

THIAGARAJAR POLYTECHNIC COLLEGE, SALEM

(Autonomous)

Reg. No.

October/November 2018 Examinations

DIPLOMA IN CIVIL ENGINEERING

ENGINEERING MECHANICS

Year/Sem: II / III (ODD-II)

Max. Marks : 75

Time : 3 hr.

PART-A**(5 x 2 = 10 Marks)****Note: (i) Answer any FIVE questions out of which question No.8 is compulsory.****(ii) All questions carry equal marks.**

- 1 Define Poisson's ratio and Modulus of Rigidity.
- 2 Define Factor of safety and Modular ratio.
- 3 What are the different types of support conditions of a beam?
- 4 Define Bending Moment with sign convention.
- 5 What is symmetrical and Asymmetrical Sections? Give Example
- 6 What is Neutral Axis? Give sketch.
- 7 How do you identify a frame as deficient frame?
- 8 State Parallel Axis Theorem.

PART-B**(5 x 3 = 15 Marks)****Note: (i) Answer any FIVE questions out of which question No. 16 is compulsory.****(ii) All questions carry equal marks.**

- 9 Define any three mechanical properties of materials.
- 10 Differentiate statically determinate and Indeterminate beams with example.
- 11 Define (i) Moment of Inertia
(ii) Section Modulus
(iii) Radius of Gyration
- 12 Determine the moment of resistance of a rectangular beam 100 mm width, 200 mm depth, if the bending stress is 10 N/mm^2 .
- 13 Define (i) Couple
(ii) Torsional rigidity
(iii) Torsional modulus.
- 14 Differentiate Perfect and Imperfect Frames.
- 15 State the application of the following
(i) Space diagram
(ii) Bow's Notation
(iii) Vector Diagram
- 16 State and Prove perpendicular axis theorem.

PART-C**(5 x 10 = 50 Marks)****Note: (i) Answer all the questions choosing either sub-division (A) or sub-division (B) of each question.****(ii) All divisions carry equal marks.**

- 17 A(i) A steel bar of 20 mm diameter and 1000 mm long is subjected to an axial compressive force of 25 kN. Find the stress, strain and contraction of the bar, if the young's modulus is $2.1 \times 10^5 \text{ N/mm}^2$. 5
- (ii) A material has a young's modulus as $1.2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio of 0.25. Calculate the values of Rigidity Modulus and Bulk Modulus. 5

(OR)

Cond..2

- B (i) A stepped bar of 1 m length is composed of two segments of 500 mm each. The first segment is 20mm x 20mm square and the next is 40mm x 40mm square in size. Determine the elongation of the bar when the axial force is 75kN Tensile. Take $E = 2 \times 10^5 \text{ N/mm}^2$. 5
- (ii) A tension test was carried out on a 30mm diameter mild steel bar on a gauge length of 200 mm. The ultimate load is 360 kN. The total elongation of the specimen is 56.50 mm and the diameter of specimen at fracture is 22.40 mm. Find (i) Ultimate stress (ii) Percentage of elongation and (iii) Percentage of contraction in area. 5
- 18 A A simply supported beam of span 8 m is loaded as shown in figure (i). Draw SFD and BMD indicating the values at salient points. 10
- (OR)**
- B An overhanging beam ABC is loaded as shown in figure (ii). Draw SFD and BMD. 10
- 19 A (i) Locate the position of centroid of the figure as shown in figure (iii) 5
- (ii) Locate the position of centroid of the angle section as shown in figure (iv) 5
- (OR)**
- B Find the moment of Inertia of the channel section as shown in figure (v) about xx and yy axis. 10
- 20 A A rectangular section simply supported over a span of 5m is carrying an udl of 25 kN/m over the entire span and a point load of 50kN at mid span. Calculate the width and depth of the beam, if the bending stress is not to exceed 8 N/mm^2 . Take the depth of the beam is 2.5 times its width. 10
- (OR)**
- B A solid circular shaft transmits a power of 100 kW at 160 rpm. The maximum shear stress is limited to 60 N/mm^2 and rigidity modulus is $0.8 \times 10^5 \text{ N/mm}^2$. Determine the following 10
- (i) Torque produced by the shaft
- (ii) Diameter of the shaft and
- (iii) Length of the shaft when the twist does not exceed 2°
- 21 A Determine the magnitude and nature of forces in the members of Truss as shown in figure (vi) by method of Joints. Tabulate the results. 10
- (OR)**
- B Determine the magnitude and nature of forces in the members of Truss as shown in figure (vii) by Graphical method. Tabulate the results. 10

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DIPLOMA IN CIVIL ENGINEERING

Construction Materials and Construction Practice

Year/Sem: II / III (ODD-II)

Max. Marks : 75

Time : 3 hr.

PART-A**(5 x 2 = 10 Marks)****Note: (i) Answer any FIVE questions out of which question No.8 is compulsory.****(ii) All questions carry equal marks.**

- 1 What are the geological classifications of rocks?
- 2 Name any four types of cements.
- 3 Define water- cement ratio.
- 4 What is meant by bearing capacity of soil?
- 5 What is queen closer?
- 6 Name any four types of windows.
- 7 Define pointing.
- 8 What is under pinning of foundation?

PART-B**(5 x 3 = 15 Marks)****Note: (i) Answer any FIVE questions out of which question No. 16 is compulsory.****(ii) All questions carry equal marks.**

- 9 Write any three characteristics of good brick.
- 10 Name the various ingredients of paint.
- 11 What are the functions of admixtures in concrete?
- 12 Name any three causes of failure of foundation.
- 13 Name different types of bonds in masonry.
- 14 Mention the advantages of Hollow block over solid block.
- 15 What are the objectives of Pointing?
- 16 Name the different types of scaffolding.

PART-C**(5 x 10 = 50 Marks)****Note: (i) Answer all the questions choosing either sub-division (A) or sub-division (B) of each question.****(ii) All divisions carry equal marks.**

- | | | | |
|----|---|----------------------------------------------------------------------------------------------------------------------|----|
| 17 | A | State any five tests on cement and its objectives. | 10 |
| | | (OR) | |
| | B | Explain about (i) Granite (ii) Marble. | 10 |
| 18 | A | Explain in detail different market forms of steel with neat sketches. | 10 |
| | | (OR) | |
| | B | Explain any five defects in timber. | 10 |
| 19 | A | Draw neat sketches for English bond in one brick and one and half brick thick wall (For both corner and T junction). | 10 |
| | | (OR) | |
| | B | Explain about spread footing and Raft foundation. | 10 |
| 20 | A | Explain about granolithic flooring and granite flooring. | 10 |
| | | (OR) | |
| | B | Draw neat sketches for any five types of stair case. | 10 |
| 21 | A | Explain the defects in plastering. | 10 |
| | | (OR) | |
| | B | Explain briefly about the construction of formwork for RCC slab. | 10 |

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DIPLOMA IN CIVIL ENGINEERING

Surveying-I

Year/Sem: II / III (ODD-II)

Max. Marks : 75

Time : 3 hr.

PART-A

(5 x 2 = 10 Marks)

Note: (i) Answer any FIVE questions out of which question No.8 is compulsory.

(ii) All questions carry equal marks.

- 1 What are the main divisions of surveying?
- 2 Define the terms : i) Base line ii) Check line
- 3 Why the zero division starts from south side of the compass?
- 4 Define : a) Line of collimation b) Reduced level
- 5 Write the curvature and refraction formulae.
- 6 Define the terms: i) Contour ii) contour interval.
- 7 Name any two satellites used in GPS technology.
- 8 Define Bench Mark and write its types.

PART-B

(5 x 3 = 15 Marks)

Note: (i) Answer any FIVE questions out of which question No. 16 is compulsory.

(ii) All questions carry equal marks.

- 9 Write the principles of surveying.
- 10 Define the term: Local attraction. Explain.
- 11 Compare: Height of collimation method with Rise and fall method.
- 12 What is reciprocal leveling?
- 13 Write any three characteristics of Contour.
- 14 Explain the term Interpolation of contours.
- 15 What are the segments of GPS?
- 16 Define Ranging and explain any one method.

PART-C

(5 x 10 = 50 Marks)

Note: (i) Answer all the questions choosing either sub-division (A) or sub-division (B) of each question.

(ii) All divisions carry equal marks.

- 17 A (i) Briefly explain classification of surveying. 5
 (ii) Define offsets and explain any one method of offsetting. 5
- (OR)**
- B (i) Briefly explain different sources of errors in chaining 5
 (ii) A 30m tape was standardised at a pull of 90 N. A line was measured with this tape under a pull of 210 N and found to be 167 m. Find the true length of the line if the cross sectional area of the tape is 1.8 mm^2 and the young's modulus of the elasticity of steel is $2.1 \times 10^5 \text{ N/mm}^2$. 5
- 18 A The following bearings were observed with a compass in a closed traverse ABCDE. 10
 Compute the included angles and apply usual check

LINE	FORE BEARING	BACK BEARING
AB	$107^\circ 15'$	$287^\circ 15'$
BC	$22^\circ 00'$	$202^\circ 00'$
CD	$281^\circ 00'$	$101^\circ 00'$
DE	$189^\circ 15'$	$9^\circ 15'$
EA	$124^\circ 45'$	$304^\circ 45'$

(OR)

- B The fore bearings and back bearings of the lines of a closed traverse are as follows. 10
Correct the bearings for local attraction

LINE	F.B	B.B
AB	62° 45'	242° 00'
BC	339° 00'	157° 15'
CD	288° 30'	108° 30'
DE	219° 00'	38° 00'
EA	125° 30'	309° 00'

- 19 A The following readings were taken with a dumpy level. 10
0.720, 1.580, 1.750, 2.520, 2.760, 2.925, 3.125, 3.820, 1.100, 1.650, 3.960, 0.900 and 2.875. The instrument was shifted after 5th, 8th and 11th readings. The first reading was taken on a BM having RL = 120.125 m. Open a page of level book, enter the readings and reduce the levels by Height of collimation method.

(OR)

- B Explain in detail about the temporary adjustment of a level. 10

- 20 A What are the types of levelling? Explain the field procedure for carrying out L.S. 10

(OR)

- B (i) A and B are two points on the opposite banks of a river. The staff readings on A and B from one bank were 6.940 and 5.270. The level was shifted to other bank and the readings were 8.160 and 5.490. Find the true difference in level and RL of B if RL of A is +100.380 m 5

- (ii) Mention the fundamental lines of a level and state the desired relationship between them. 5

- 21 A (i) Write short notes on hand held GPS receiver. 5
(ii) Define Map and explain its types. 5

(OR)

- B The areas within the contour lines at the site of a reservoir and at the face of the proposed dam are as follows. 10

Contour	Area enclosed in sqm
160	3050
150	3000
140	2200
130	1900
120	1200
110	750
100	250

Taking 100 m as the bed level of reservoir, determine the capacity of the reservoir when the maximum water level is 160 m. Calculate the capacity of the reservoir using Trapezoidal and prismoidal rule.

- Note :
1. Answer all questions under PART – A in the answer sheet supplied.
 2. Answer question under PART – B in the drawing sheet supplied to a suitable scale.
 3. The sketches under PART – A should be drawn using pencil and drawing instruments not necessary to scale.
 4. Any data, not given may be assumed suitably and should be indicated in the drawing.

PART-A (15 Marks)

I. Answer the following:

1. Give the symbols for the following: 3
 - a) Brick work
 - B) Foundation Cement Concrete
 - C) Sand
2. Give the minimum dimension and floor area required for a Living Room. 3
- ii. Sketch the Elevation of a Panelled Door (Double Leaf) using the following details. 9
 - 1) Door Size - 1200 mm x 2100 mm
 - 2) Vertical Post - 80 mm x 100 mm
 - 3) Horizontal Post - 100 mm x 80 mm
 - 4) Vertical style - 40 mm x 100 mm
 - 5) Other Horizontal Style (Rail) - 40 mm x 100 mm
 - 6) Panel thick - 25 mm

PART – B (60 Marks)

- iii. The Sketch "A" shows the line plan of a **RESIDENTIAL BUILDING WITH TWO BED ROOM WITH RCC FLAT ROOF**. The dimensions noted therein indicate the clear dimensions between the inside walls. The specifications are given below:

1. FOUNDATIONS:

The foundations for all main walls shall be in C.C. 1:5:10 mix, 900 wide and 200 thick laid at 1400 below ground level. It consists of two RR masonry footings in CM 1:6 of size 600 x 600, 450 x 600 is provided.

2. BASEMENT:

The basement will be in RR masonry in CM 1:6, 380 mm wide and 600 thick above ground level for all main walls and is filled with clean river sand to a depth of 450. A DPC in CM 1:3, 20 thick will be provided for all walls at basement level.

3. SUPER STRUCTURE:

All walls will be in brickwork in CM 1:5 using 1st class bricks 200 thick. The height of all walls will be 3100 above floor level. The partition walls between Bath and WC will be 100 thick in brick work in CM 1:4 and carried upto bottom of roof. Parapet walls 200 thick and 600 high will be provided all round.

4. ROOFING:

The roofing will be of R.C.C. 1:2:4 mix, 150 thick flat slab over the rooms and verandah. A weathering course 75 thick, consisting of two courses of flat tiles set in CM 1:3 mixed with crude oil will be provided over the slab.

5. DOORS, WINDOWS etc:

- | | |
|---------------------------------|---------------|
| 1) D - Door (panelled) | - 1200 x 2100 |
| 2) D1 - Door (Flush) | - 1000 x 2100 |
| 3) D2 - Door (Flush) | - 850 x 2100 |
| 4) A/O - Arch Opening | - 1830 x 2100 |
| 5) W - Window (Glazed) | - 1220 x 1220 |
| 6) W1 - Window (Glazed) | - 1000 x 1220 |
| 7) KW - Kitchen Window (Glazed) | - 1200 x 900 |
| 8) V - Ventilator | - 1200 x 600 |

6. LINTEL AND SUNSHADE:

All internal wall openings will be provided with R.C.C. Lintel 1:2:4 mix, 150 thick and all external wall openings will be provided with R.C.C. Lintel - Cum - sunshade 1:2:4 mix, 600 wide and 70 average thick.

7. FLOORING:

The flooring will be in C.C. 1:5:10, 150 thick, Plastered smooth with CM 1:3, 50 thick for all portions.

8. STEPS:

Steps will be in brickwork in CM 1:5 laid on C.C. 1:4:8. Provide steps of Rise 150 and Tread 300.

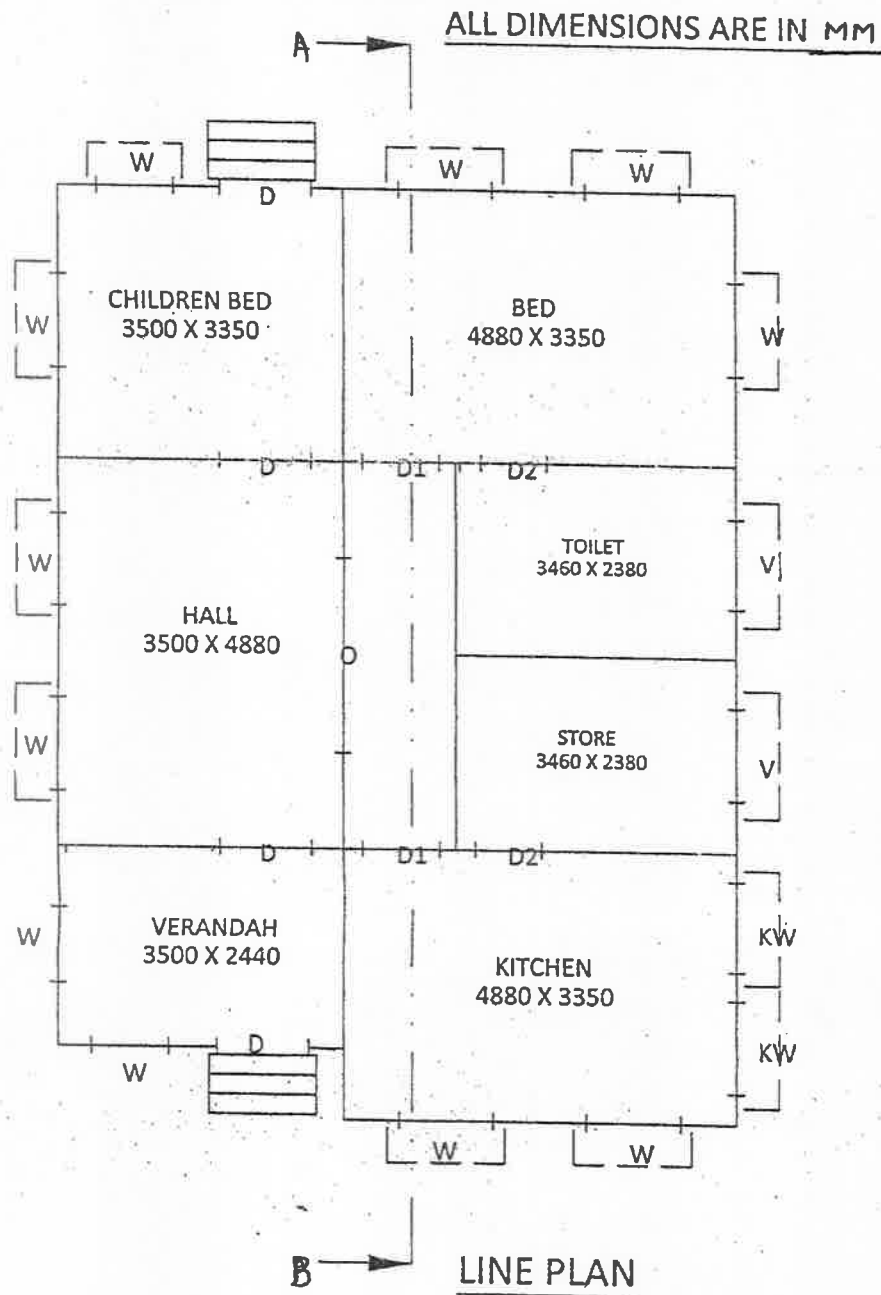
Note: Any other dimensions found necessary may be assumed suitably making clear indication of the same. All dimensions indicated are in millimeters.

Draw the following views to a suitable scale, complete details and dimensions.

- | | |
|------------------------------|------------|
| a) Plan of the building | (20 marks) |
| b) Sectional Elevation on AB | (25 marks) |
| c) Front Elevation | (15 marks) |

SKETCH - A

A RESIDENTIAL BUILDING WITH TWO BED ROOM WITH R.C.C FLAT ROOF



REFERENCE		
DOOR	D	1200 X 2100
DOOR	D1	1000 X 2100
DOOR	D2	850 X 2100
ARCH OPEN	A/O	1830 X 2100
WINDOW	W	1220 X 1220
WINDOW	W1	1000 X 1220
WINDOW	KW	1200 X 900
VENTILATOR	V	1200 X 600
STEPS		
TREAD	300	
RISE	150	