

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022
COMMON TO CIVIL AND MECH
Third Semester
NUMERICAL METHODS

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

- 1 Mention the numerical methods to find the eigen values and eigen vectors.
- 2 Find the first approximation to the root near $x=0$ of $x^3 + 3x - 1 = 0$ by Newton's method.
- 3 State Lagrange's interpolation formula.
- 4 Say true or false. Newton's interpolation formulae are not suited to estimate the value of a function near the middle of a table.
- 5 Using Trapezoidal rule evaluate $\int_0^{\pi} \sin x dx$ by dividing the range into 6 equal parts.
- 6 In order to evaluate by Simpson's (1/3) rule as well as by Simpson's (3/8) rule, what is the restriction on the number of intervals?
- 7 Write down Adam-Bashforth predictor formula
- 8 Write the merits and demerits of Taylor series method.
- 9 What is the purpose of Liebmann's process?
- 10 Write the Crank Nicholson difference scheme to solve $u_{xx} - au_t = 0$ with $u(0,t) = T_0, u(l,t) = T_1$ and the initial condition as $u(x, 0) = f(x)$.

PART-B (5 x 16 = 80)

- 11 a. Using Newton's iterative method, find the root between 0 and 1 of $x^3 = 6x - 4$ correct to two decimal places.

OR

- b. Solve the system of equations, using the Gauss-Elimination method.

$$28x + 4y - z = 32$$

$$x + 3y + 10z = 24$$

$$2x + 17y + 4z = 35$$

(P.T.O)

- 12 a. Using Newton's backward interpolation formula, find the polynomial $f(x)$ satisfying the following data. Hence evaluate at $x = 9$

X	4	6	8	10
f(x)	1	3	8	16

OR

- b. From the following table, using Stirling's formula estimate the value of $\tan 16^\circ$

x:	0°	5°	10°	15°	20°	25°	30°
tan x:	0.0	0.0875	0.1763	0.2679	0.3640	0.4663	0.5774

- 13 a. Compute the value of the definite integral $\int_4^{52} \log_e x \, dx$ using (i) Trapezoidal rule. (ii) Simpson's 1/3 rule. (iii) Simpson's 3/8 rule by dividing the range into 6 equal parts.

OR

- b.

(i) Evaluate $\int_{-1}^1 (1 + x + x^2) \, dx$ by Gaussian three point formula

(ii) By taking 8 intervals, evaluate $\int_0^2 x e^x \, dx$, using Trapezoidal rule.

- 14 a. Solve $y' = 1 - y, y(0) = 0$ by modified Euler's method and tabulate the solutions at $x = 0.1$ and 0.2 .

OR

- b.

Given $\frac{dy}{dx} = x^2(1 + y), y(1) = 1, y(1.1) = 1.233, y(1.2) = 1.548, y(1.3) = 1.979$, evaluate $y(1.4)$ by Adams-Bashforth method.

15 a.

Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5$, $t \geq 0$ given that $u(x,0) = 20$, $u(0,t) = 0$, $u(5,t) = 100$.

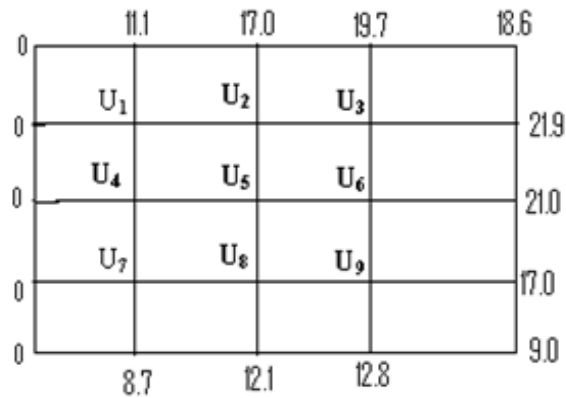
Compute u at one time step, with $h = \Delta x = 1$ by Crank – Nicholson method

OR

b.

Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ at the nine mesh points of the square given the

Values of u at the boundary as shown.



Sl.No. 4005 D

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022
COMMON TO CIVIL AND ECE
Sixth Semester
DISASTER MITIGATION AND MANAGEMENT
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Write Short notes about Disaster management cycle.
- 2 Write Short about Wild fire.
- 3 What are the three factors of Risk?
- 4 Define Fire Risk.
- 5 Expand NDMP.
- 6 Define Mitigation.
- 7 How Private sector can help during disaster?
- 8 Write Short notes about Emergency Services.
- 9 Write two types of tsunami Warning?
- 10 Mention two Risk reduction measures of Landslide.

PART-B (5 x 16 = 80)

- 11 a. Describe flood and explain causes of flood.
OR
b. Explain earthquake and its causes.
- 12 a. Describe drought and explain causes of drought
OR
b. Explain the Major tasks during the disaster.
- 13 a. Describe the factors to considered during good construction
OR
b. Explain Risk and suggest two ways of reducing risk with appropriate examples
- 14 a. Explain briefly State Disaster Response Fund.
OR
b. Explain briefly provisions in the Act for Disaster Risk Reduction.
- 15 a. Explain Volcanism and discuss the causes and effects .
OR
b. Explain briefly capacity development themes.

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022
CIVIL ENGINEERING
Seventh Semester
ELECTIVE - TOTAL QUALITY MANAGEMENT
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Explain with an example on durability of a product.
- 2 Define leadership in quality aspects.
- 3 Write short note on customer defection.
- 4 Differentiate between team and teamwork.
- 5 Mention any four features of check sheet.
- 6 List the new seven tools of quality management.
- 7 Why site visits are necessary in a benchmarking process?
- 8 Explain the term reliability.
- 9 Write short notes on environmental effect.
- 10 Differentiate between ISO 14000 and ISO 9000 series of quality system.

PART-B (5 x 16 = 80)

- 11 a. Enlighten the habits of successful people according to Stephen Covey.

OR

- b. Define quality cost. Explain the different types of quality costs.

- 12 a. Describe the Juran Trilogy in detail with diagram.

OR

- b. Discuss the various steps in the development of performance appraisal system.

- 13 a. Write notes on:

(a) Differentiate matrix diagram and matrix data analysis diagram.

(b) Differentiate tree diagram and decision tree diagram. Calculate mean, median, mode and standard deviation for the following distribution of marks in TQM out of 100 marks for 80 students.

Marks	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
No. of students	4	26	22	16	12

(P.T.O)

OR

- b. Describe in detail the steps involved in six sigma process. And also discuss the advantages of six sigma.

- 14 a. Discuss in detail the quality function development with suitable diagram.

OR

- b.
 - a) List out the benefits of the FMEA.
 - b) Discuss the different types of FMEA.

- 15 a. Explain the various stages of quality auditing.

OR

- b. Discuss in detail the benefits of ISO 14000.

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022

CIVIL ENGINEERING

Sixth Semester

HIGHWAY ENGINEERING

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

- 1 Write various factors controlling the alignment of roads?
- 2 Briefly outline the highway development in India.
- 3 Write different types of Transition Curves.
- 4 State the factors that govern the length of summit curve.
- 5 What is meant by flexible pavement?
- 6 Write different strength tests for the evaluation of soil subgrade.
- 7 List different methods of road construction.
- 8 Compare tar and bitumen.
- 9 Write note on pavement evaluation.
- 10 Briefly explain the term spalling of joints.

PART-B (5 x 16 = 80)

- 11 a. Compare the Nagpur road plan and the second twenty year road plan, discuss the merits of each.

OR

- b. a. What are the objects of highway geometric design?
b. Define Camber and discuss the effects of shape of camber and the effects of providing steep cross fall.

- 12 a. (i) Under what circumstances summit curves are provided.
(ii) Calculate the stopping sight distance required to avoid head on collision of two cars approaching from opposite directions at a speed of 85Kmph and 95 Kmph. Assume that the reaction time of drivers be 2.5secs and the coefficient of friction between road surface and tyres be 0.4.

OR

- b. Calculate the safe stopping sight distance for design speed of 60 km/hr for
a. Two way traffic on a two lane road.
b. Two way traffic on a single lane road. Assume suitable data required.

- 13 a. Discuss the advantages and limitations of the CBR method of design.

OR

(P.T.O)

b. Discuss Westergaard's concept of temperature stresses in concrete pavements.

14 a. Discuss the principles, applications and limitations of direct shear, triaxial and unconfined compression test.

OR

b. Write short notes on
a. Penetration macadam
b. Bituminous concrete

15 a. What is meant by pavement evaluation and explain it?

OR

b. What are the various types of failures in flexible pavement? Explain the causes.

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS -FEB - 2022
CIVIL ENGINEERING
Seventh Semester
ELECTIVE - MUNICIPAL SOLID WASTE MANAGEMENT
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Write short notes on waste transformation.
- 2 What is centralized sorting?
- 3 Define of Bio-degradable waste.
- 4 Give the applications of medium container storage
- 5 What are the common collection services used for residential waste?
- 6 Define container utilization factor.
- 7 Write short note on compaction.
- 8 Write short note on electrostatic precipitator.
- 9 Write the formula for leachate generation rate in Active Area.
- 10 List out some Ground water investigation

PART-B (5 x 16 = 80)

- 11 a. Explain resource recovery through material recycling?
OR
b. State the environment impact of improper designed landfill?
- 12 a. Explain the incineration process with neat sketch
OR
b. What are the component separation methods available for solid waste processing? Explain any one type.
- 13 a. Write short note on the following unit operations of solid waste transfer operations
 - a) Pickup
 - b) Haul
 - c) At-site
 - d) Off- route**OR**
b. What are transfer stations? List out the operations to be carried out in transfer Station.
- 14 a. Explain about various method of collection of wastes?
OR
b. What is component separation? Explain in detail with proper sketches.
- 15 a. Describe the advantages and disadvantages of land filling methods
OR
b. List out and explain the common solid waste components.

VINAYAKA MISSIONS RESEARCH FOUNDATION**(Deemed to be University)****B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022****CIVIL ENGINEERING****Sixth Semester****DESIGN OF STEEL STRUCTURES**

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions**Part-A (10 x 2 =20 Marks)**

- 1 What are the advantages of HSFG bolts?
- 2 Define the term edge distance.
- 3 Define tension member.
- 4 Draw the various forms of tension members
- 5 What is meant by strut?
- 6 What is meant by actual length?
- 7 State the permissible value for a slenderness ratio in compression member
- 8 Draw the neat sketch of built up beam sections
- 9 Write about spacing of purlins
- 10 Write over turning effects due to wind loads in plate girders

PART-B (5 x 16 = 80)

- 11 a. A tie member consists of two ISMC 250.the channels are connected on either side of 12mm thick gusset plate. Design the welded joint to develop the full strength of the tie. However the overlap is to be limited to 400mm.

OR

- b. Design the welded connection to connect two plates of width 200mm and thickness 10mm for 100% efficiency
- 12 a. Design a single angle section for a tension member of a roof truss to carry a factored tensile force of 225KN.the member is subjected to the possible reversal of stress due to the action of wind. The length of the member is 3m.Use 20mm shop bolts of grade 4.6 for the connection.

OR

- b. Explain about lug angles.
- 13 a. Design a slab base for a column ISHB 300@577N/m carrying an axial factored load of 1000KN.M20 concrete is used for the foundation. Provide welded connection between column and base plate.

OR

- b. A column section ISHB 350@710N/m is carrying a factored load 800KN a factored moment 30N/m and a factored shear of 80KN.assuming ends are milled, design a suitable column splice.

(P.T.O)

- 14 a. Design a simply supported beam to carry a uniformly load of 68 KN. The Effective span of beam is 6 m. the effective length of compression flange of beam is also 6m. The ends are free from to rotate at the section

OR

- b. The effective length of compression flange of simply supported beam MB 500, @0.869kN/m is 8m. Determine the safe uniformly distributed load per meter length which can be placed over the beam having an effective span of 8m. Adopt maximum permissible stress as per code. The ends of beam are restrained against rotation at the bearings.

- 15 a. Explain about the various elements of the roof truss and mark all its significance

OR

- b. LB 200, @ 0.198 kN/m is subjected to bending moment 12 kN-m. The plate of loading passes through centroid of beam section, and it is inclined 8 degree with YY – axes in the anti-clockwise direction. Locate the neural axis. Determine maximum bending stress induced in the beam section.

Sl.No. 4025 D

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022
CIVIL ENGINEERING
Seventh Semester
ELECTIVE - GROUND IMPROVEMENT TECHNIQUES
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Briefly write about the role played by ground improvement in foundation engineering.
- 2 When is pre-loading adopted as a ground improvement technique?
- 3 What is a Well Point System?
- 4 State the advantages and disadvantages of dewatering.
- 5 What is Static compaction?
- 6 What is a sand compaction pile?
- 7 Define Geopipes
- 8 Define Geofoam .
- 9 Define Grouting.
- 10 What is meant by Chemical Stabilization ?

PART-B (5 x 16 = 80)

- 11 a. Write in brief about : a). Compaction b). Vibro-Compaction c). Pre-loading d). Pre-loading with vertical drains

OR

 - b. Write about the following. a). Chemical stabilization b). Grouting
- 12 a. What is a deep well? When is it adopted? What are its merits and demerits?

OR

 - b. Compare the various dewatering systems suitability with its merits and demerits.
- 13 a. Write in brief about the following. a). Sand drains b). Wick drains

OR

 - b. How is a stone column installed by vibro-displacement method?
- 14 a. Geosynthetics can be used as soil reinforcement – Justify in detail with supporting sketches.

OR

 - b. Explain the methods for improving the expansive soil.
- 15 a. Write a detailed note on the various grout injection methods.

OR

 - b. Enumerate in detail the different methods of mechanical stabilization.

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS -FEB-2022
CIVIL ENGINEERING
Sixth Semester
DESIGN OF REINFORCED CONCRETE AND MASONRY
STRUCTURES

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Write short notes on retaining wall
- 2 What are the forces acting on the retaining wall?
- 3 Mention the factor to be consider while design the water tank
- 4 What is the different between under ground and over head water tank
- 5 Write short notes on tread
- 6 What is the necessary to provide culvert?
- 7 Draw the neat sketch of yield line pattern for simply supported triangular slab
- 8 Define the term durability
- 9 Write short notes on effective length of column
- 10 State the term permissible stress

PART-B (5 x 16 = 80)

- 11 a. Design a counter fort retaining wall based on the following data
Height of wall above ground level = 6m
SBC of soil = 160kn/m²
Angle of internal friction = 33°
Density of soil = 16kn/m³
Spacing of counter forts = 3m c/c
Adopt M20 grade concrete and Fe415 HYSD bars

OR

- b. Design a cantilever retaining wall to retain earth embankment 4.5m high above ground level. The density of earth is 18kn/m³ and its angle of repose is 25°. The embankment is horizontal at its top. The safe bearing capacity of the soil may be taken as 210kn/m² and the coefficient of friction between soil and concrete is 0.55. Adopt M20 grade concrete and Fe415 HYSD bars.
- 12 a. A reinforced concrete dome of 6m base diameter with a rise of 1.25m is to be designed for a water tank. The uniformly distributed live load including finishes on dome may be taken as 2 kn/m² Adopting M20 concrete and grade I steel, Design the dome and ring beam Permissible tensile stress in steel = 100N/mm²

(P.T.O)

OR

- b. Design a circular tank with fixed base for capacity of 5, 00,000 liters. The depth of water is to be 4m. Free board 200mm using M20 concrete and grade I steel
Permissible Direct Tensile Stress In Concrete = $1.2n/\text{mm}^2$
Permissible stress in steel in direct tension = $100\text{N}/\text{mm}^2$

- 13 a. Explain the type of staircase with neat sketches

OR

- b. Write the design procedure of flat slab

- 14 a. Broadly explain the yield line theory

OR

- b. Design a circular slab of diameter 4m which is simply supported t the edges. Adopt service live load as $5 \text{ kn}/\text{m}^2$ and Adopt M15 concrete and Fe415 bars. Assume load factor according to IS:456-2000 code

- 15 a. What is brick masonry? Explain

OR

- b. Explain briefly about the design of axial loaded brick wall?

Sl.No. 4024 D

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022
CIVIL ENGINEERING
Fifth Semester
MODERN METHODS OF STRUCTURAL ANALYSIS
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

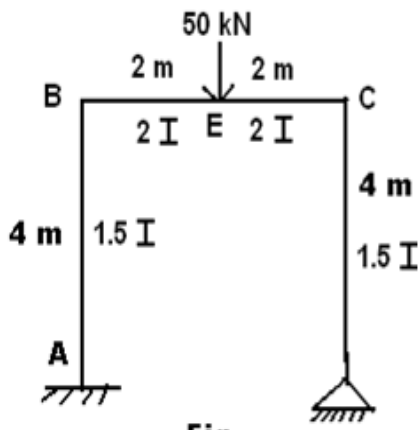
Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 Define internal and external indeterminacies.
- 2 Define compatibility in force method of analysis.
- 3 Define degree of freedom of the structure with an example.
- 4 Write about the force displacement relationship.
- 5 List out the advantages of FEM.
- 6 What are different types of elements used in FEM?
List out the shape factors for the following sections
- 7 a. Circular section
b. Diamond section
- 8 How is the shape factor of a hollow circular section related to the shape factor of a ordinary circular section?
- 9 What are the components in suspension bridge with stiffening girder?
- 10 What are the forces developed in beams curved in plan?

PART-B (5 x 16 = 80)

11 a.

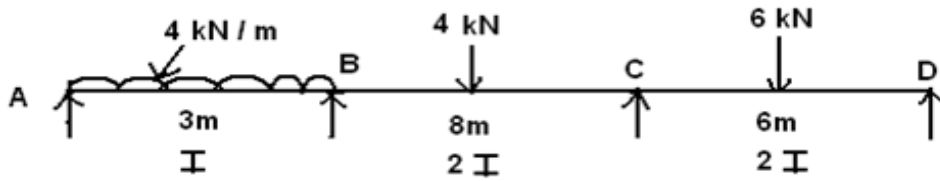
4. Analyse the portal frame ABCD shown in figure by flexibility matrix method and sketch the bending moment diagram



2
OR

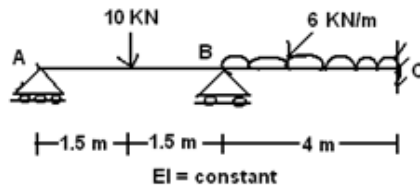
b.

Analyse the continuous beam shown in figure by flexibility method.



12 a.

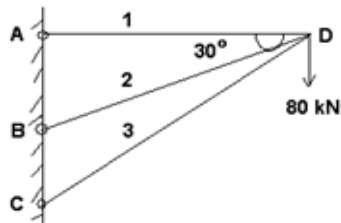
Analyse the continuous beam ABC shown in figure by stiffness method and also sketch the bending moment diagram



OR

b.

Using matrix stiffness method, analyze the truss for the member forces in the truss loaded as shown in figure. AE and L are tabulated below for all the three members.



Member	AE	L
AD	400	400
BD	461.9	461.9
CD	800	800

13 a.

How the CST (Constant Strain Triangles) developed in FEM? Explain the above Elaborately.

OR

b. Explain elaborately the term convergence. Also mention the commonly used F.E software and their uses.

14 a. Analyse a propped cantilever of length 'L' and subjected to udl of w/m length for the entire span and find the collapse load.

OR

b. A uniform beam of span 4 m and fully plastic moment MP is simply supported at one end and rigidly clamped at other end. A concentrated load of 15 kN may be applied anywhere within the span. Find the smallest value of MP such that collapse would first occur when the load is in its most unfavorable position.

- 15 a. A three hinged stiffening girder of a suspension bridge of 100 m span subjected to two pointloads 10 kN each placed at 20 m and 40 m respectively from the left hand hinge. Determine the bending moment and shear force in the girder at section 30 m from each end. Also determine the maximum tension in the cable which has a central dip of 10 m.

OR

- b. A suspension bridge cable has a span of 120m and a central dip 10m is suspended from the same level at two towers. The bridge cable is stiffened by a stiffening girder hinged at the end supports which carries a single concentrated load of 100kN at a point of 30 m from left end. Assuming equal tension in the suspension hangers.
Calculate:
i) the horizontal tension in the cable.
ii) the maximum positive bending moment.

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022
CIVIL ENGINEERING
Seventh Semester
RAILWAY, AIRPORT AND HARBOUR ENGINEERING
(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions
Part-A (10 x 2 =20 Marks)

- 1 What are the four main types of welding rails?
- 2 Define gauge and different type of gauges.
- 3 Name different types of yards.
- 4 What is the role of remote sensing and GIS in railways?
- 5 What is meant by Runway?
- 6 Mention the advantages of airport.
- 7 Write a short note on Transit shed.
- 8 Give the short notes on Quays.
- 9 What is meant by evaluation of highway projects?
- 10 What are various types of economic evaluation?

PART-B (5 x 16 = 80)

- 11 a. Define the following. i).Negative super elevation ii). Cant deficiency iii) Various types of gradient iv).Grade compensation

OR

- b. Derive an equation for super elevation with a neat sketch.

- 12 a. Describe the various types of railway stations with sketches.

OR

- b. Draw a neat sketch of diamond crossing in railways indicating the important features.

- 13 a. Describe types of airport components with neat sketch.

OR

- b. What is wind rose diagram? What is its utility? What are its types? Explain each type.

- 14 a. Describe in detail the various types of floating docks.

OR

- b. Explain the various types of Coastal Protection works.

- 15 a. Write and explain the cost and benefits of transport project.

OR

- b. Explain basic principles of economic Evaluation.

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022

CIVIL ENGINEERING

Seventh Semester

ESTIMATION AND QUANTITY SURVEYING

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

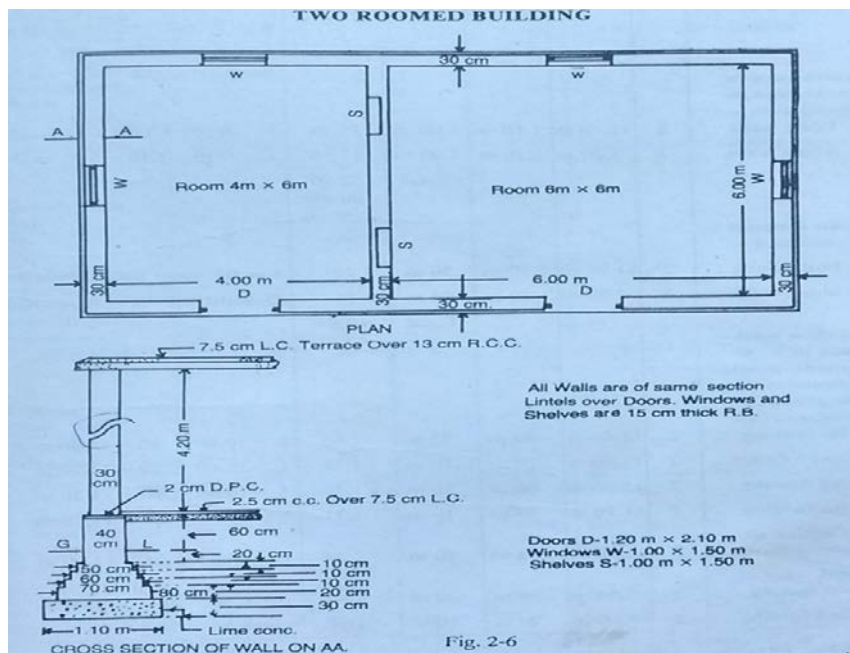
Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

- 1 Define Centerline method of estimating.
- 2 Differentiate wearing coat and soling coat in a Road work.
- 3 Define General Specification?
- 4 What are the qualifications needed for a tenderer?
- 5 What is a running account bill?
- 6 Write a model work order form.
- 7 What are the necessities of valuation?
- 8 What is the difference between Valuation and Estimation?
- 9 Differentiate Debit and Credit.
- 10 What is a debit account?

PART-B (5 x 16 = 80)

- 11 a. 1. Estimate the quantities by Separate wall method of the following items of two room building from the given plan and section.
- Earthwork in excavation in foundation.
 - Foundation in lime concrete.
 - Ist class brick work in CM 1:6 in foundation & plinth
 - 2.5cm DPC and
 - Ist Brickwork in lime mortar in Superstructure

**OR**

- b. What are the different types estimates? Explain briefly.
- 12 a. Write the detailed specifications for Plain Cement concrete and Reinforced cement concrete.

OR

- b. Write the detailed specifications
- White washing.
 - Colour washing.
 - Painting and
 - Pointing.
- 13 a. What are the problems occur while executing the construction work in site.
- OR**
- b. What is M book? How it is used in the field of construction for one project?

(p.t.o)

Sl.No. 4031 D

- 14 a. A first class building is situated on a main road of the city, having plot area 600 sq.m The covered area is 50% of the plot. All amenities such as water supply, sanitary and electricity are provided. The age of the building is 20 years. The assumed plinth area rate at the time of construction was rs 250/- per sq.m. Assume life of the building as 100 years and cost of the land as rs 70/- per sq.m. Find the total value of the property

OR

- b. A three storied building is standing on a plot of land measuring 800sq.m. The plinth area of each story is 400sq.m. The R.C.C. framed structure and the future life may be taken as 70 years. The building fetches a gross rent of Rs. 1500.00 per month. Work out the Capitalized value of the property on the basis of 6% Net yield. For sinking fund 3% Compound interest may be assumed. Cost of land may be taken Rs. 40.00per sq.m. Other data's required may be assumed suitably.
- 15 a. What are the rules and regulations to be followed when transfer the entries?

OR

- b. Write the classification of tools and plants and explain it?

Sl.No. 4031 D

VINAYAKA MISSIONS RESEARCH FOUNDATION**(Deemed to be University)****B.E. (PART TIME) DEGREE EXAMINATIONS - FEB-2022****CIVIL ENGINEERING****Third Semester****ADVANCED MECHANICS OF SOLIDS**

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours

Maximum Marks:100 Marks

Answer **ALL** questions**Part-A (10 x 2 =20 Marks)**

- 1 Write down the expression for the strain energy stored in a rod of length 'L' and cross sectional area 'A' subjected to tensile load?
- 2 Find the strain energy per unit volume, the shear stress for a material is given as 50 N/mm². Take G= 80000 N/mm².
- 3 State the degree of indeterminacy in a fixed beam.
- 4 What are the advantages of fixed beams?
- 5 What is the middle third rule?
- 6 Write the expression for crippling load when column with one end fixed and other end hinged.
- 7 State the principal theories of failure.
- 8 Explain shear strain Energy theory.
- 9 Write the shear centre equation for unsymmetrical I section.
- 10 Define stress concentration.

PART-B (5 x 16 = 80)

- 11 a. A simply supported beam of span L is carrying a concentrated load W at the centre and a uniformly distributed load of intensity of w per unit length. Show that Maxwell's reciprocal theorem holds good at the centre of the beam.

OR

- b. A beam 8m length carries loads of 40kN each at a distance of 2m and 6m from one end. The beam is simply supported at the ends. The beam is of rectangular section with breadth b and depth d. If $d=2b$, and the shear stress is not to exceed, Take $c=80\text{MN/m}^2$. find
- i size of beam
 - ii energy stored
 - iii deflection due to shear under the load of 40kN

- 12 a. Derive the expression SF and BM for a propped cantilever carrying a point load at the centre and propped at the end, draw SF and DM diagrams.

OR

- b. A cantilever beam ABC of span 6m fixed at A and propped at C is loaded with an UDL of 10 kN/m for the length of 4m from the fixed end. Find the prop reaction, maximum sagging and point of concentrations.

(P.T.O)

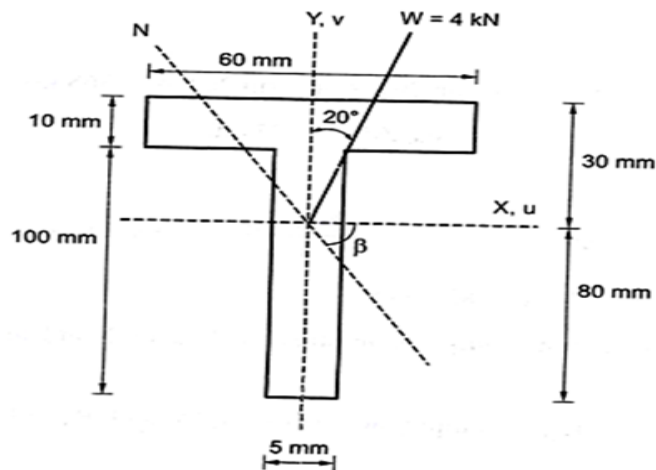
- 13 a. Determine Eulers crippling load for an I section joist 40cm x 20cm x 1cm and 5m long which is used as a strut with both ends fixed. Take $E=2.1 \times 10^5 \text{ N/mm}^2$.

OR

- b. A 1.5 m long cast iron column has a circular cross-section of 50mm diameter. One end of the column is fixed and other end is free. Taking factor of safety as 3, calculate the load using Rankine formula. Take yield stress as 560 MPa and $a=1/1600$.
- 14 a. Direct stresses of 120 N/mm^2 tensile and 90 N/mm^2 compression exist on two perpendicular planes at a certain point in a body. They are also accompanied by shear stress on planes. The greatest principal stress at the point due to these is 150 N/mm^2 .
- a) What must be the magnitude of the shearing stress on the two planes?
b) What will be the maximum shearing stress at the point?

OR

- b. In a material, the principal stresses are 50 kN/m^2 , 40 kN/m^2 , and -30 kN/m^2 . Calculate the total energy, volumetric strain energy, shear strain energy and factor of safety on the total strain energy criteria if the material yields at 100 N/mm^2 .
- 15 a. A curved beam has a T-section (shown in fig.). The inner radius is 300 mm. what is the eccentricity of the section?



OR

- b. Derive the equation of Shear centre for unequal I-section.
