

Building Construction Materials Drawing

Sec. A

1. Classification of stone masonry. Difference between stone & brick masonry.
2. Draw sec. of wall with different parts of building & 200,300,400,500mm thick wall section.
3. Different types of bonds used in brick masonry & explain English & Flemish bond.
4. Defects in brick masonry, reinforced brick works & composite masonry.
5. What is cavity wall, its advantage & its construction method.
6. Different types of partition walls.
7. Function of foundation & causes of failure of foundation.
8. Different types of foundation & situation where they are used. Grillage & Raft foundation.

Sec. B

1. List various types of floors their construction procedure.
Terrazzo, concrete, tile, brick, marble, mosaic
2. Different types of roofs & roofs covering materials
(b) king post & queen post truss.
3. Location of door & window. Different types of doors & windows
advantage of steel windows.
4. Types of doors & windows fixtures used.

Sec. C

1. What is dampness, its causes & effects of dampness. Material used for DPC & remedy for dampness in buildings.

2. Requirement of a good acoustic material & its effects of noise on human body. Explain construction detail of sound proofing for cavity type wall.
3. Fire proofing properties of timber, bricks, stone, glass, concrete, plaster & acc, fire protection & requirement of a multi storeys building

Sec. D

1. Detail of a good brick earth & harmful ingredients of brick earth.
2. Procedure for manufacturing of bricks & characteristics of different types of brick.
3. Different types of cement & their uses & mortars.
4. Characteristics & deterioration of building stone.
5. characteristics of paint & varnish & their applying process
6. Defect in timber, seasoning & its procedure, fire proofing & prevention of wood, plywood & fiberboard.

STRUCTURAL ANALYSIS

Q1 What are different type of beams? Differentiate between cantilever and simply supported beams.

Q2 A cantilever of length 5m carries U.D.L of 2 kN/m length over the whole length & pt. load of 4 kN at free end. Draw S.F & B.M diag.

Q3 A cantilever of length 6m carries gradually varying load, zero at free end and 2 kN/m at fixed end. Draw S.F & B.M diag.

Q4 A beam of length 6m is simply supported at ends and carries a U.D.L of 1.5 kN/m and three concentrated loads of 1 kN , 2 kN and 3 kN at distance of 1.5 m , 3 m and 4.5 m from left end. Draw S.F & B.M diag. & determine maximum B.M.

Q5 A beam of length 6m is simply supported at its ends. It is loaded with gradually varying load of 750 N/m from left end support to 1500 N/m at right end support. Construct S.F & B.M diag.

Q6 Assumptions made in Euler's column theory.

Q7 Expression for crippling load when both ends of column are hinged.

- Q8 Expression for crippling load when one end of column is fixed & other end is free.
- Q9 Expression for crippling load when both end of column are fixed.
- Q10 Expression for crippling load when one end of column is fixed & other end is hinged.
- Q11 Crippling stress in terms of Effective length and radius of gyration
- Q12 Define stress and strains? Also classify them.
- Q13 Define Hooke's Law.
- Q14 Write a note on Mohr's circle of stresses.
- Q15 A body is subjected to direct stresses in two mutually perpendicular directions accompanied by simple shear stress. Draw Mohr's circle of stresses and explain how will you obtain principal stresses and principal planes.
- Q16 Direct stresses of 160 N/mm^2 tensile and 120 N/mm^2 compressive exist on two mutually perpendicular planes at certain point in body. The greatest principal stress is due to shear stress is 200 N/mm^2
- Which must be magnitude of shearing stress on two planes.
 - Which will be max. shearing stress at point.
- Q17 The principal stress at point across two mutually perpendicular planes are 100 N/mm^2 & 50 N/mm^2 . Determine the max. tangential & resultant stresses on plane inclined at 30° to the axis of minor principal stress.

Ques:1 Expand $f(x) = x \sin x$, $0 < x < 2\pi$ as a Fourier series.

Ques:2 Obtain the Fourier series e^x in the interval $-\pi < x < \pi$

Ques:3 If $f(x) = \begin{cases} x & 0 < x < \pi/2 \\ \pi - x & \pi/2 < x < \pi \end{cases}$

Show that

$$f(x) = \frac{4}{\pi} \left[\sin x - \frac{\sin 3x}{3^2} + \frac{\sin 5x}{5^2} - \dots \right]$$

By Fourier series.

Ques:4 Find the half range cosine series. $f(x) = (x-1)^2$ in the interval $0 < x < 1$

Ques:5 If $M = \tan^{-1} \tan(\pi/4 + \theta/2)$ Prove that

i) $\tan \theta/2 = \tan \theta/2$

ii) $\cosh M = \sec \theta$.

Ques:6 Define an analytic function. State and prove the necessary and sufficient conditions for a function to be analytic.

Ques:7 If $f(z)$ is analytic function of z . Prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |Rf(z)|^2 = 2 |f(z)|^2$

Ques:8 $\int_C \frac{1}{z} dz = -\pi i$ or πi according as C is the semi-circle $|z|=1$ from -1 to 1

Que:-9 Evaluate $\oint_C \frac{z dz}{(z-1)(z-3)}$ where C is C
(z) = 3.5

Que:-10 Expand $\frac{e^{2z}}{(z-1)^3}$ about the
Singularity $z=1$ in Laurent's series.

Que:-11 Determine $\oint_C \frac{z}{(z-1)(z-2)^2} dz$ where C is circle
($z-2$) = $\frac{1}{2}$
by Cauchy's Residue theorem.

Que:-12 $\oint \frac{z^2 - 2z}{(z+1)^2(z+4)} dz$
where (z) = 10 By Cauchy's Residue theorem.

Que:-13 Expand $\int_0^\infty \frac{x^2}{x^4+1} dx$ using
Complex integration.

Que:-14 Evaluate $\int_0^{2\pi} \frac{\cos 2\theta}{5-4\cos\theta} d\theta$.

Que:-15 Evaluate $\int_0^\infty \frac{\cos ax}{x^2+1} dx$.

Que:-16 Evaluate $\int_0^{2\pi} \frac{d\theta}{a+b\cos\theta}$.

Que:-17 using simplex method solve
the following linear programming Problem.

$$\text{maximize } Z = 2x_1 + 5x_2$$

subject to

$$x_1 + 4x_2 \leq 24$$

$$3x_1 + x_2 \leq 21$$

$$x_1 + x_2 \leq 9$$

$$x_1, x_2 \geq 0$$

Ques-18

using dual-simpler method

$$\text{Maximize } Z = -3x_1 - 4x_2$$

subject to

$$x_1 + x_2 \geq 1$$

$$2x_1 + 3x_2 \geq 2$$

$$x_1, x_2 \geq 0$$

- Q-1 Define mass-density, specific weight, specific volume and specific gravity.
- Q-2 What is fluid and define types of fluid?
- Q-3 What is surface tension? Derive it and expression for pressure inside a droplet.
- Q-4 What is capillarity?
- Q-5 What are the types of fluid flow? Explain them.
- Q-6 Explain continuity equation in differential form.
- Q-7 What is vortex flow and types of vortex flow?
- Q-8 Derive pressure, density, height relationship.
- Q-9 What is manometer? Types of manometer and their relative problems.
- Q-10 Derive Euler eq.ⁿ of motion.
- Q-11 What are the limitations of Bernoulli's eq.ⁿ? Also explain their applications.
- Q-12 Numerical related to the applications of Bernoulli's theorem.
- Q-13 Define -
- (i) Boundary layer thickness
 - (ii) Laminar boundary layer
 - (iii) Smooth and rough boundaries.

Q-14 Numericals related to boundary layer analysis.

Q-15 What is dimensionless analysis? And also explain principle of homogeneity.

Q-16 What are dimensional no and their significance?

Q-17 What is model study? Also explain similar and destroyed model.

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SEC-A

- ① A 20 m chain used for a survey work & was found to be 20.10 m at beginning & 20.3 m at the end of work. The area of plan drawn to a scale of 1 cm = 8 m was measured with the help of a planimeter & was found to be 32.56 Sq. cm. Find the true area of field.
- ② A Steel tape 30 m long standardised at 65°F with a pull of 20 kg was used for measuring a base line. Find the correction per tape length if the temp. at time of measurement was 70°F & the pull exerted was 20 kg. Weight of 1 cubic cm of steel = 7.86 g, Weight of tape = 0.8 kg & $E = 2.1 \times 10^6$ kg/cm². Co-efficient of expansion of tape per 1°F = 6.5×10^{-6} .
- ③ A tape length 30 m weight 0.12 N/m it measures correctly when supported throughout under tension of 85 N & at a temp of 20°C. Determine temperature & sag correction when field conditions are as under. Temp = 13.5°C tension in chain 100 N & Co-efficient of expansion is 1.15×10^{-5} .
- ④ (a) What are various errors in chaining / Tape & inst. used for chaining.
 (b) What are principle of chaining.
 (c) obstacles in chaining.
 (d) ill Conditioned & well Conditioned triangles.
- ⑤ A & B are two points on opposite side of a river along a chain line C A B which crosses the river at right angle. The surveyor select a point D which is 50.10 m from A & along the bank and a perpendicular C D on line B D of distance C A is 60.5 m determine the distance A B.

Sec. B

1. (a) Difference between W.C.B. & A.B.
 (b) What is local attraction & its causes.
 (c) Difference between Prismatic & Surveyor's compass.
2. The interior angle of a closed traverse are $\angle A = 120^\circ$, $\angle B = 95^\circ$, $\angle C = 60^\circ$ and $\angle D = 85^\circ$ the measured bearing of line A B = 50°. Find bearing of other lines.

Teacher's Signature: _____

2. The following bearings were observed with a compass. Where do you suspect L.A. Find correct bearings

Line	F.B.	B.B.
AB	64°00'	244°
BC	81°00'	261°
CD	156°00'	333°
DE	187°00'	6°00'
EA	179°00'	9°00'

3. Following bearings were observed with a compass. Calculate interior angles apply the check for angles & distribute the error if any

Line	F.B.
AB	60°30'
BC	122°30'
CD	46°00'
DE	205°00'
EA	300°30'

4. What are various methods of spirit levelling

- (a) The following staff readings were observed successively with level, the inst. was shifted after 2nd, 4th & eighth readings. 1st reading have a B.M. 132.133. Enter the reading in level book form by rise & fall method & apply the check & draw profile diagram.

0.875, 1.235, 2.310, 1.385, 2.930, 3.125, 4.125, 0.120, 1.875, 2.030, 3.075

OR

The following staff readings were observed successively with level & 5 metre levelling staff on a continuously sloping ground.

0.875, 1.235, 2.310, 1.385, 2.930, 3.125, 4.125, 0.120, 1.875, 2.030, 3.075

5. A line of levels were taken from P to A & continued to BM shown in table RL up. Complete the L-Book Page & apply check

B.S.	I.S.	F.S.	R.L.	Remarks
3.920	-	-	-	P
1.460	-	7.780	-	-
7.050	-	3.270	-	A
-	2.360	-	-	-
4.810	-	0.850	-	-
8.630	-	2.970	-	-
7.020	-	3.190	-	-
-	-	4.280	-	-
-	-	-	227.300	B.M.

1.115		115.92
	*	0.645
	*	0.905
1.855		0.615
	*	117.51
	2.245	1.510
	*	115.84
0.725		1.715
		0.305

a) Define Contours, Contour interval & draw sketches of vertical cliff & overhanging characteristic of contours.

Sec. C

- 1) Explain Methods of plane table Survey with sketches.
- 2) Define orientation ^{with various methods} Solve two point problem.
- 3) Solve three point problem by trial & error method.
2. Various Types of theodolite, describe T.P. & Permanent adjustment of theodolite.
3. For a closed traverse ABCDE, length & bearing of line measured with tape compass as follows.

Line	Length (m)	Bearing
AB	360.5	N 33° 45' W
BC	215	N 38° 05' E
CD	165.8	S 35° 25' E
DE	192.5	S 66° 45' E
EA	278.3	S 39° 45' W

Compute the consecutive Co-ordinates & closing error. Adjust the Co-ordinates.

4. The following are lengths & bearing of a closed traverse Calculate length & bearing of line DA

Line	Length (m)	Bearing
AB	78.2	140.12
BC	198	36.24
CD	37.8	338.48
DA	?	?

Teacher's Signature : _____

Sec. D

- ① A line was levelled tachometrically with a tachometer with a tachometer fitted with an anallactic lens, the value of Constant being 100. Following observations were made, Staff held vertically.

Inst. Station	Height of Axis	Staff at	Vertical Angle	Staff reading	Remarks
A	1.38	B.M.	$-1^{\circ}54'$	1.03, 1.29, 2.42	R.L.
A	1.38	B	$2^{\circ}36'$	1.22, 1.825, 2.43	638.55 m
B	1.40	C	$3^{\circ}6'$	0.785, 1.61, 2.435	

Draw a profile diagram & compute the elevation of A, B & C and distance between A & C.

- ② A tachometer is set up at an intermediate point on a traverse. Course P Q and the following observations are made on a vertically held staff.

Inst. Station	Vertical angle	Staff intercept	Axial height	Remarks
P	$8^{\circ}36'$	2.350	2.105	R.L. of P
Q	$6^{\circ}8'$	2.055	1.895	321.5 m

The instrument is fitted with anallactic lens & Constant being 100. Draw a profile diagram & compute the elevations of Q & distance between P and Q.

- ③ Determine the distance from instrument station P to A & B from following data

Inst. Station	Vertical Angle	Staff reading (m)
P A	$-6^{\circ}36'$	1.2, 2.0, 2.8
P B	$+13^{\circ}42'$	1.15, 1.9, 2.75

- ④ Two horizontal distances 50 m & 80 m were accurately measured on a levelled ground & staff intercept were 0.496 & 0.796 respectively. Compute the tachometric constants. Comment if the telescope is fitted with anallactic lens or not.

4) What are various horizontal & vertical curves with neat sketch.

b) Derive distance & elevation formula for inclined sight staff vertical.

c) Various components of a simple circular curve.

- 5) Two straight lines T_1 & T_2 intersect at chainage (375+12), the angle of deflection being 110° . Calculate the chainage of the tangent points of right hand curve of 400 m radius.

b) Define transition curve their advantages and need. Various methods to find length of a transition curve.

Two straight A_1 & B_1 meet at a chainage of 3450 m. A right handed simple circular curve of 250 m radius joins them. The deflection angle between two straight is 50° . Tabulate the necessary data to layout the curve by Rankine's method of deflection angles. Take chord interval as 20 m.

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