

Seat Number

--	--	--	--	--	--



Engineering Geology (114111)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** sub question from each unit. Figures to the right indicate full marks.
5. Assume suitable data if necessary.

UNIT – I

- | | | |
|----|---|---|
| 1. | What do you understand by the term 'structure of a Rock?' Enumerate and briefly discuss the various structures that are found in sedimentary Rocks? | 8 |
| 2. | What are Igneous Rocks? How are they formed? Differentiate between Intrusive and Extrusive rocks? | 8 |
| 3. | a) Explain in detail Agents of metamorphism | 4 |
| | b) Explain in detail kinds of metamorphism. | 4 |

UNIT – II

- | | | |
|----|--|---|
| 4. | Explain in detail concordant and discordant structures of Igneous rocks? Describe Laccoliths, Paccoliths and Batholiths in detail. | 8 |
| 5. | What is meant by folding of rocks and how is it produced? Describe the various types of folds encountered in the crust of the earth? | 8 |
| 6. | e) Explain depth zones of ground water table? | 4 |

- f) Explain in detail artesian wells? 4

UNIT – III

7. What are the physiographic divisions of India? Describe in detail coal deposit of Gondwana system in India? 8
8. Explain with figure how development of valley takes place? Describe the resulting features of river rejuvenation, 8
9. g) What are field characters of Deccan trap basalt? 4
- h) Explain basic dykes of Deccan trap basalt? 4

UNIT – IV

10. Describe the surface and subsurface exploration for engineering project? 8
11. Describe the quality and quantity of drill water, core- logging, core recovery? 8
12. c) Give an account of causes of landslides? 4
- d) Give an account on preventive measures taken against landslides. 4

UNIT – V

13. Discuss the different problems which a civil engineer has to face during construction of dams in limestones, Deccan trap and what are the suitable treatment. 8
14. Why tunneling is required? How do decide suitability if fault and fold occurs during tunneling? 8
15. i) Discuss in detail dams on compact basalt? 4
- j) Discuss in detail dams on Amygdaloidal basalt? 4

Seat Number

--	--	--	--	--	--



Fluid Mechanics - I

(114112)

P. Pages : 3

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All **five** questions are compulsory. Attempt **any two** out of a, b & c at one place only.
5. Figures to the right indicates full marks.
6. Use of non programmable calculator is allowed.
7. Assume suitable data if necessary.

UNIT – I

1. a) State any eight properties of fluid. Also state their units. 8
- b) Ten liters of a liquid of specific gravity 1.3 is mixed with eight liters of a liquid of specific gravity 0.8. If the bulk of the liquid shrinks by 1% on mixing. Calculate specific gravity, the volume and the weight of the mixture. 8
- c) A vertical gap 1.2 cm wide of infinite extent contains fluid of viscosity 1 N-S/m^2 & specific gravity 0.9. A metallic plate of size $1\text{m} \times 1\text{m} \times 0.2\text{cm}$ is lifted up with a constant velocity of 0.2m/s through the gap. If the plate is at a distance of 0.4cm from one of the plane surfaces of the gap, find the vertical force required take weight of the plate 50 N . 8

UNIT – II

2. a) In order to measure the pressure difference between two points in an inclined pipeline carrying water, an inverted U – tube is connected to the points. Manometric liquid has specific gravity 0.5 and the manometer deflection is 0.8m . If the down stream tapping is 0.4m lower than the upstream one, find the pressure difference between the two points. 8

- b) A vertical sluice gate 4m wide & 2m deep is hinged at the top. Liquid of specific gravity 1.5 stands to a height of 2m above the top of the gate on the upstream side. On the downstream side water stands to a height of 1m above the top of the gate. Find Resultant force acting on the gate and point at which the resultant force acts. 8
- c) A wooden block of relative density 0.7 has width 15cm, depth 30cm & length 150cm. It floats horizontally on the surface of sea water (take density $\approx 1000 \text{ kg/m}^3$). Calculate the volume of water displaced, depth of immersion & the position of centre of buoyancy. Also find the metacentric height. 8

UNIT – III

3. a) What is flow net ? how is it constructed ? What are the methods of drawing a flow net ? state uses of flow net. 8
- b) In a two dimensional incompressible steady flow, stream lines are drawn so that they are 10mm apart and velocity at first location is 5m/s. What is the velocity in the same field where the stream lines are 8mm apart ? If pressure at first location is 200 kPa, find out the pressure at second location. Assume the density of the fluid as 900 kg/m^3 . 8
- c) A horizontal venturimeter with inlet & throat diameter 300mm & 100mm respectively is used to measure the rate of flow of water. The pressure intensity at inlet is 130 kN/m^2 while the vacuum pressure head at the throat is 35cm of mercury. Assuming that 3% of head is lost in between inlet & throat, find ; the value of coefficient of discharge for the venturimeter & the rate of flow. 8

UNIT – IV

4. a) State four advantages of dimensional analysis & model analysis. 8
- b) From the following data, find the scale ratio of model. 8
 Model – velocity of water 1m/s through circular pipe.
 Prototype – velocity of oil 0.12 m/s through 50mm diameter pipe
 Assume kinematic viscosity of water $0.01 \text{ cm}^2/\text{s}$ & that of oil $0.006 \text{ cm}^2/\text{s}$. Assume dynamic similarity. Also find the diameter of pipe used for model.
- c) A 300mm diameter pipe carried oil of density 950 kg/m^3 & dynamic viscosity 1.0 N.S/m^2 . If the length of the pipe is 10km and the discharge is 150 lit/s. Check whether the flow will laminar or not. Also calculate the power required to pump the oil. 8

UNIT – V

5. a) What is notch ? Differentiate between a notch & a weir. How are notches & weirs classified ? 8
- b) An external cylindrical mouthpiece of 15cm diameter is discharging water under constant head of 6m. Determine discharge through the mouthpiece & coefficient of discharge. (Assume $C_c=0.62$). 8
- c) Two orifices are placed in a vertical wall in such a way that lower one is 30cm above the ground while upper one is 6m above the first one. Horizontal distance travelled by the jet from top orifice is three times than the one travelled by lower jet. Both distances are measured at ground level. Assuming $C_v = 0.98$ for both orifices, find the head of water behind the wall. 8

Seat Number

--	--	--	--	--	--



Theory of Structure - I (114113)

P. Pages : 5

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** questions from each unit.
5. Figures to the right indicates full marks.
6. Use of non programmable calculator is allowed.
7. Assume suitable data whenever necessary.

UNIT - I

1. a) For simply supported beam shown in fig.1 find slope and deflection at centre of beam. Use moment area method and assume uniform flexural rigidity. Also find position and amount of maximum deflection. 8

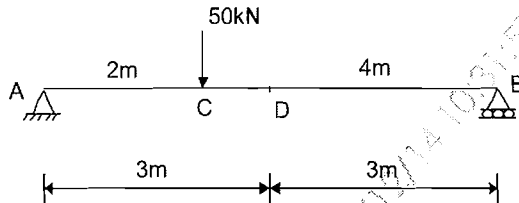


Fig.1

- b) For a simply supported beam shown in fig. 2 calculate slope and deflections at A, B, C and D. Take $E = 2 \times 10^5 \text{ MPa}$, $I = 2 \times 10^6 \text{ mm}^4$ use conjugate beam method. 8

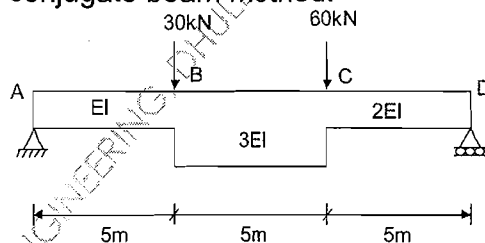


Fig.2

- c) A simply supported beam of span 6m carries a udl of 20 kN/m over left half of the span. Using unit load method. Calculate the deflection at midspan $EI = 16000 \text{ kNm}^2$. 8

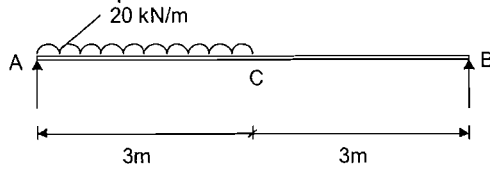


Fig. 3

UNIT - II

2. a) A framed structure is loaded as shown in fig. 4 find the vertical deflection of the joint D if. 8

- area of all horizontal members = $5 \times 10^{-4} \text{ m}^2$
- area of all vertical members = 10^{-4} m^2
- area of all inclined members = $5.6 \times 10^{-4} \text{ m}^2$
- and $E = 2 \times 10^8 \text{ kPa}$.

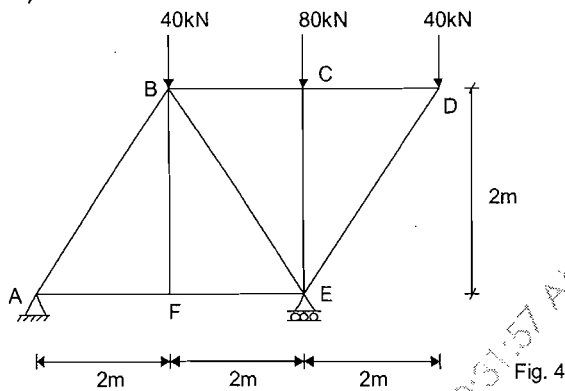


Fig. 4

- b) A truss consisting of two equilateral triangles is loaded as shown in fig. 5. Determine the vertical deflection of the joint C and the horizontal movement of the roller at D. The length of each member is 3 m the cross sectional area of all ties are 300 mm^2 each and that of all struts are 600 mm^2 each. Take $E = 200 \text{ GPa}$. 8

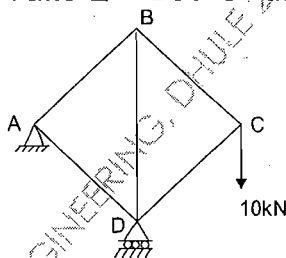


Fig. 6

- c) Analyse the truss supported and loaded as shown in fig. 7 cross section area of each member in cm^2 is indicated in brackets Take $E = \text{constant}$. 8

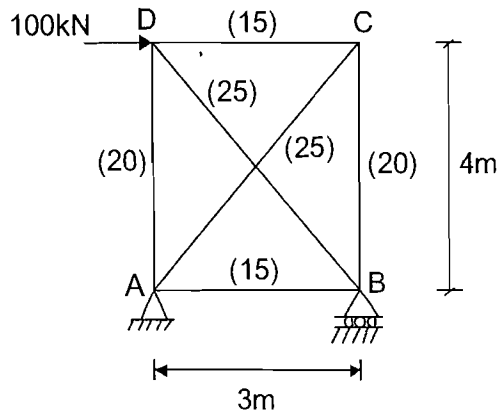


Fig. 7

UNIT - III

3. a) A fixed beam AB of span 8 m carries point load of 20 kN and 40 kN at 2 m and 5m from A respectively. It also carries a udl of 20 kN/m spread over the length of 3 m between two point loads. Calculate the support moments and draw SF and BM diagram for the fixed beam. 8
- b) A fixed beam of span 'L' carrying UVL of zero at one end and w/m at 'a' from support A. i.e. over the part of span. Determine fixed end moments at supports of plot BMD. 8

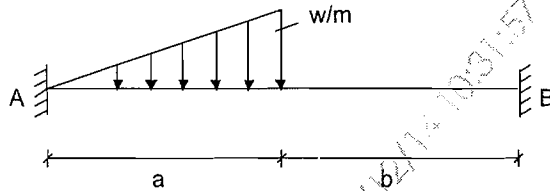


Fig. 8

- c) A continuous beam ABC is fixed at A and is simply supported at B and C such that $AB = BC = 6\text{m}$. AB carries a point load of 60 kN at the centre. A clockwise couple of 180 kNm is acting at the centre of BC consider EI constant. Calculate the support moments and draw SFD and BMD. 8

UNIT – IV

4. a) A three hinged parabolic arch with hinges at springings A and B and at crown 'c' is loaded as shown in fig. 8. The load of 40 kN acts at centre of AC. Calculate the reactions at A and B and bending moment at point. D which is the mid point of CB. 8

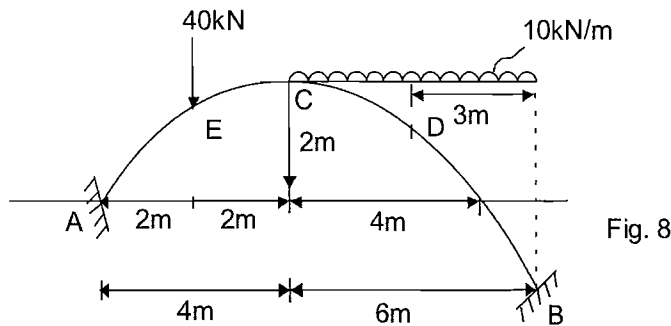


Fig. 8

- b) A three hinged parabolic arch of horizontal span l and central rise y_c carries a udl of w per horizontal unit length over the left hand half of the span. Calculate the position and magnitude of the maximum bending moment. 8
- c) A two hinged parabolic arch is loaded as shown in fig. 9 determine the 8
- horizontal thrust
 - maximum positive and negative moments.
 - shear force and normal thrust at 10 m from the right support.

Assume $I = I_0 \sec\theta$. Where I_0 is the moment of inertia at the crown and θ is the slope at the section under consideration.

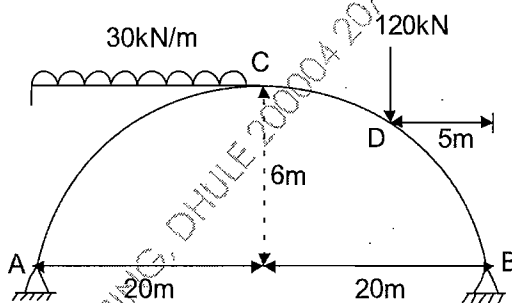


Fig. 9

UNIT - V

5. a) Find the reactions at supports, SF at E and moment at E for the beam loaded as shown in fig. 10 using influence line diagrams. 8

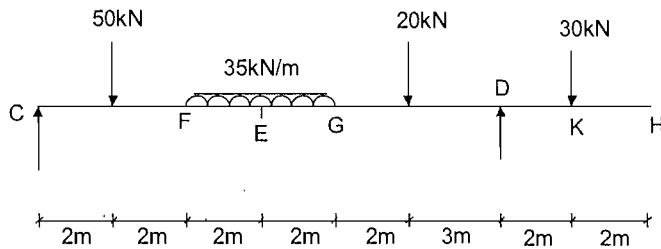


Fig. 10

- b) A girder of span 20m is simply supported at its ends four wheel loads 150 kN, 150 kN, 250 kN and 100 kN transverse the girder from right to left with 100 kN load leading distance between wheel loads is 3m each. 8

Using influence lines determine :

- maximum SF at 8 m from left support.
- maximum BM at 8 m from left support.

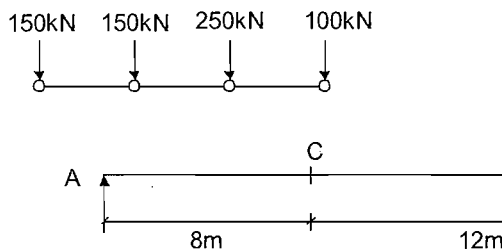


Fig. 11

- c) i) What do you mean by 1LD ? State its uses. 4
- ii) Explain condition for maximum BM at a section for wheel load. 4

SSVPS'S COLLE

GINEERING, DHULE 200004 20/12/14 10:31:57 AM SSVPS'S COLLEGE OF ENGINEERING, DHULE 200004 20

Seat Number

--	--	--	--	--	--



Building Design & Drawing (114114)

P. Pages : 4

Time : Four Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** questions from each unit.
5. The Drawing questions should be draw on drawing sheet only.
6. Use of non programmable calculator is allowed.
7. Assume suitable data if necessary.

UNIT - I

1. a) Explain the term: 8
 - i) Building bye laws & its necessity.
 - ii) Systems of ventilation.
- b) Explain the term: 8
 - i) Necessity of air conditioning.
 - ii) Fire load.
- c) Explain the term: 8
 - i) Requirements for different building services.
 - ii) One pipe and two pipe system.

UNIT – II

2. Planning of residential building single storeyed, flat roof type load bearing structure with detail drawing (Refer fig 1) & other data given below :

- Foundation is at 1000 mm depth.
- Sill height = 800 mm.
- Ceiling height = 3000 mm.
- Thickness of slab = 120 mm.
- Rise = 160 mm, Tread = 250mm and width of stairs = 1300
- Chajja projection = 750 mm.
- Slab projection = 150 mm.
- UCR masonry in cm (1.6) in plinth and foundation.
- BBM in cm (1.6) 300 thk for masonry wall
- Provide doors and windows suitably.

Draw to a scale of 1:100 assuming any other data

- Draw detailed plan of Refer Fig 1 8
- Front Elevation showing all details of Refer Fig 1 8
- Section along A'A' with all details. 8

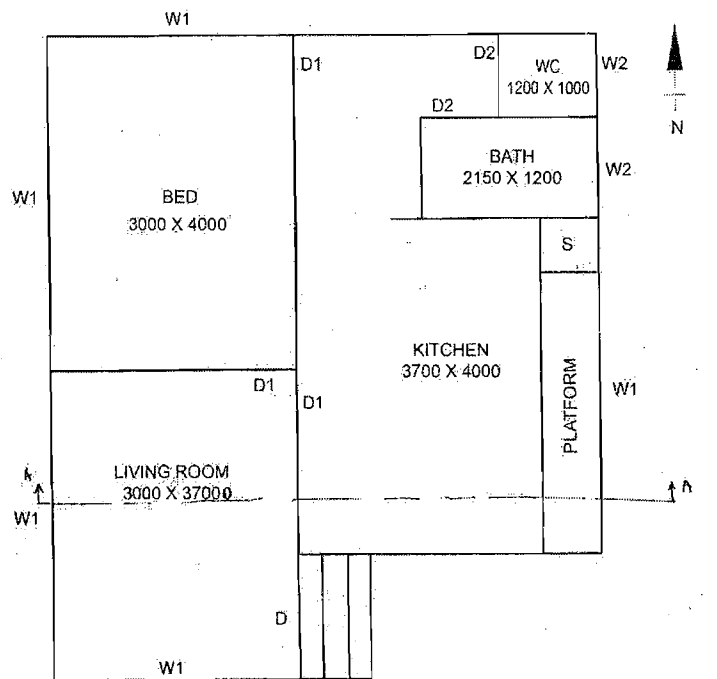
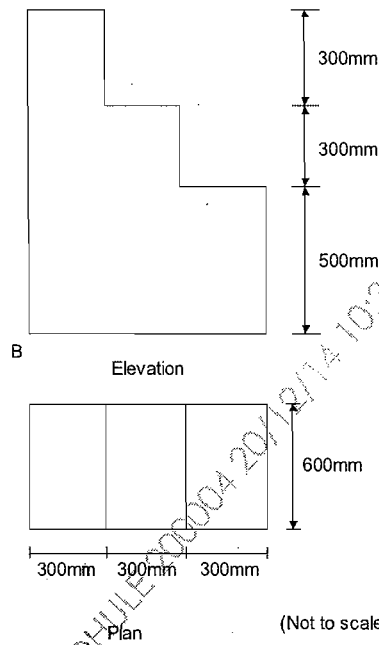


FIG. (1) Line Plan of Residential Building

UNIT – III

3 Planning and designing of apartment house (Flat) Having framed structure only from given data.

- i) Size of plot – 25 m x 30 m.
- ii) Permissible built up area on each floor 1/3 of plot area.
- iii) Draw a scale of 1:100 assuming all necessary data.
- a) Draw Typical floor plan of flat (Detailed) showing column position. 8
- b) Detail Elevation of the above typical floor plan assuming all standard details. 8
- c) The Fig 2 shows the plan and elevation of an object it is inclined at a angle of 30° to picture plane (B) The observer is standing at a distance of 3.0 m from picture plane along central visual ray. Assuming eye level a 2.0 m above G. L. Draw the perspective view to suitable scale. 8



UNIT – IV

4. a) Draw a line plan of hostel building for 40 students double seated with all requirements. with scale of 1:100 (Frame structure only) 8
- b) Showing the detail furniture arrangement of one room. 8
- c) Showing detail site plan of the hostel building. 8

UNIT – V

5. a) Draw a line plan of bank building with all requirements with scale of 1: 100 (Frame structure only) 8
- b) Showing the detail schedule of Doors and windows of bank building. 8
- c) Showing parking plan of the Bank building. 8

Seat Number

--	--	--	--	--	--



Surveying - II (114115)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** questions from each unit.
5. Non-programmable calculator is allowed.

UNIT – I

1. a) Two stations A and B 120km apart are 144m and 556m above mean sea level. An intervening peak 70km from A has RL of 160m. As certain whether A and B are intervisible or not. If not find the height of the scaffold at B so that the line of sight has 2m clearance everywhere. 8
- b) Explain in brief the various triangulation figures commonly adopted and compare its merit & demerits. 8
- c) Explain about base line measurement. List the equipment used for base line measurement. 8

UNIT – II

2. a) State and explain any five laws of weights. 8
- b) Explain : 4
 - i) Delambres method. 4
 - ii) Adjustment of triangle with central station. 4
- c) Explain method of adjustment of Geodetic quadrilateral. 8

UNIT – III

3. a) Explain crab and drift in aerial photogrammetry. 8
- b) Write short notes on following.
- i) Aerial photogrammetry. 4
- ii) Terrestrial photogrammetry. 4
- c) Define photogrammetry, its objects and applications to various fields. 8

UNIT – IV

4. a) Explain methods of locating soundings. 8
- b) Explain the principle of working of Nautical Sextant. Explain procedure of measuring horizontal angle with Nautical Sextant. 8
- c) Explain the various methods of solving a three point problem in hydrographic surveying and explain clearly the analytical method. 8

UNIT – V

5. a) Explain with a sketch the components of a "Remote sensing" system. 8
- b) State clearly the various practical applications of remote sensing to civil engineering field. 8
- c) Explain principle of EDM. State the applications of EDM to civil Engineering. 8

Seat Number

--	--	--	--	--	--



Concrete Technology (113103)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** sub questions from each unit.
5. Figures to the right indicate full marks.
6. Use of non programmable calculator is allowed.
7. Assume suitable data if necessary.

UNIT – I

1. a) i) What is hydration? On which factors rate of hydration depends? 4
 ii) List out various tests to be carried out on cement. Which test is very important justify your stand. 4
- b) i) Explain the term 'Grading of Aggregates' Explain its effect on properties of concrete. 4
 ii) Write a short note on 'Flakiness index'. 4
- c) i) How well graded and poorly graded aggregates affect the strength of concrete. 4
 ii) Write a short note on 'Gap graded aggregates'. 4

UNIT – II

2. a) Explain the difference between bleeding and segregation and state measures to be taken to avoid each. 8
- b) Define the term water cement ratio. Explain the effect of water cement ratio on strength of concrete. Show the relation between water cement ratio and compressive strength by graph. 8
- c) Define Shrinkage of concrete and give its classification. Write a short note on Carbonation Shrinkage. 8

UNIT – III

3. a) i) Write a short note on Accelerators. 4
- ii) State and explain the effects of hot weather on concreting remedial measures. 4
- b) Write different types of self compacting concrete Advantages and disadvantages of self compacting concrete. 8
- c) i) Explain effect of plasticizer on concrete. 4
- ii) Write a short note on 'Marsh cone test'. 4

UNIT – IV

4. a) i) Explain the term 'Target Strength' for mix design. 4
- ii) Enlist the basic data required for mix design. 4
- b) Explain the various steps in concrete mix design according to I.S. code method. 8
- c) i) What do you understand by Nominal mix, standard mix, and design mix? 4
- ii) Explain factors affecting the choice of mix proportions. 4

UNIT – V

5. a) Write short notes on :
- i) Permeability of concrete. 4
- ii) Durability of concrete. 4
- b) Write short notes on :
- i) Pulse velocity method. 4
- ii) Non destructive testing on concrete. 4
- c) i) What do you understand by 'Carbonation of concrete'? 4
- ii) How carbonation of concrete can be determined? 4

Seat Number

--	--	--	--	--	--



Building Construction Techniques & Materials (113104)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** questions from each unit.
5. Figures to the right indicate full marks.
6. Assume suitable data, if necessary.

UNIT – I

- | | | |
|----|---|---|
| 1. | Give comparison between Load bearing wall type and R.C.C. framed structure. | 8 |
| 2. | Draw sectional elevation showing basic components in a building Load bearing wall type. | 8 |
| 3. | Enumerate the various types of building foundations. Explain any one with sketch. | 8 |

UNIT – II

- | | | |
|----|---|---|
| 4. | Name various types of masonry. What are the general principles to be observed in the construction of stone masonry. | 8 |
| 5. | Name the different bonds used in brick masonry. Show by sketches any two. | 8 |
| 6. | Write short notes on any two of the following. | 8 |
| | i) Cavity wall. | |
| | ii) Hollow concrete blocks masonry. | |
| | iii) Form work. | |

UNIT – III

7. What are the types of Lintels. Differentiate between steel lintels and R.C.C. Lintels. 8
8. Name various types of doors. Explain any one by means of neat sketch. 8
9. What are the various types of stairs. Draw section of dog-legged stair. 8

UNIT – IV

10. What are the types of steel sloping Roof trusses. Give line diagrams (any four) for different spans. 8
11. Write short notes **any two** of the following. 8
 - i) Scaffolding.
 - ii) Shoring.
 - iii) Under pinning.
12. Draw sectional elevation of R.C.C. framed structure showing basic components (through wall). 8

UNIT – V

13. What are the qualities of good building stone. Describe in brief any one test performed on stones. 8
14. What are the various tests performed on bricks explain any one test. 8
15. Write short notes on **any two**. 8
 - i) Defects in timber.
 - ii) Veneers.
 - iii) Heat insulating materials/means.

Seat Number

--	--	--	--	--	--



Surveying – I (113105)

P. Pages : 2

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** questions from each unit.
5. Figures to the right indicate full marks.
6. Use of non- programmable calculator is allowed.

UNIT – I

1. a) Explain with neat sketch reciprocal levelling & profile levelling. 8
- b) The following reading were taken with a level & 4m staff. Draw up a level book page & reduce the levels by rise & fall method. 8
 0.578 BM (= 58.250m), 0.933, 1.768, 2.450, (2.005 and 0.567) C.P., 1.888, 1.181, (3.679 and 0.612) C. P., 0.705, 1.810.
- c) i) Draw a neat sketch to indicate the following level surface, horizontal Surface, Vertical line and Horizontal line. 4
- ii) Define Bench Mark. Explain the types of bench mark. 4

UNIT - II

2. a) The following records are obtained in a traverse survey, where the length & bearing of the last line were not recorded. 8

Line	Length (m)	Bearing
AB	75.50	30°24'
BC	180.50	110°36'
CD	60.25	210°30'
DA	?	?

Compute the length & bearing of line DA.

- b) Explain in detailed temporary adjustments of transit theodolite. 8
- c) i) Explain procedure of measuring magnetic bearing of a line with theodolite. 4
- ii) What is mean by balancing a traverse? State the various rules used to this. 4

UNIT – III

3. a) Explain with neat sketches characteristics of contours. 8
- b) i) Explain fixed hair method. 4
- ii) Write a short note on Anallactic lens. 4
- c) To determine the elevation of a point P, a tachometer was set up at a station A and observations were made to a staff held vertically at P. As a check, the instrument was set up at another point B and observations were taken to a staff held at P. The R. C. of the BM was 235.455. The instrument constants were 100 and 0.3. Determine the R. L. of P from both observations. 8

Instrument at	Staff at	Vertical angle	Hair Readings	Readings at B. M.
A	P	3°45'	2.235, 2.795, 3.355	1.75
B	P	2°30'	0.945, 1.490, 2.035	2.25

UNIT – IV

4. a) What are the types of transition curve and how length of transition curve is found out? 8
- b) Explain elements of simple circular curve. 8
- c) Explain field procedure of setting out of compound curve. 8

UNIT – V

5. a) What is orientation? What are the methods of orientation? Describe the methods with neat sketch. 8
- b) What is the principle of plane table survey? What are the advantages & disadvantages of plane tabling? 8
- c) Write a short note on Box sextant & Abney level with neat sketch. 8

Seat Number

--	--	--	--	--	--



Engineering Mathematics - III (113101)

P. Pages : 4

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figures to the right indicate full marks.
5. Use of non-programmable calculator is allowed.
6. Assume suitable data, if necessary.
7. All questions are compulsory.

1. Solve any two

- a) i) Solve $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2y = \cos 2x$ 4
- ii) Solve $(D^2 + 2D + 1)y = x e^{2x}$ 4
- b) i) Solve $(D^2 + 3D + 2)y = e^{e^x}$ by V. P. method 4
- ii) Solve $u = r \frac{d}{dr} \left(r \frac{du}{dr} \right) + ar^3$ 4
- c) Solve $(2x+1)^2 \frac{d^2y}{dx^2} + 2(2x+1) \frac{dy}{dx} + 4y = 4 \sin[2 \log(2x+1)] + \cos 2 \log(2x+1)$ 8

2. Solve any two

- a) The differential equation satisfy by beam, uniformly loaded with one end fixed and second subjected to tensile force P. Given by 8

$$EI \frac{d^2y}{dx^2} - Py = -\frac{W}{2} x^2$$

Find equation of elastic curve for the beam under condition $y = 0, \frac{dy}{dx} = 0$ when $x = 0$.

b) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to conditions.

8

- i) u is finite for all t .
- ii) $u(0, t) = 0 ; \forall t$
- iii) $u(\pi, t) = 0 ; \forall t$
- iv) $u(x, 0) = \pi x - x^2 ; 0 \leq x \leq \pi$.

c) solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ subject to

8

- i) $u(x, \infty) = 0 ;$ for all x
- ii) $u(0, y) = 0 ;$ for all y
- iii) $u(10, y) = 0 ;$ for all y
- iv) $u(x, 0) = 100 \sin\left(\frac{\pi x}{10}\right) ; 0 \leq x \leq 10$.

3. Attempt any two

a) i) The first four moment about $x = 4$ are 1, 2.5, 5.5 and 16. Calculate coefficient of skewness and kurtosis.

4

ii) Calculate first four central moment from data

4

C. I.	0-20	20-40	40-60	60-80	80-100
F	6	8	21	10	5

b) i) If 10% bolts are produce in a company turn out to be defectives. Determine the probability that out of 10 bolts chosen at random, at most two will be defectives.

4

ii) The life of army shoes is normally distributed with mean 8 months and S. D. of 2 months. If 5000 pairs are issued, how many pairs would be expected to replacement after 12 months? $[P(z = 2) = 0.4772]$.

4

- c) The following are the marks obtain by ten students in statistic and mathematics. Obtain regression equation to estimate marks of statistics if marks of mathematics are 30. Also find $r(x, y)$. 8

Marks in Mathematics	25	28	35	32	31	36	29	38	34	32
Marks in statistic	43	46	49	41	36	32	31	30	33	39

4. Attempt **any two**.

- a) i) Define Hypothesis, Null hypothesis and alternative hypothesis. 4
- ii) A sample of 400 individuals is found to have a mean of 67.47. Can it be reasonably regarded as a sample from large population with mean 67.39 and S. D. 1.3. 4
- b) i) A manufactures of ball – bearings guarantees that 2% of items are defectives. A sample of 1000 ball bearings gave 25 defectives. Can we say that product meets guarantee at 5% L.O. S.? 4
- ii) In order to start a new S. T. bus to a certain remote village, it is required to get average fare of Rs 400 daily. Reports on number of passengers for 21 days revealed that the overage daily collection of fare was Rs 390 with S. D. of Rs. 40. Do these data supports the demand of people for starting a new S.T. bus to a village? [Given $t_{(20, 0.05)} = 1.725$]. 4
- c) In experiment on pea breeding, the following frequencies of seeds were obtained. 8

Round & Green	Wrinkled & Green	Round & Yellow	Wrinkled & Yellow	Total
222	120	32	150	524

Theory predicts that the frequencies should be in ratio 8 : 2 : 2 : 1. Examine the correspondence between theory and experiment.

[Given $\chi^2(3, 0.05) = 7.81$].

5. Attempt **any two**

- a) i) Find D. D. of $\phi = e^{2x} \cos yz$ at origine in the direction of tangent to the curve $x = a \sin t$, $y = a \cos t$, $z = at$ at $t = \frac{\pi}{4}$. 4

- ii) Show that $\vec{F} = (6xy + z^3)\vec{i} + (3x^2 - z)\vec{j} + (3xz^2 - y)\vec{k}$ is irrotational. 4
Hence find its scalar potential ϕ .
- b) i) If D. D. of $\phi = axy + byz + czx$ at (1, 1, 1) has maximum magnitude 4 4
in the direction parallel to x-axis. Find a, b, c.
- ii) Show that $r^2\vec{r}$ is irrotational vector field. 4
- c) Find surface of equipressure in case of steady motion of a rotation 8
which has velocity potential $\phi = \log(xyz)$ and is under the action of
force
 $\vec{F} = yz\vec{i} + xz\vec{j} + xy\vec{k}$.

Seat Number

--	--	--	--	--	--



Strength of Materials - I (113102)

P. Pages : 4

Time : Three Hours

Max. Marks : 80

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** sub question from each unit.
5. Figures to the right indicate full marks.
6. Use of non-programmable calculator is allowed.
7. Assume suitable data if necessary.

UNIT I

1. a) A hollow circular steel tube of external diameter 300 mm and uniform thickness of 20 mm throughout is filled with concrete from inside. Find the total axial compressive load, the column can support if permissible stress in concrete is 4 N/mm^2 and modular ratio is 18. The permissible stress in steel is 130 N/mm^2 . 8
- b) Find the stress and elongation of a steel bar, having uniform diameter D and length L , due to its self weight. The bar is rigidly fixed at its top end. 8
- c) Two vertical rods of steel and copper are rigidly attached at their upper ends, at a distance of 600 mm apart. Each rod is 3 m long and 12 mm in diameter. A horizontal rigid cross bar connects the lower ends of the rods carrying a load of 4500 N so that cross bar remains horizontal. Find the position of load on cross bar and the stresses in each rod. Take $E_s = 2 \times 10^5$ & $E_c = 1 \times 10^5 \text{ N/mm}^2$. 8

UNIT II

2. a) Derive the relation

8

$$\sigma_{\max} = \frac{W}{A} \left[1 \pm \sqrt{\frac{2h}{\delta_{st}} + 1} \right] \text{ where } \delta_{st} = \frac{PL}{AE}$$

- b) i) Derive the relation $E = 3K(1 - 2\mu)$.

4

- ii) Define the terms: Bulk Modulus, Modulus of rigidity, Poisson's ratio, Factor of safety.

4

- c) In a tensile test on a steel tube of external diameter 18 mm and internal diameter 12 mm, an axial pull of 2 kN produces stretch of 6.72×10^{-3} mm in a length of 100 mm and a lateral contraction of 3.62×10^{-4} mm in outer diameter. Calculate the values of Poisson's ratio and three moduli's viz, E, G & K.

8

UNIT III

3. a) Derive the expression for bending stress.

8

$$\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$$

- b) The horizontal beam as shown in figure 1, is hinged at A and supported on roller at B. Draw SFD and BMD showing all important points.

8

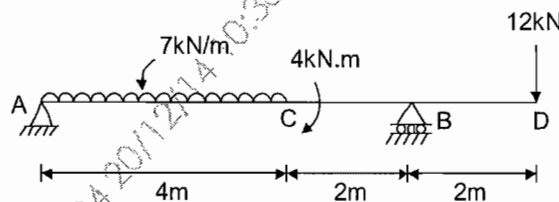


Fig.1

- c) A beam 500 mm deep of a symmetrical section has $I = 1 \times 10^8 \text{ mm}^4$ and is simply supported over a span of 10 m. Calculate,

8

- i) The udl it may carry if maximum bending stress is not to exceed 150 N/mm^2 .
- ii) The maximum bending stress if the beam carries a central point load of 25 kN.

UNIT IV

4. a) Derive the relation: shear stress $\tau = \frac{S\bar{A}\bar{Y}}{I \cdot b}$. Also show that for rectangular beam section, the maximum value of shearing stress is 1.5 times of average value. 8
- b) A T-shaped cross section of a beam in figure 2, is subjected to a vertical shear force of 100 kN. Calculate the shear stress at the neutral axis and at the junction of the web and flange. The M.I. at N.A. is $113.4 \times 10^6 \text{ mm}^4$. 8

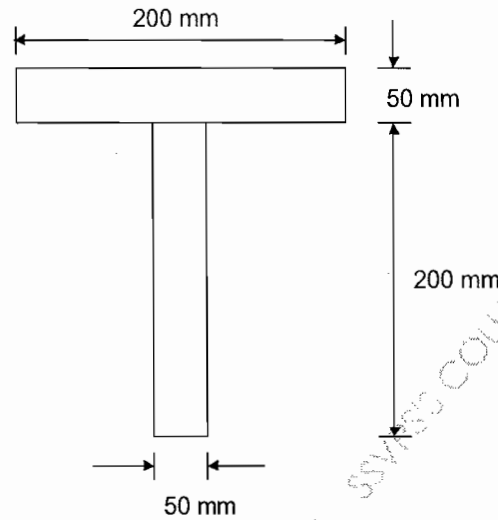


Fig.2

- c) A 1.2 m long column has a circular cross section of 45 mm diameter. The one end of column is fixed and another end is free. Taking the factor of safety as 3, calculate the safe load by using. 8
- i) Euler's formula, Taking $E = 1.2 \times 10^5 \text{ N/mm}^2$.
- ii) Rankine's formula, Taking $\sigma_C = 560 \text{ N/mm}^2$ and Rankine's constant $a = \frac{1}{1600}$.

UNIT V

5. a) Define Principal stresses and principal planes. If a rectangular member is subjected to a direct stress (σ) in one plane only. Then prove that normal and shear stresses on oblique plane are,

8

$$\sigma_n = \sigma \cos^2 \theta \text{ and } \sigma_t = \frac{\sigma}{2} \sin 2\theta.$$

- b) If an element is subjected to state of stress as shown in figure 3, find the principal stresses. Also find the stress components on a plane AE which is at 30° anticlockwise from face AC.

8

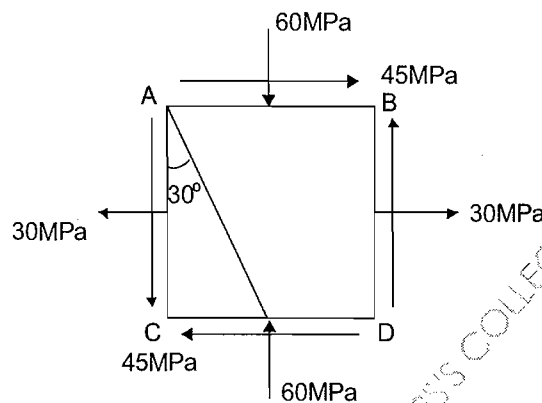


Fig.3

- c) A hollow rectangular pier is 500 mm X 800 mm externally with uniform thickness of 150 mm. It carries a compressive load of 1200 kN in a vertical plane bisecting 800 mm side at an eccentricity of 100 mm.
- Calculate maximum and minimum stresses over the cross section neglecting self weight.
 - If maximum compressive stress is limited to 5 MPa, find the permissible load at an eccentricity of 100 mm.
 - If maximum compressive stress is limited to 5 MPa, find the permissible eccentricity for 1200 kN load.

8

Seat Number

--	--	--	--	--	--



Concrete Technology (1040)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt all **five** questions.
5. From each unit, attempt **any two** bit out of a, b, c.
6. Neat diagrams must be drawn wherever necessary.
7. Figures to right indicate full marks.

UNIT – I

1. a) What is grading of aggregates ? How do you determine the fineness modulus of aggregates. 10
- b) i) What is hydration ? On which factors the rate of hydration depends. 5
- ii) Write a short note on initial setting time test on cement. 5
- c) Explain in detail crushing value and abrasion value test for aggregates. 10

UNIT – II

2. a) Explain the difference between bleeding and segregation and state measures to be taken to avoid each. 10
- b) List various properties of hardened concrete. Explain any one in detail. 10
- c) i) What is importance of water cement ratio in concrete. 5
- ii) Write a short note on creep of concrete. 5

UNIT – III

3. a) Explain in details polymer concrete and self compacting concrete. 10
- b) Explain the following in details.
- i) Light weight concrete. 5
- ii) Pumping of concrete. 5
- c) Define admixture. State classification of admixture and give its importance in concrete. 10

UNIT – IV

4. a) Define M20 Name the different method of concrete mix design and explain I.S. guidelines for the concrete mix design. 10
- b) i) Explain the Target strength for mix design. 5
- ii) What do you mean by nominal mix, standard mix and design mix. 5
- c) Explain statistical control and high strength concrete mix design. 10

UNIT – V

5. a) i) Write a short note on carbonation of concrete. 5
- ii) How distress of concrete can be diagnosed. 5
- b) Write short notes on :
- i) Repair of cracks. 5
- ii) Evaluation of cracks. 5
- c) i) What are the symptoms of distress on concrete. 5
- ii) Explain durability of concrete in detail. 5

Seat Number

--	--	--	--	--	--



Building Construction & Materials (1030)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **all five** questions.
5. From each question attempt sub questions (**any two** out of a,b,c) such that every question attempted for maximum 20 marks.
6. Figures to the right indicates full marks.
7. Assume suitable data if necessary.
8. Answer all the questions of a unit at one place.

UNIT – I

1. a) What are the different types of buildings as per NBC of India 1970. Compare load bearing and framed structure. 10
- b) What are the different types of foundations. Describe any one with sketch. 10
- c) Explain B. C of soil and factor of safety. 10

UNIT – II

2. a) Compare with sketch English bond and Flemish bond. 10
- b) What are the different types of stone masonry. Explain any one with sketch. 10
- c) Write short notes on : 10
 - a) Cavity wall construction.
 - b) Form work for civil engg. structure.

UNIT – III

3. a) Give comparison between Arch and Lintels. What are the types of Arches. Explain any one with sketch. 10
- b) Explain six parallel door with sketch & all related terms. 10
- c) What are the types of stair cases. Explain with sketches, where these are provided (any two). 10

UNIT – IV

4. a) Explain flat and pitched roof with sketch. What are various roof covering materials. 10
- b) Explain scaffolding and sharing, their types with sketch. 10
- c) Write short notes on – 10
- i) Ferro – cement.
- ii) Modular coordination.

UNIT – V

5. a) What is dressing of stone. What are the qualities of good building stone. 10
- b) What are the various tests of bricks. Explain any one test on bricks. 10
- c) Write short notes on. 10
- i) Veneers.
- ii) Defects in timber.

Seat Number

--	--	--	--	--	--



Strength of Materials (1010)

P. Pages : 4

Time : Three Hours

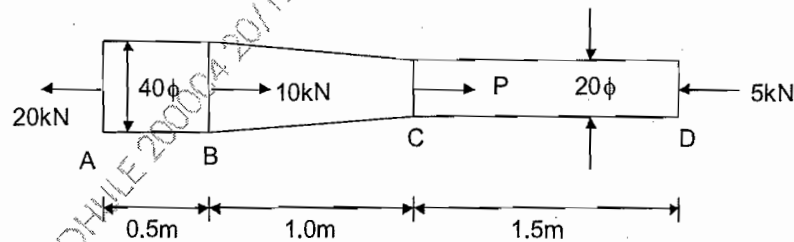
Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt complete question at one place only.
5. All questions are compulsory and solve **any two** bit out of a, b, & c in each question.
6. Assume suitable data if required.
7. Use of non programmable calculator is allowed.

UNIT- I

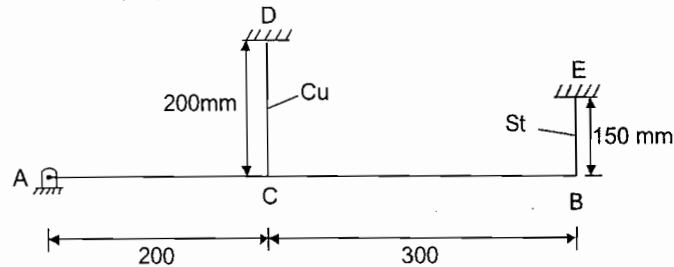
1. a) i) State and explain Hooke's law 2
 ii) Define stress and lateral strains. 2
 iii) Find unknown force 'P' and change in length of bar ABCD subjected to axial forces as shown in figure. Take $E = 200 \text{ G.Pa}$ 6



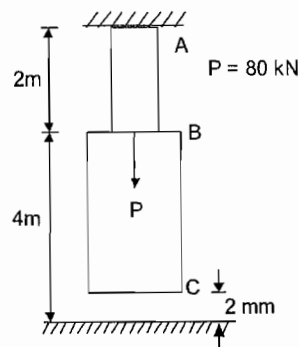
- b) A rigid bar AB is hinged at A and is supported by copper and steel wires as shown in figure. If temperature of the system is raised by 40°C , Find the stresses in wires

$$E_c = 100\text{GPa}, E_s = 200\text{GPa}, \alpha_c = 18 \times 10^{-6}/^\circ\text{C}.$$

$$\alpha_s = 12 \times 10^{-6}/^\circ\text{C}, A_{cu} = 500\text{mm}^2, A_{st} = 500\text{mm}^2.$$



- c) A compound bar ABC is rigidly fixed at A and is 2 mm above the lower support. It is loaded as shown in figure. IF the sectional area of AB is 200mm^2 and that of BC is 400mm^2 , determine the reactions at the ends and the stress in the two sections $E = 200\text{ G pa}$.



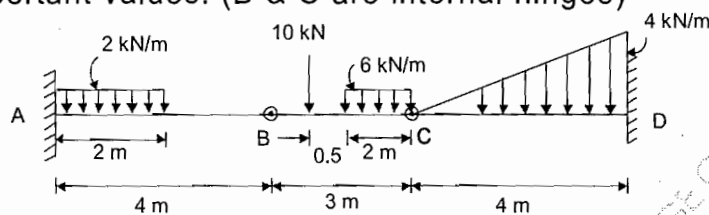
UNIT - II

2. a) i) Define modulus of rigidity. 2
 ii) A boiler shell 2m diameter, 4m long is subjected to internal fluid pressure of 3M pa If maximum tensile stress allowed in steel plate is 150 M Pa, find thickness of plate. Also find the changes in diameter, length and volume of the shell. 8
 $E = 200\text{G Pa}, \mu = 0.25$.
- b) i) Explain 'Bulk modulus' 2
 ii) A metal rod 700mm long. 25mm in diameter is pulled with an axial tensile force of 50 KN. A uniform lateral pressure of 32 M Pa is maintained over the entire surface of the rod. Calculate, change in length of rod, change in diameter of rod, & change in volume of rod. Take $E = 200\text{ G Pa}, \mu = 0.28$ for material. 8

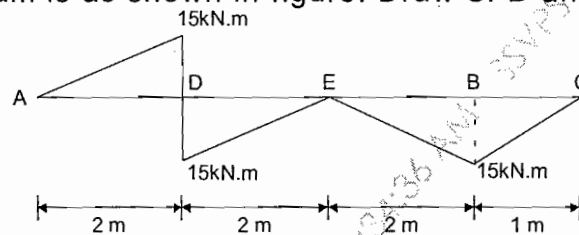
- c) i) Define proof resilience and modulus of resilience. 2
 ii) A wagon whose weight is 30 kN is attached to a wire rope and is moving on a level track at a speed of 3 km/hr. The area of cross section of the rope is 500 mm². Suddenly the rope jams and wagon is brought to rest. If the length of rope is 10 m at the time of sudden stoppage. Calculate the
 i) instantaneous maximum stress and 8
 ii) elongation in rope. Take $E = 200 \text{ GPa}$.

UNIT – III

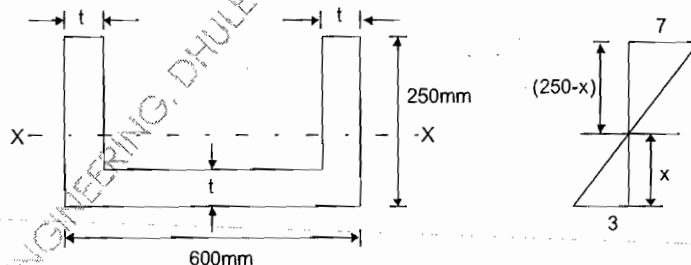
3. a) The beam is supported and loaded as shown in figure calculate shear force & bending moment and draw shear force diagram and bending moment diagram indicating all the important values. (B & C are internal hinges) 10



- b) A beam ABC is simply supported at A & B, supports A and B are 6m apart and overhang BC = 1m. The BM diagram for the beam is as shown in figure. Draw SFD and load diagram. 10



- c) i) State the assumptions made in theory of bending. 2
 ii) A beam having a cross section in form of a channel as shown in figure is subjected to bending moment action about the x-x axis. Calculate the thickness "t" of channel in order that the bending stresses at the top and bottom of beam will be in ratio 7:3. 8



UNIT – IV

4. a) i) State the equation of torsion with specifying all terms used. 2
 ii) A 'T' shape cross section of beam having flange width 500 mm and overall depth 700mm with uniform thickness 100 mm is subjected to shear force of 40 kN. Calculate the shearing stresses and sketch shear stress distribution. Also find the ratio of max^m shear stress to averages shear stress. 8
- b) i) Explain torsional rigidity. 2
 ii) A shaft is required to transmit 50 kW power at 200 r. p. m. The maximum torque may exceed the mean by 70% shear stress in the shaft is not to exceed 60 MPa. Determine the cross- section if it is solid circular (q) it is hollow circular having external diameter 1.5 times the internal. 8
- c) A column 6m long has both ends fixed. Cross section of column is solid circular. It has to support an axial load of 900 KN, Use Rankine's formula to determine suitable diameter for column. Take $\sigma_c = 330 \text{ M Pa}$ and $\alpha = \frac{1}{7500}$. Use factor of safety 3. 10

UNIT – V

5. a) i) Explain: 1) middle third rule 4
 2) Core section.
- ii) A rectangular stunt is 150mm wide and 120 mm thick It carries a load of 18 kN at an eccentricity of 10 mm in a plane bisecting the thickness. Find the maximum and minimum intensities of stress in the section. 6
- b) i) Define principal stresses and maximum shear stress. 2
 ii) A point in strained material is subjected to a normal tensile stress of 70 M Pa & shear stress of 30 M Pa on one plane and on the other plane i.e. perpendicular to first, one is subjected to a compressive resultant stress 'R' inclined at an angle of 60° with the plane. Determine the magnitude of 'R', principal stresses and location of principal planes. 8
- c) Find the dimensions of a hollow shaft internal diameter = 0.6 x external dia to transmit 150 kW at 250 r. p. m. If the shearing stress is not to exceed 70N/mm². 10
 If a B. M. of 3000 N-m is now applied to the shaft. Find the speed at which it must be driven to transmit the same power for the same value of maximum shearing stress.

Seat Number

--	--	--	--	--	--



Surveying - I (1020)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** questions from each unit.
5. Use of non programmable calculator is allowed.

UNIT – I

1. a) Explain :
 - i) Plotting of L – section and cross section. 5
 - ii) Curvature, refraction & combined correction. 5
- b) State the various permanent adjustment of dumpy level. Explain the procedure of test and adjustment of axis of bubble tube. 10
- c) Explain Reciprocal levelling? How errors are eliminated in reciprocal leveling ? 10

UNIT – II

2. a) Explain Gale's traverse table with suitable example. 10
- b) State the uses of theodolite and explain any one in detail. 10
- c) i) Write short note on consecutive co – ordinate and independent co – ordinate. 5
- ii) Explain principal axis of transit theodolite and give the relationship in between them. 5

UNIT – III

3. a) In tachometric surveying following observations are made with tachometer provided with analytic lens and staff being held vertically. Calculate RL of P, Q & R. Also calculate horizontal distance between PQ & QR. 10

Inst station	Height of axis in m	Staff at	Vertical angle	Reading (m)	Remark
P	1.5	B-M	$-6^{\circ}12'$	0.963, 1.515, 2.067	RL of
P	1.5	Q	$+7^{\circ}5'$	0.819, 1.341, 1.863	BM = 360.000
Q	1.6	R	$+12^{\circ}27'$	1.860, 2.445, 3.030	

- b) Explain :
 i) Fixed hair method. 5
 ii) To cheometric contouring. 5
 c) Derive an expression for the horizontal distance and elevation from tachometer when the line of sight is inclined and staff vertical. 10

UNIT – IV

4. a) What is mean by transition curve ? How length of transition curve is found out. 10
 b) What is mean by compound curve ? Explain setting out a compound curve. 10
 c) i) Explain with neat sketches types of vertical curve. 5
 ii) Derive the relation between the radius and degree of curve. 5

UNIT – V

5. a) Explain :
 i) Equipment required for plane table survey. 5
 ii) Errors in plane table surveying. 5
 b) What is two point problem and three point problem ? Explain solution of two point problem. 10
 c) Write short note on :
 i) Box sextant. 5
 ii) Digital planimeter. 5

Seat Number

--	--	--	--	--	--



Engineering Mathematics - III (1050)

P. Pages : 4

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All the questions are compulsory.
5. Assume suitable data, if necessary.
6. Figures to the right indicate full marks.
7. Use of non-programmable calculator is allowed.

1. Solve any four.

20

a) $(D^3 + 1)y = e^{-x} + 2^x$

b) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = \sinh x + \sin\sqrt{2}x$

c) $(D^2 - 2D + 1)y = x e^x \cos x$

d) Solve $(D^2 + 2D + 1)y = e^{-x} \log x$ by variation of parameter method.

e) $u = r \left[\frac{d}{dr} \left(r \frac{du}{dr} \right) \right] + ar^3$

- f) The deflection of strut with one end built in $x = 0$ and other supported and subjected to the end thrust P satisfy equation,

$$\frac{d^2y}{dx^2} + a^2y = \frac{a^2R^2}{P}(\ell - x)$$

Given that $y = \frac{dy}{dx} = 0$ when $x = 0$

Show that $y = \frac{R^2}{P} \left[\frac{\sin ax}{a} - \ell \cos ax + \ell - x \right]$

2. Attempt any two :

a) i) Solve : $\frac{dx}{dt} - y = 1, \frac{dy}{dt} - x = 1$ 6

ii) Solve : $\frac{dx}{1} = \frac{dy}{1} = \frac{dz}{(x+y)(3+e^{xy}+\sin xy)}$ 4

b) Solve : $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ subjected to conditions 10

i) $u(x, \infty) = 0; \forall x$

ii) $u(0, y) = 0; \forall y$

iii) $u(1, y) = 0; \forall y$

iv) $u(x, 0) = \sin^3 \pi x; 0 < x < 1$

c) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subjected to conditions 10

i) u is finite for all t

ii) $u = 0$ when $x = 0, \pi$; for all t

iii) $u(x, 0) = \pi x - x^2; 0 < x < \pi$

3. Attempt any four.

20

- a) Calculate coefficient of variation from following data.

x	6	7	8	9	10	11	12
f	3	6	9	13	8	5	4

- b) Obtain first four moment about mean from given data.

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

- c) The first four moments about $x = 5$ are 1, 2.5, 5.5 and 16. Calculate coefficient of Skewness and Kurtosis.
- d) Calculate coefficient of correlation from following data.

x	23	28	42	17	26	35	29	37	16	46
y	25	22	38	21	27	39	24	32	18	44

- e) If two lines of regression are

$$2x - 9y + 6 = 0, \quad x - 2y + 1 = 0$$

- Find i) mean of x and y
ii) coefficient of correlation $r(x, y)$

- f) Define Kurtosis. Explain types of Kurtosis.

4. Attempt **any four**.

20

- a) An urn contain 9 balls, two of which are red, three are blue and four are black, three balls are drawn from the urn at random. What is the probability that they are of the same colour?
- b) In a certain Bionomial distribution,
 $E(x) = 6$ and $\text{var}(x) = 3$. Find $P(x < 2)$
- c) A manufacturer of pins knows that on an average 5% of his products are defective. He sells pins in a box of 100 and guarantees that no more than 4 pins will be defectives. What is the probability that a box will meet guarantee?
- d) Let x be a continuous variable following normal distribution with mean 12 and S.D. of 2. What is the probability that the value of x selected at random lies in the interval (11, 14) ?
[Given $P(z = 0.5) = 0.1915$
 $P(z = 1) = 0.3413$]

- e) If the probability that an individuals suffer a bad reaction from an injection is 0.001. Determine the probability that out of 2000 individuals more than 2 will suffer a bad reaction?
- f) Among 64 offsprings of a certain cross between guniea pigs 34 were red, 10 were black and 20 were white. According to genetic model these numbers should be in ratio 9 : 3 : 4. Are the data consistent with model at 5% LOS?

$$[\text{Given } \chi^2_{(2, 0.05)} = 5.99]$$

5. a) Attempt **any two**.

8

- i) Define Hypothesis, Null Hypothesis, Alternative Hypothesis.
- ii) Write the error in testing of hypothesis.
- iii) Define sampling. Write types of sampling.

b) Attempt **any two**.

12

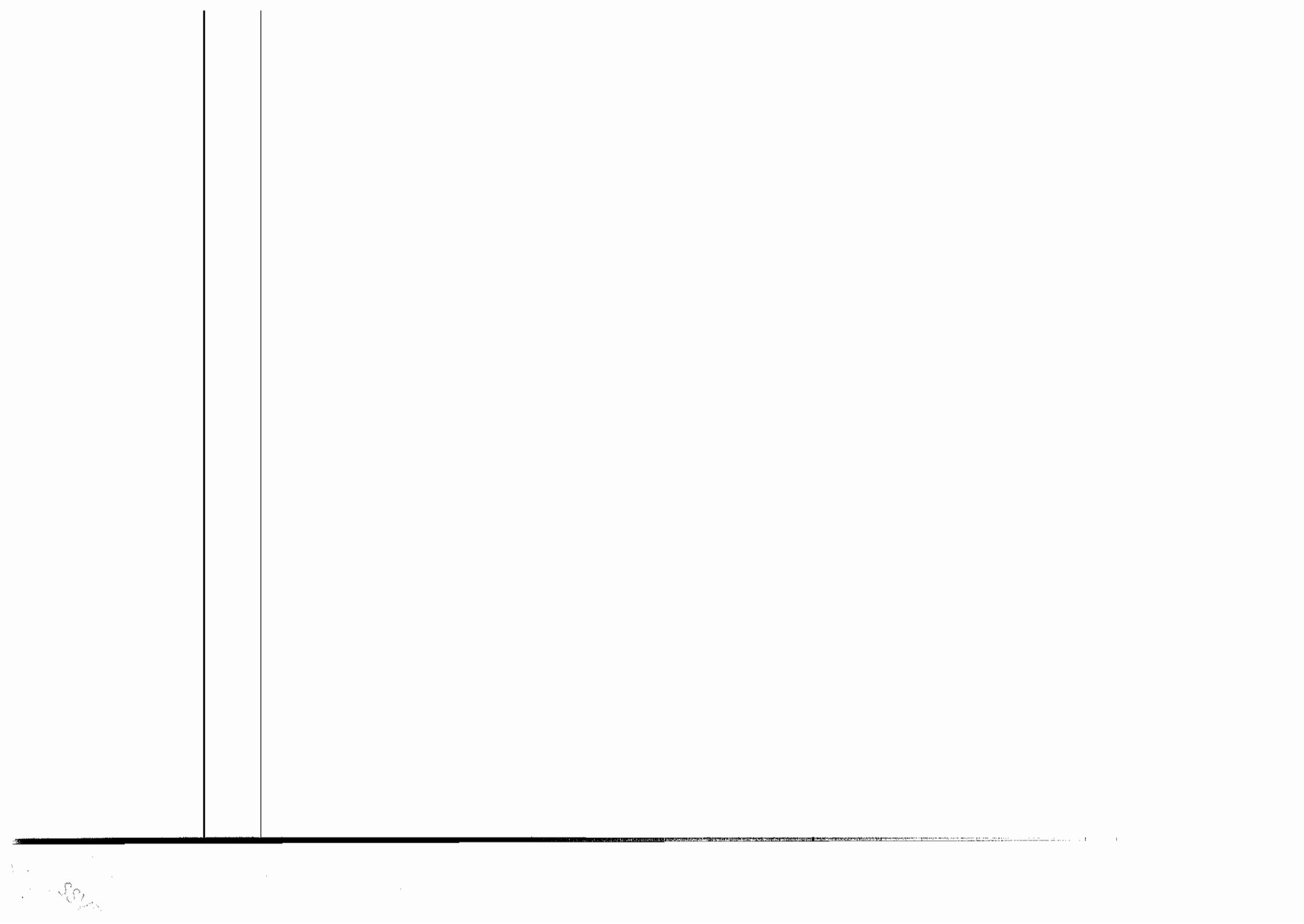
- p) A sample of 900 items is found to have mean of 65.3 cm. Can it be regarded as a sample from large population with mean 66.2 cm and S.D. of 5 cm at 5% LOS?
- q) A manufacturer of ball bearing guarantees that only 2% products supplied by him are defectives. A sample of 1000 ball bearing gave 25 defective. Can we say that product meets guarantee?
- r) From the following table showing the number of plants having certain characters, test the hypothesis that the flower colour is independent of flatness of leaf at 5% LOS.

$$[\text{Given } \chi^2_{(1, 0.05)} = 3.84]$$

	Flat Leaves	Curled Leaves
White Flower	99	36
Red Flower	20	5

SSV/PSG

SSV/PSG



Seat Number

--	--	--	--	--	--



Engineering Geology (1110)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** questions from each unit.
5. Assume suitable data if necessary.

UNIT – I

- | | | |
|----|---|----|
| 1. | Explain in detail welding, cementation and residual deposits. | 10 |
| 2. | Explain Hatch's scheme of classification of Igneous rock. | 10 |
| 3. | What are the rock forming minerals ? Define the mineral. Distinguish between Felsic and Mafic minerals. | 10 |

UNIT – II

- | | | |
|----|--|----|
| 4. | How rocks are faulted ? Describe its component parts and types of faults. | 10 |
| 5. | What is Rejuvenation of river ? Describe the resulting features of river rejuvenation. | 10 |
| 6. | Explain in detail Meanders and OX – bow lakes. | 10 |

UNIT – III

- | | | |
|----|--|----|
| 7. | Explain in detail vertical distribution of ground water. | 10 |
| 8. | Describe in detail perched water table, Artesian well and springs. | 10 |

9. Write a short note on – 10
- i) Mineral wealth of Dharwar.
- ii) Physiographic divisions of India.

UNIT – IV

10. Write in detail observations and precautions during drilling. 10
11. Explain drilling as a method of subsurface geological exploration and what are its limitations. 10
12. What is mean by land slide ? What are the causes and preventive measures to be taken against landslides. 10

UNIT – V

13. With suitable examples and neat sketches, explain about Dam on Deccan trap basalt and limestone. 10
14. Discuss in detail tunnels through fault and fold. 10
15. Write in detail geological investigation required for a reservoir. 10

Seat Number

--	--	--	--	--	--



Theory of Structures - I

(1070)

P. Pages : 4

Time : Three Hours

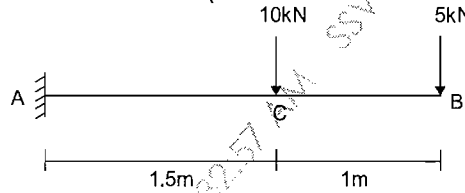
Max. Marks : 100

Instructions to Candidates :

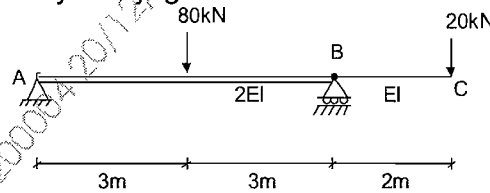
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any two** questions from each unit.
5. Figures to the right indicates full marks.
6. Use of non-programmable calculator is allowed.
7. Assume suitable data whenever necessary.

UNIT - I

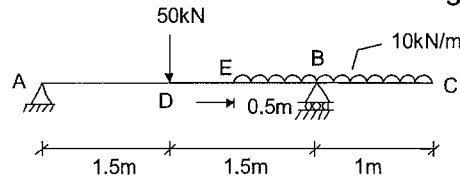
1. Determine the slope and deflection at the free end of a cantilever beam by moment area method (Take $EI = 4000 \text{KNm}^2$) 10



2. Determine the rotation at 'A' and deflection at 'C' in the overhanging beam by conjugate beam method. 10

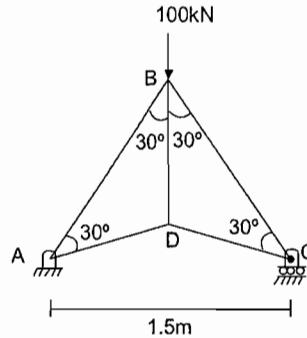


3. Determine the deflection at the free end of the overhanging beam by unit load method. Assume uniform flexural rigidity. 10

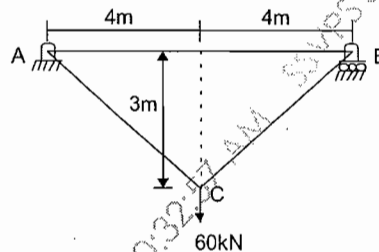


UNIT - II

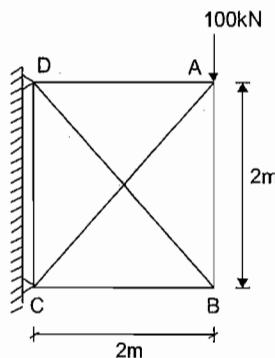
4. A symmetrical frame of 1.5 m span is hinged at 'A' & is suspended on roller at 'C'. as shown below. The cross sectional area of members AB and BC is 1000mm^2 while that of members AD, BD and CD is 500mm^2 . Determine the horizontal deflection of the joint 'C'. Take E for the frame material as 200 Gpa. 10



5. A pin - jointed frame is carrying a load of 60 kN at 'C' find vertical as well as horizontal deflection of 'C'. Take area of member AB as 1000mm^2 & those of members AC & BC as 1500mm^2 . E= 200 Gpa. 10

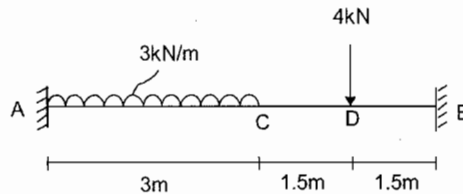


6. Analyze the truss supported and loaded as shown. The cross - sectional area and E are the same for all the members. 10

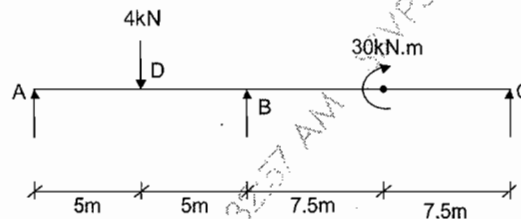


UNIT - III

7. A beam AB of uniform section and 6m span is built - in at the ends. A uniformly distributed load of 3 kN/m runs over the left half of the span & there is in addition a point load of 4 kN at right quarter as shown. Determine the fixing moments at the ends and the reactions. Also draw S. F. and B. M. Diagrams. 10



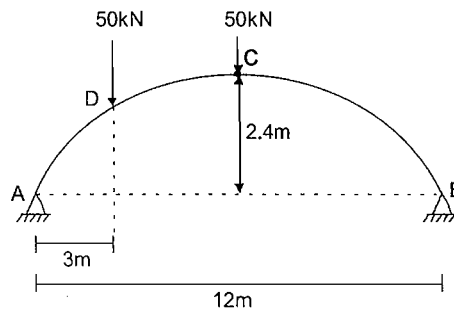
8. A beam AB of 8m span is fixed at its both ends. When a uniformly distributed load of 20 kN/m is placed on the beam, its support 'B' sinks 12 mm below the support A. What are the support moments. if 'I' for the section is $98.75 \times 10^6 \text{ mm}^4$ and $E = 200 \text{ GPa}$. 10
9. A Continuous beam ABC of constant Moment of Inertia is simply supported at A, B & C. as shown in figure. Find support moments and plot bending moment diagram and shear force diagram. 10



UNIT - IV

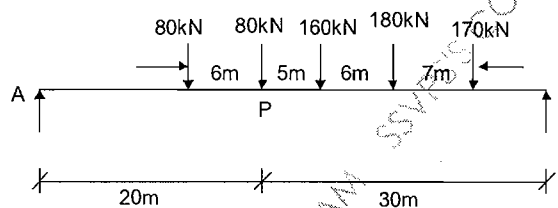
10. A parabolic three - pinned arch has a span of 20 m and central rise 4 m. It is loaded with a uniformly distributed load of 20 kN/m for a length of 8 m from the left end support. Draw Bending moment diagram and find the position and magnitude of maximum bending moment over the arch. 10
11. A Three - hinged parabolic arch has a span of 30 m and central rise 6 m. Determine the magnitude of maximum positive and negative bending moment at a section 10 m from left hand support, when point load 90 kN rolls over it. 10

12. A two hinged parabolic arch of span 12 m and central rise 2.4 m has secant variation for the moment of Inertia of the rib. and is loaded as shown. Find horizontal thrust on the arch and bending moment at 'D'. 10



UNIT - V

13. For the span shown in the sketch below, obtain the bending moment at a section 'P', 20 m from 'A' due to the given loads in the position indicated. Also determine the position of the loads, for maximum bending moment at section 'P' and the value of maximum moment. 10



14. A uniformly distributed load of 50 kN/m of 6 m length crosses a girder of span 40 m from left to right. With the help of influence lines, determine the values of shear force and bending moment at a point 12 m from the left support, when the head of the load is 16 m from the left support. 10
15. a) Discuss the uses and principles of Influence lines. 5
- b) Draw Influence lines for shear force and bending moment at any section of a simply supported beam of span l . Indicate salient points. 5

Seat Number

--	--	--	--	--	--



Fluid Mechanics - I

(1100)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** sub questions from each of five units.
5. Each sub question carries 10 marks.
6. It is advised to solve all parts of a question in one stretch.
7. Assume suitable data, if necessary.
8. Neat diagrams must be drawn, wherever necessary.

UNIT – I

1. a) Define following fluid properties and state their values for pure water at standard conditions in S.I. units. 10
 - i) Specific gravity
 - ii) Specific weight
 - iii) Dynamic viscosity
 - iv) Surface tension &
 - v) Vapour pressure.
- b) An isosceles triangular plate, of height 2 m & base 1.25m, closes an opening of same size in a vertical wall. The apex of the opening is downwards and base is horizontal. The plate is hinged along its base situated 1m below free surface of water, started on one side of the wall. Calculate the force required to be applied horizontally at the apex of the plate to keep it closed. 10
- c) State the Archimede's principle. 10

A body weighed 18N and 10N when weighed under submerged conditions in liquids of specific gravities 0.85 and 1.20 respectively. Calculate its volume and weight in air.

UNIT – II

2. a) i) Define streamline, equipotential line and flow net. 5
 ii) Explain uses & limitations of flow net. 5
 b) Define steady & unsteady flow. 10
- A vertical pipe, carrying oil of specific gravity 0.90, tapers uniformly from 20cm. diameter at the lower section to 10 cm diam. at the upper section. The vertical distance between the two sections is 1.20m. The pressure gauges installed at the lower and upper sections read 6.30 N/cm^2 and 5 N/cm^2 respectively, when the discharge of oil is 30 l/s. Calculate the loss of head between the two sections. Also determine the direction of flow.
- c) Water flows through an inclined venturimeter having inlet & throat diameters 10cm and 5cm respectively. The vertical distance between inlet & throat is 35cm. A mercury manometer joined between inlet & throat indicates 9cm of mercury column at a given flow rate. The inlet is lower than throat, i.e. flow is upwards. Neglecting friction, find the flow rate and pressure difference between inlet and throat. 10

UNIT – III

3. a) i) State & Explain Buckingham pi theorem. 3
 ii) The capillary rise 'h' of a fluid of density ' ρ ' and surface tension ' σ ' in a tube of diameter 'D' depends on the angle of contact ' θ ' and acceleration due to gravity 'g'. Obtain the expression for 'h' by using Buckingham pi theorem in the form.

$$\frac{h}{D} = f_n \left[\frac{\sigma}{\rho g D^2}, \theta \right]$$

 b) i) State the three methods of measurement of viscosity & principle on which they are based. 3
 ii) Oil of density 900 kg/m^3 & viscosity 0.30 Pa.s flows in a pipe of diam 15cm at a velocity of 2.0 m/s. Calculate the velocity of water in a 1.0cm diam pipe to make the two flows dynamically similar. Viscosity of water is 0.0013 Pa.s 7
 c) Define Laminar flow. 10
- A circular pipe, 6cm diam, carries a liquid in laminar state. A pitot tube at a radial distance of 2.5 cm from the axis indicated a velocity of 0.50 m/s. Determine : (i) the maximum velocity, (ii) the average velocity, (iii) discharge.

UNIT – IV

4. a) An orifice, 5cm diam, in a vertical side of a tank discharges water. 10
The water surface in the tank is at a constant level of 1.50m above the centre of orifice. The coefficient of contraction is 0.62.
If head loss in the orifice is 0.14m,
Calculate : (i) coefficient of velocity & coeff. of discharge,
ii) discharge through the orifice & (iii) the location of the point of impact of the jet on a horizontal plane located 0.50m below the centre of the orifice.
- b) i) Write a short note on Cipolletti Weir. 3
ii) Prove that under the same operating head of liquid, the discharge through an external mouthpiece is more than that through orifice of same size. 7
- c) The flow in a 2.50 m wide rectangular channel is measured by a rectangular Weir, 1.50mm long having crest height 0.50m. Find the discharge in the channel when the head over the Weir is 0.30m. Assume $C_d = 0.60$. Consider end contractions & velocity of approach. Take two trials only. 10

UNIT – V

5. a) i) A rectangular channel, 2.50 m wide, carries water at a depth of 1.0m. The bed slope is 1 in 2000. Find the average shear stress on the boundary. 5
ii) For a flow in a rectangular channel of width 4m & depth of flow 1.5m the Darcy – Weisbach friction factor 'f' is 0.025. Find the values of Chezy's 'C' & Mannings 'n'. 5
- b) Define the normal depth of flow in open channel. 10
Design the efficient trapezoidal channel section to carry $20 \text{ m}^3/\text{s}$ at a bed slope of 1 in 2500 & side slope of 1.5H : 1V. Assume Manning's $n = 0.020$.
- c) A rectangular channel carries a discharge of $2.0 \text{ m}^3/\text{s}$ at a depth of 0.20m. width of channel is 2.0m. 10
Calculate :
i) The specific energy.
ii) The depth alternate to the existing depth.
iii) Froude numbers at the existing and alternate depth.

--	--	--	--	--	--



Surveying - II (1080)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
 2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
 3. Students should note, no supplement will be provided.
 4. Answer **any two** subquestions from each question.
 5. Figures to the right indicates full marks.
 6. Use of non programmable electronic pocket calculator is allowed.
 7. Assume additional suitable data, if required.
-
1. a) Explain any five corrections to be applied to the base line measurement. 10
 - b) Write note on Signals & Towers. 10
 - c) i) From electronic station E 20.40m to the west of main station B, following angles were observed. 5
 $\angle BEC = 75^\circ 24' 15''$
 $\angle CEA = 57^\circ 22' 22''$
 The station E & C are on opposite sides of the line AB. Reduce the angles to B, if AB = 5270m & BC = 4820m.
 - ii) Two triangulation stations A & B, 45km apart have elevations 245m & 255m respectively. The intervening ground may have a uniform elevation of 214m. Ascertain whether station A & B are intervisible Both are ground station. If not find the minimum height of signal required at 'B' so that the line of sight may not pass nearer the ground by 3.0m. 5

2. a) State & explain any five Law's of Weights. 10
- b) Explain the method of adjustment of a braced geodetic quadrilateral. 10
- c) Following are the mean observed values of angles in spherical triangle PQR. 10
 $\angle P = 50^\circ 28' 23''$ weight 4
 $\angle Q = 66^\circ 09' 35''$ weight 3
 $\angle R = 63^\circ 22' 18''$ weight 2
Length of QR is 170km. Assuming the radius of earth to be 6371km.
Calculate
i) Spherical excess
ii) Adjusted spherical angles.
iii) Adjusted plane angles.
3. a) Explain the following. 10
i) Principal point.
ii) Tilt of photograph.
iii) Oblique photograph.
iv) ISO centre.
v) Collimation mark.
- b) i) Determine the minimum number of photograph required to be photograph for aerial photograph to cover an area of 60km x 40km from following data. 5
Size of Photograph – 23cm x 23cm
Scale of photograph 1:12000
Overlap – 60%
Side lap – 30%
- ii) A line AB measures 15cm on a photograph taken with an aerial camera having focal length 25cm. The same line measures 8cm on map drawn to a scale 1:40,000, Calculate the flying height of the air craft, if the average altitude of the ground is 500m. 5
- c) Explain : 10
i) Mirror stereoscope.
ii) Applications of photogrammetry.

4. a) Explain Basic components of an Ideal Remote sensing. 10
- b) Define Remote sensing. State how it differs from photogrammetry. 10
- c) List the applications of Remote sensing & describe any two in details. 10
5. a) State the different methods of locating sounding and explain any one in details. 10
- b) Explain how centre line on ground & then it's transfer of underground is done in tunnel surveying. 10
- c) Write short note : 10
 - i) Special features of mine surveying.
 - ii) EDM.

SSVPS'S COLLEGE OF ENGINEERING, DHULE 2000004 20
SSVPS'S COLLEGE OF ENGINEERING, DHULE 2000004 20/12/14 10:33:11 AM
SSVPS'S COLLEGE OF ENGINEERING, DHULE 2000004 20

Seat Number

--	--	--	--	--	--



Building Design & Drawing (1090)

P. Pages : 3

Time : Four Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Answer to the first two question should be written on ruled answer book and question three and four on drawing sheet.
6. Neat diagram must be drawn wherever necessary.
7. Figures to the right indicate full marks.
8. Assume additional suitable data if necessary.

UNIT I

1. Attempt any two.

- a) What are the principles of planning of building. Explain "Aspects" and "prospect" with sketch. 10
- b) Explain the necessity of building byelaws. Define "FAR" and "Height of building". 10
- c) Define: 10
 - i) Fire grading.
 - ii) Fire safety.
 - iii) Fire load.
 - iv) Air conditioning system.

UNIT II

2. Attempt **any two**. 5
- a) i) Define thermal insulation of a building. Write down different methods of thermal insulation. 5
- ii) Differentiate between sound insulation & acoustics. 5
- b) i) What are the different building services. Explain any one. 5
- ii) What is lighting? State necessity of artificial lighting. 5
- c) Compare one pipe system and two pipe system of plumbing with sketch. 10

UNIT III

3. Draw a residential building single storeyed on a plot 16 m x 20 m. The main road of 12 m is abutting 16 m side of plot on east of plot. The Accommodation and other requirements are as follows:

- i) Minimum requirements:
- | | | |
|-----------------|---|----------------------------|
| Living room | = | 15 m ² |
| Kitchen-Dinning | = | 15 m ² |
| Two Bed rooms | = | 15 m ² . (each) |

Staircase, W.C., Bath etc. of suitable size as per bye laws.

- ii)
- | | | |
|------------------|---|-------------|
| External walls | = | 20 cm thick |
| Internal walls | = | 10 cm thick |
| Plinth height | = | 1.0 m |
| Floor height | = | 3.15 m |
| Foundation Depth | = | 1.5 m |

- iii) The building is RCC framed structure type.

- iv) Draw following with scale 1:100.

- a) Detailed plan. 10

- b) Section through staircase. 10

- c) Front Elevation. 5

- and d) site plan to scale 1:200. 5

UNIT IV

4. a) Draw a single storeyed Hostel building with following data:

- i) No. of Students = 30
- ii) The rooms are two seated.
- iii) Additional provisions should be made for
 - Common room = 32 m²
 - Medical room = 12 m²
 - Hostel clerk room = 12 m²
 - Store room = 12 m²

Verandah, passage, sanitary blocks, staircase etc. of suitable size should be provided wherever necessary.

Draw to a scale of 1:100 or 1:200.

- a) Detailed plan. 10
- b) Front Elevation. 5
- c) Section to show details of construction. 5
- b) Draw to a scale of 1:25 or suitable, a two point perspective view of the object shown in fig.1. Retail all construction lines. 10

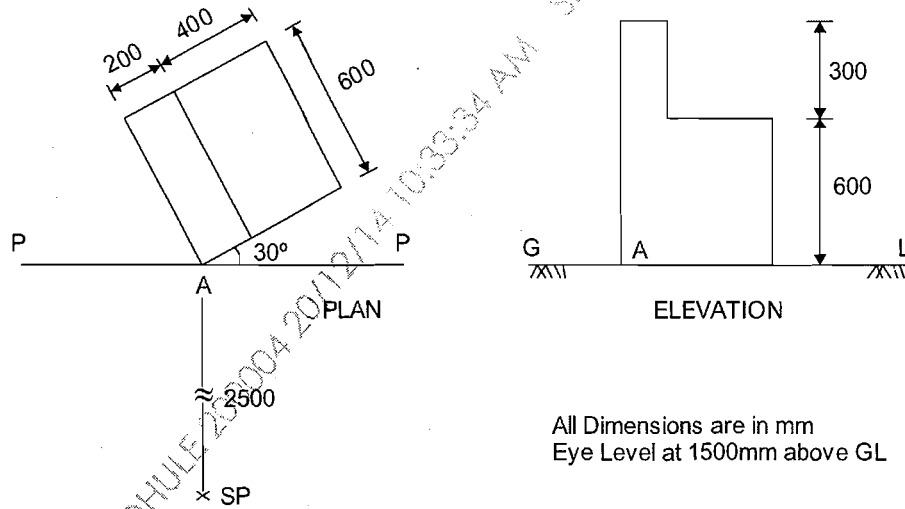


Fig. 1

SSVPS'S COLLEGE OF ENGINEERING, DHULE 2000004 20
SSVPS'S COLLEGE OF ENGINEERING, DHULE 2000004 20/12/14 10:33:34 AM
SSVPS'S COLLEGE OF ENGINEERING, DHULE 2000004 20

SSVPS'S COLLEGE