a. Determine $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$ and $x = 1.6$ from the following data. (07 Marks)

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

b Estimate $\int_0^2 e^{x^2} dx$ taking 10 intervals by (i) Trapezoidal formula (ii) Simpson's 1/3rd Formula. (09 Marks)

OR

6 a. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Romberg's method. (07 Marks)

b. Compute $\int_0^{\pi/2} \int_0^{\pi/2} \sqrt{\sin(x+y)} dx dy$ using Trapezoidal method. (09 Marks)

Module -4

7 a. Using Taylor's series solve $\frac{dy}{dx} = x^2 y - 1$ given $y(0) = 1$. Compute $y(0.1)$ and $y(0.2)$ (07 Marks)

b. Given $\frac{dy}{dx} = x^2(1+y)$ with $y(1) = 1$. Compute $y(1.4)$ using Adams Bashforth method (09 Marks)

OR

8 a. Using Runge-Kutta fourth order method solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y=1$ when $x=0$. Find $y(x=0.2)$ taking $h=0.2$ (08 Marks)

b. Using Modified Euler's method find $y(20.2)$ and $y(20.4)$ given that $\frac{dy}{dx} = \log_{10}\left(\frac{x}{y}\right)$ with $y(20) = 5$ and taking $h=0.2$. (08 Marks)

Module -5

9 a. Find $y(0.25)$, $y(0.5)$ and $y(0.75)$ satisfying $\frac{d^2y}{dx^2} + y = x$ with boundary conditions $y(0) = 0$ and $y(1) = 2$. (07 Marks)

b. Solve $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values given in Fig. Q 9(b). Compute u_1 to u_9 up to 3 iterations. (09 Marks)

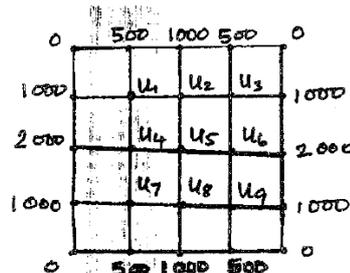


Fig. Q9(b)

OR

10 a. Solve the equation $u_t = u_{xx}$ subjected to the conditions $u(0,t) = u(1,t) = 0$, $u_t(x,0) = \sin(\pi x)$ for $0 \leq t \leq 0.1$ by taking $h = 0.2$ **(08 Marks)**

b. Using finite difference equation, solve $\frac{d^2u}{dt^2} = 4\frac{d^2u}{dx^2}$ subjected to $u(0,t) = u(4,t) = 0$, $u_t(x,0) = 0$ and $u(x,0) = x(4-x)$ upto 4 steps. Choose $h = 1$ and $k = 0.5$. **(08 Marks)**

CBCS Scheme **15CV664**
Model Question paper
Sixth Semester B.E. Degree Examination, May-June 2018
Finite Element Method Of Analysis

Time 3hrs

Max Marks 80

Module 1

1.

- a) Explain the terms plain stress and plain strain. Also give constitutive laws for these cases. **(8 marks)**.
- b) Mention the advantages and disadvantages of finite element method. **(8 marks)**.

OR

2.

- a) Mention the steps involved in Rayleigh Ritz method for determining deflection of a beam. **(8 marks)**.
- b) Determine the deflection of a cantilever beam of length 'L' and loaded with a vertical load 'P' at the free end by Rayleigh Ritz method. Use a trial function **(8 marks)**.

$$y = a \left[1 - \frac{\cos \pi x}{2L} \right]$$

Module 2

3.

- a) What are convergence and compability requirements of a good displacement model? **(8 marks)**.
- b) Define shape functions. Mention their properties? **(8 marks)**.

OR

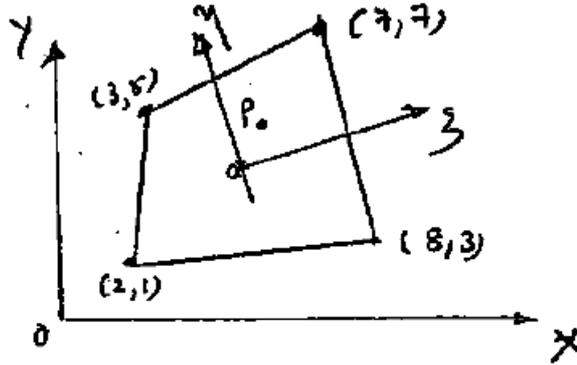
4.

- a) Explain the following?
 - I. Local co-ordinates.
 - II. Global co-ordinates.
 - III. Natural co-ordinates. **(8 marks)**.
- b) Derive the shape function for a 3 noded bar element in terms of natural coordinates. Plot the variation of shape function? **(8 marks)**.

Module 3

5.

- Define Isoparametric, sub parametric and super parametric elements. Explain any one briefly? (8 marks).
- Determine Cartesian coordinate for the point P ($\xi = 1/2$, $\eta = 0.6$) shown in Fig



(8 marks).

OR

6.

- Derive the Jacobian matrix for a linear quadrilateral element.(16 marks).

Module 4

7.

- Determine the nodal displacements for the truss shown in fig?(16 marks).

$$A_1 = 1200 \text{ mm}^2$$

$$A_2 = 1000 \text{ mm}^2$$

$$E = 2 \times 10^5 \text{ N/mm}^2$$

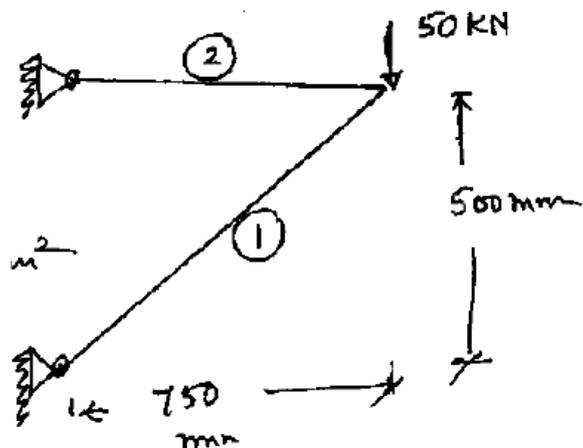
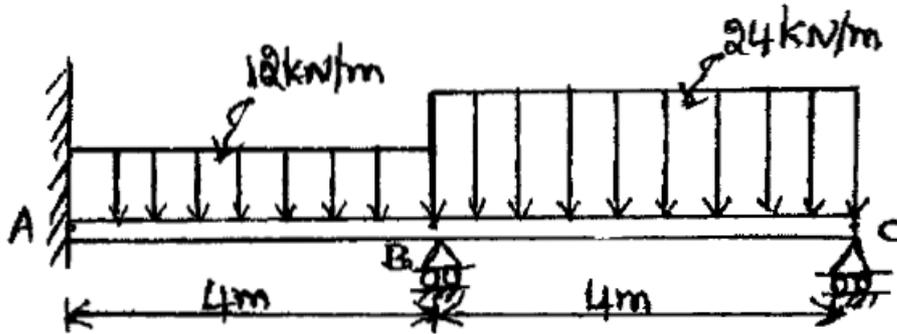


Fig.Q4(b)

OR

8.

- a) Determine the nodal displacements at the joints for the beam shown in Fig?
Take $E= 200\text{GPa}$, $I= 4\times 10^6 \text{ mm}^4$. **(16 marks)**.



Module 5

9.

- a) Write short notes on:
I. Softwares used in finite element analysis.
II. Hermitian polynomials. **(8 marks)**.
- b) Explain the terms material non linearity and geometrical non linearity. **(8 marks)**.

OR

10.

- a) Briefly explain the stiffness matrix formulation of MINDLIN'S plate element. **(16 marks)**.

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15CVL67

Sixth Semester B.E Degree Examination, June-July 2018
SOFTWARE APPLICATION LAB

Time-3hrs

MaxMarks-80

NOTE: Answer Three full questions, choosing one full question from each module

Assume any missing data suitably

Module -1

- 1. Analyze the following using Staad.Pro
 - a. Portal Frame [20 Marks]
 - b. Continuous Beam [20 Marks]

OR

- 2. Analyze a 3 story building (Plan Should be provided by the examiner) [40 Marks]

Module -2

- 3. Prepare a project management schedule linking different tasks and allotting resources, also create baseline project with tracking for civil engineering structures [20 Marks]

OR

- 4. Create a shape file with layers which includes points, lines and polygons. [20 Marks]

Module -3

- 5. Design Doubly Reinforce Beam using Excel for the following data
The effective span = 5 m, Width = 250 mm, over all depth – 500mm, service load(LL+DL)= 40 KN/m, Effective cover= 50mm, FCK=20 , Fy=415.
[20 Marks]

OR

- 6. Design a two way slab Using Excel for the following data
Size of the panel = 3*4, Live load= 4 KN/m, Bearing= 300mm, Fck = 20, Fy=415
[20 Marks]

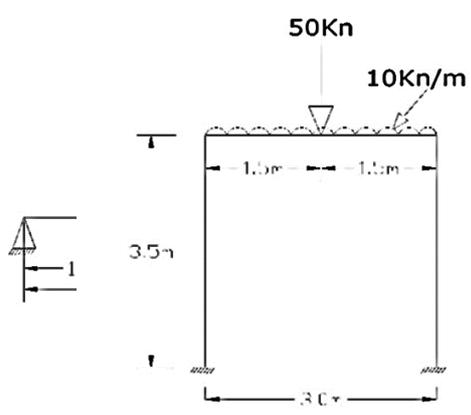


Fig. 1 (a)

Fig 1(b)

Note: Similar Kind of questions may be set.