



**KLE.Dr.M.S.SHESHGIRI
COLLEGE OF ENGINEERING & TECHNOLOGY
BELAGAVI-08**

**LIBRARY AND INFORMATION CENTER
QUESTION PAPERS**

3rd, 4th, 5th, 6th, 7th & 8th SEM

CIVIL

DECEMBER-2017/JANUARY-2018





CBCS Scheme

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15MAT31

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018 Engineering Mathematics – III

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Express $f(x) = (\pi - x)^2$ as a Fourier series of period 2π in the interval $0 < x < 2\pi$. Hence deduce the sum of the series $1 + \frac{1}{2^2} + \frac{1}{3^2} + \dots$ (08 Marks)
- b. The turning moment T units of the Crank shaft of a steam engine is a series of values of the crank angle θ in degrees. Find the first four terms in a series of sines to represent T . Also calculate T when $\theta = 75^\circ$. (08 Marks)

θ :	0°	30°	60°	90°	120°	150°	180°
T :	0	5224	8097	7850	5499	2626	0

OR

- 2 a. Find the Fourier Series expansion of the periodic function,

$$f(x) = \begin{cases} l+x, & -l \leq x \leq 0 \\ l-x, & 0 \leq x \leq l \end{cases}$$
 (06 Marks)
- b. Obtain a half-range cosine series for $f(x) = x^2$ in $(0, \pi)$. (05 Marks)
- c. The following table gives the variations of periodic current over a period:

t sec:	0	$\frac{T}{6}$	$\frac{T}{3}$	$\frac{T}{2}$	$\frac{2T}{3}$	$\frac{5T}{6}$
A amp:	1.98	1.30	1.05	1.30	-0.88	-0.25

Show that there is a direct current part 0.75 amp in the variable current and obtain the amplitude of the first harmonic. (05 Marks)

Module-2

- 3 a. Find the Fourier transform of $f(x) = \begin{cases} 1 & \text{for } |x| < 1 \\ 0 & \text{for } |x| > 1 \end{cases}$ and evaluate $\int_0^{\infty} \left(\frac{\sin x}{x}\right) dx$ (06 Marks)
- b. Find the Fourier cosine transform of $f(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ 2-x & \text{for } 1 < x < 2 \\ 0 & \text{for } x > 2 \end{cases}$. (05 Marks)
- c. Obtain the inverse Z-transform of the following function, $\frac{z}{(z-2)(z-3)}$. (05 Marks)

OR

- 4 a. Find the Z-transform of $\cos\left(\frac{n\pi}{2} + \alpha\right)$. (06 Marks)
- b. Solve $u_{n+2} - 5u_{n+1} + 6u_n = 36$ with $u_0 = u_1 = 0$, using Z-transforms. (05 Marks)
- c. If Fourier sine transform of $f(x)$ is $\frac{e^{-\alpha x}}{\alpha}$, $\alpha \neq 0$. Find $f(x)$ and hence obtain the inverse

Fourier sine transform of $\frac{1}{\alpha}$. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Calculate the Karl Pearson's co-efficient for the following ages of husbands and wives: (06 Marks)

Husband's age x:	23	27	28	28	29	30	31	33	35	36
Wife's age y:	18	20	22	27	21	29	27	29	28	29

- b. By the method of least square, find the parabola $y = ax^2 + bx + c$ that best fits the following data: (05 Marks)

x:	10	12	15	23	20
y:	14	17	23	25	21

- c. Using Newton-Raphson method, find the real root that lies near $x = 4.5$ of the equation $\tan x = x$ correct to four decimal places. (Here x is in radians). (05 Marks)

OR

- 6 a. In a partially destroyed laboratory record, only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y = 107$ respectively. Calculate \bar{x} , \bar{y} and the coefficient of correlation between x and y . (06 Marks)

- b. Find the curve of best fit of the type $y = ae^{bx}$ to the following data by the method of least squares: (05 Marks)

x:	1	5	7	9	12
y:	10	15	12	15	21

- c. Find the real root of the equation $xe^x - 3 = 0$ by Regula Falsi method, correct to three decimal places. (05 Marks)

Module-4

- 7 a. From the following table of half-yearly premium for policies maturing at different ages, estimate the premium for policies maturing at age of 46: (06 Marks)

Age:	45	50	55	60	65
Premium (in Rupees):	114.84	96.16	83.32	74.48	68.48

- b. Using Newton's divided difference interpolation, find the polynomial of the given data: (05 Marks)

x	3	7	9	10
f(x)	168	120	72	63

- c. Using Simpson's $\left(\frac{1}{3}\right)^{th}$ rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates. (05 Marks)

OR

- 8 a. Find the number of men getting wages below ₹ 35 from the following data: (06 Marks)

Wages in ₹ :	0 - 10	10 - 20	20 - 30	30 - 40
Frequency :	9	30	35	42

- b. Find the polynomial $f(x)$ by using Lagrange's formula from the following data: (05 Marks)

x:	0	1	2	5
f(x):	2	3	12	147

- c. Compute the value of $\int_{0.2}^{1.4} (\sin x - \log_e x + e^x) dx$ using Simpson's $\left(\frac{3}{8}\right)^{th}$ rule. (05 Marks)



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Module-5

- 9 a. A vector field is given by $\vec{F} = \sin y \hat{i} + x(1 + \cos y)\hat{j}$. Evaluate the line integral over a circular path given by $x^2 + y^2 = a^2$, $z = 0$. (06 Marks)
- b. If C is a simple closed curve in the xy -plane not enclosing the origin. Show that $\int_C \vec{F} \cdot d\vec{R} = 0$, where $\vec{F} = \frac{y\hat{i} - x\hat{j}}{x^2 + y^2}$. (05 Marks)
- c. Derive Euler's equation in the standard form viz., $\frac{\partial f}{\partial y} - \frac{d}{dx} \left[\frac{\partial f}{\partial y'} \right] = 0$. (05 Marks)

OR

- 10 a. Use Stoke's theorem to evaluate $\int_C \vec{F} \cdot d\vec{R}$ where $\vec{F} = (2x - y)\hat{i} - yz^2\hat{j} - y^2z\hat{k}$ over the upper half surface of $x^2 + y^2 + z^2 = 1$, bounded by its projection on the xy -plane. (06 Marks)
- b. Show that the geodesics on a plane are straight lines. (05 Marks)
- c. Find the curves on which the functional $\int_0^1 ((y')^2 + 12xy) dx$ with $y(0) = 0$ and $y(1) = 1$ can be extremized. (05 Marks)



CBCS SCHEME

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15MATDIP31

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018 Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- Express complex numbers $\frac{(5-3i)(2+i)}{4+2i}$ in the form $a+ib$. (06 Marks)
 - If $x = \cos\theta + i \sin\theta$, then show that $\frac{x^{2n}-1}{x^{2n}+1} = i \tan\theta$. (05 Marks)
 - Prove that the area of the triangle whose vertices are A, B, C is $\frac{1}{2}[B \times C + C \times A + A \times B]$. (05 Marks)

OR

- Find the cube root of $\sqrt{3} + i$. (06 Marks)
 - Find the modulus and amplitude of $\frac{3+i}{2+i}$. (05 Marks)
 - Prove that the vectors $i - 2j + 3k$, $-2i + 3j - 4k$ and $i - 3j + 5k$ are coplanar. (05 Marks)

Module-2

- Find the n^{th} derivative of $e^{ax} \sin(bx + c)$. (06 Marks)
 - If $y = e^{a \sin^{-1} x}$, prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2+a^2)y_n = 0$. (05 Marks)
 - If $u = \sin^{-1}\left(\frac{x^2+y^2}{x+y}\right)$, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$. (05 Marks)

OR

- Find the pedal equation $r = a(1 + \cos \theta)$. (06 Marks)
 - Expand $\tan x$ in ascending powers of x . (05 Marks)
 - If $u = x + y + z$, $v = y + z$, $w = z$ then find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$. (05 Marks)

Module-3

- Evaluate $\int_0^{\pi/2} \sin^n x \, dx$. (06 Marks)
 - Evaluate $\int_0^a \frac{x^3}{\sqrt{a^2-x^2}} \, dx$. (05 Marks)
 - Evaluate $\int_1^2 \int_1^3 xy^2 \, dx \, dy$. (05 Marks)

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OR

- 6 a. Evaluate $\int_0^1 \int_0^2 \int_0^2 x^2 yz \, dx \, dy \, dz$ (06 Marks)
- b. Evaluate $\int_0^{\pi/6} \cos^4 3x \, dx$. (05 Marks)
- c. Evaluate $\int_0^2 \frac{x^4}{\sqrt{4-x^2}} \, dx$. (05 Marks)

Module-4

- 7 a. A particle moves on the curve $x = 2t^2$, $y = t^2 - 4t$, $z = 3t - 5$, where t is the time. Find the velocity and acceleration at $t = 1$ in the direction $i - 3j + 2k$. (06 Marks)
- b. Find the unit vector normal to the surface $x^2 - y^2 + z = 2$ at the point $(1, -1, 2)$. (05 Marks)
- c. Show that the vector $f = (2x - 5y)i + (x - y)j + (3x - z)k$ is a solenoidal. (05 Marks)

OR

- 8 a. If $f(x, y, z) = 3x^2y - y^3z^2$ then find $\text{grad } f$ at the point $(1, -2, -1)$. (06 Marks)
- b. Evaluate (i) $\text{div } R$, (ii) $\text{curl } R$, if $R = xi + yj + zk$. (05 Marks)
- c. Find a , if $(axy - z^2)i + (x^2 + 2yz)j + (y^2 - axz)k$ is an irrotational vector. (05 Marks)

Module-5

- 9 a. Solve $(x^2 + y^2)dx + 2xydy = 0$ (06 Marks)
- b. Solve $(e^x + 1)\cos x \, dx + e^y \sin x \, dy = 0$ (05 Marks)
- c. Solve $(1 + xy)ydx + (1 - xy)x dy = 0$ (05 Marks)

OR

- 10 a. Solve $(x \log x) \frac{dy}{dx} + y = 2 \log x$ (06 Marks)
- b. Solve $(x + 2y^3) \frac{dy}{dx} = y$ (05 Marks)
- c. Solve $(1 + e^{x/y})dx + e^{x/y} \left(1 - \frac{x}{y}\right) dy = 0$ (05 Marks)

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15CV/CT32

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018 Strength of Materials

Time: 3 hrs.

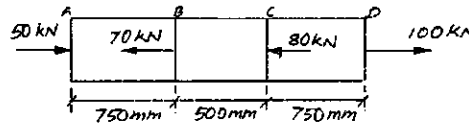
Max. Marks: 80

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

Module-1

- 1 a. Draw stress versus strain curve for mild steel specimen subjected to axial tension indicating the salient points. (03 Marks)
- b. Derive the expression for elongation of tapering circular bar due an axial load P. Use standard notations. (06 Marks)
- c. A circular bar of uniform cross sectional area of 1000mm^2 is subjected to forces as shown in fig. Q1(c). If Young's Modulus for the material is 200GPa , determine the total deformation. (07 Marks)

Fig.Q1(c)



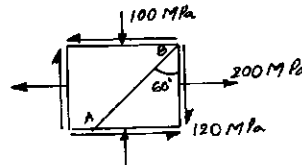
OR

- 2 a. Define the four Elastic constants. (04 Marks)
- b. A compound bar consists of a steel rod of 20mm diameter rigidly fitted into a copper tube of 20mm internal dia and 5mm thickness. Determine the stresses induced in the different materials when the compound bar is subjected to an axial tensile load of 50kN. Take $E_s = 200\text{GPa}$ and $E_c = 120\text{GPa}$. (06 Marks)
- c. A steel bar is 20m long at a temperature of 20°C . Find the free expansion of the rod, if the temperature is raised to 65°C . Take $E = 200\text{GPa}$, $\alpha = 12 \times 10^{-6}/^\circ\text{C}$. Find the thermal stress produced when i) free expansion of the rod is completely prevented ii) the rod is permitted to expand by 5.8mm only. (06 Marks)

Module-2

- 3 a. Show that the shear stress on the principal plane is zero. (06 Marks)
- b. At a point in a strained material the stresses acting are as shown in fig. Q3(b). Determine the i) Principal stresses and their planes ii) Maximum shear stresses and their planes iii) Normal and shear stresses on the inclined plane AB. (10 Marks)

Fig.Q3(b)



OR

- 4 a. Derive Lamé's equations for radial and hoop stresses for thick cylinder subjected to internal and external fluid pressures. (06 Marks)
- b. A closed cylindrical steel vessel of 4mm plate thickness with plane ends carries fluid under a pressure of 3MPa. The diameter of cylinder is 25cm and length is 75cm. Calculate the longitudinal and hoop stresses in the cylinder wall. Also determine the change in diameter, length and volume of cylinder. Take $E = 210\text{GPa}$, $\mu = 0.286$. (10 Marks)

1 of 2

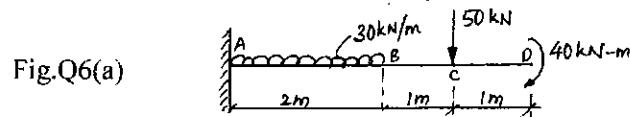
Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-3

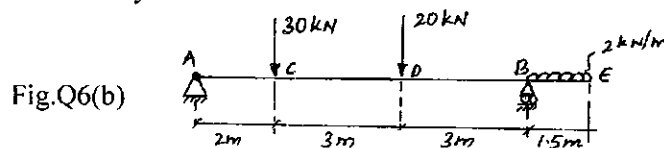
- 5 a. Derive the relationships between load intensity, shear force and bending moment. (06 Marks)
- b. For a simply supported beam subjected to a UDL of intensity W /unit length throughout plot the SFD and BMD and prove that maximum Bending moment is $\frac{Wl^2}{8}$. (10 Marks)

OR

- 6 a. For the cantilever beam shown in fig.Q6(a), plot the SFD and BMD. (06 Marks)



- b. For the overhanging beam shown in fig.Q6(b), plot the SFD and BMD. Locate points of contra flexure if any. (10 Marks)

**Module-4**

- 7 a. List the assumptions in theory of Simple bending. (04 Marks)
- b. Define : i) Section modulus ii) Modulus of rupture iii) Moment of resistance. (03 Marks)
- c. A T – beam with a flange of 100mm × 20mm and with a web of 20mm × 100mm is used as a simply supported beam over a span of 8m. It carries a UDL of 1.5kN/m throughout. Determine the maximum compressive and maximum tensile stresses and plot the variation across the depth of the beam. (09 Marks)

OR

- 8 a. Derive the Euler's equation for buckling load on an elastic column with both ends pinned or hinged. (06 Marks)
- b. A hollow rectangular cast iron column has external dimensions of 150mm × 200mm and all round metal thickness of 25mm. The column is 5m long with both ends fixed. If E for column material is 120GPa, compute the critical value of load on this column by Euler's formula. Compare the value of load obtained by Rankine's formula. Take $f_c = 500\text{MPa}$ and $\alpha = \frac{1}{1600}$. (10 Marks)

Module-5

- 9 a. Derive the torsion equation with usual notations. (08 Marks)
- b. State the different theories of failure. Explain any two briefly. (08 Marks)

OR

- 10 a. Prove that a hollow circular shaft is stiffer and stronger than a solid circular shaft in torsion which have same material, length and weight. (10 Marks)
- b. A solid shaft transmits 20kW of power, rotating at 2rps. Determine the required diameter of the shaft if the shearing stress is not to exceed 40MN/m^2 and angle of twist is limited to 6° in a length of 3m. Take $G = 83 \times 10^3\text{N/mm}^2$. (06 Marks)



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15CV33

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018

Fluid Mechanics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define the terms 'continuum' and 'rheology'. (04 Marks)
- b. Explain why an inflated balloon will rise to a definite height once it starts to rise, whereas a submarine will always sink to the bottom of ocean once it starts to sink, if no changes are made. How then can a submarine stay at a definite level under the water? (04 Marks)
- c. Prove that the relative density of mixture of 'n' fluids is greater when equal volumes are taken than when equal weights are taken, assuming no changes in volume as the result of mixing. (08 Marks)

OR

- 2 a. Why does the viscosity of a liquid decrease with increase in temperature whereas it increases with increase in temperature in the case of gas? (04 Marks)
- b. Find the increase in the pressure required to reduce the volume of water by 0.8 percent. Given $K = 2.075 \times 10^9 \text{ Nm}^{-2}$. (04 Marks)
- c. Determine the pressure difference ($p_A - p_B$) in Fig. Q2(c).

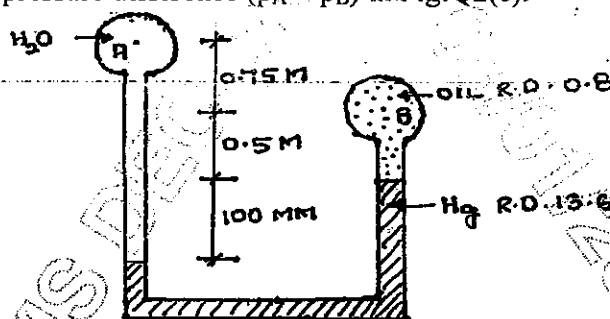


Fig. Q2(c)

(08 Marks)

Module-2

- 3 a. Prove that for a plate kept vertical in a liquid will have its centre of pressure below its centroid. (07 Marks)
- b. In each of the following cases state, giving reasons whether the flow is steady, unsteady, uniform or non uniform.
 - i) $U = 10xt + 15x^2$
 - ii) $U = 20$
 - iii) Flow in pipe bend with constant discharge.
 - iv) Flow in a converging pipe in which discharge is gradually increased.
 - v) Flow in a constant diameter pipe in which discharge is continuously increasing. (05 Marks)
- c. If the equation of stream lines for a given fluid flow problem is $x^2 - y^2 = \text{constant}$, determine the magnitude and direction of velocity vector at (3, 4). (04 Marks)

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OR

- 4 a. A 60° radial gate of 5m radius and 3m length stores water upto its top as shown in Fig.Q4(a). Determine the components of total force and its point of application.

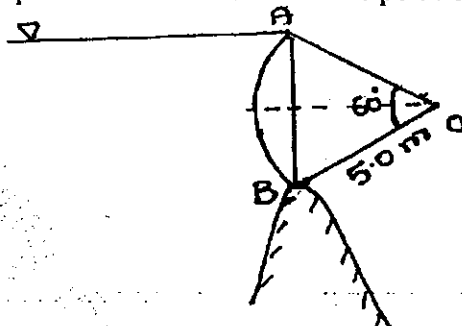


Fig.Q4(a)

(06 Marks)

- b. Show that the stream lines and velocity potential lines cross each other orthogonally. (05 Marks)
- c. Stating the assumptions made, derive the Euler's equation. Hence obtain Bernoulli's equation from it. (05 Marks)

Module-3

- 5 a. A pitot tube is mounted on an air plane to indicate the speed of the plane relative to the prevailing wind. What differential pressure intensity in kPa will the instrument register when the plane is travelling at a speed of 200 kmph in a wind of 60 kmph blowing against the direction of the plane? $\rho_{\text{air}} = 1.2 \text{ kg/m}^3$. (05 Marks)
- b. State impulse momentum equation. Derive the expression for force exerted by a flowing fluid on a pipe bend. (05 Marks)
- c. Derive the equation for the discharge through the venturimeter. (06 Marks)

OR

- 6 a. In a 45° bend a rectangular air duct of 1 m^2 cross sectional area is gradually reduced to 0.5 m^2 area. Find the magnitude and direction of force required to hold the duct in position if the velocity of flow at 1 m^2 section is 10 ms^{-1} , and pressure is 30 kN/m^2 . Take the specific weight of air as 0.0116 kN/m^3 . (06 Marks)
- b. A pitot static tube is inserted in a 30 cm diameter pipe. The static pressure in the pipe is 12.5 cm of mercury (vacuum). The stagnation pressure at the centre of the pipe is 1.15 N/cm^2 (gauge). Calculate the rate of flow of water through the pipe. The mean velocity of flow is 0.875 times the central velocity. Take $C_v = 0.985$. (06 Marks)
- c. Define the terms 'Orifice' and 'Mouthpiece'. Give the detailed classification of mouth pieces with neat sketches. (04 Marks)

Module-4

- 7 a. Water flows over a rectangular weir in wide at a depth of 15 cm and afterwards passes through a triangular right angled weir. Taking C_d for rectangular weir 0.62 and for triangular 0.59. Find the depth over the triangular weir. (06 Marks)
- b. Explain cippolletti notch. What is the advantage of cippolletti notch over trapezoidal notch? Give the equation of discharge over a cippolletti notch. (10 Marks)

OR

- 8 a. A rectangular notch 40 cm long is used for measuring a discharge of 30 LPS. An error of 1.5 mm was made while measuring the head over the notch. Calculate the percent error in the discharge. Take $C_d = 0.6$. (06 Marks)

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15CV33

- b. Mention the advantages of triangular notch over rectangular notch. (04 Marks)
c. Define hydraulic coefficients and to discuss how to determine the hydraulic coefficients experimentally. (06 Marks)

Module-5

- 9 a. Define the terms 'compound pipe' and 'equivalent pipe'. Derive the expression for diameter of equivalent pipe. (06 Marks)
b. Water flowing through a rigid pipe of diameter 500 mm with 1.5 m/s is suddenly brought to rest. Find the instantaneous pressure rise if $K_{\text{water}} = 2 \text{ GPa}$. (04 Marks)
c. A compound piping system consists of 1800 m of 0.5 m, 1200 m of 0.4 m and 600 m of 0.3 m new cast iron pipes connected in series. Convert the system to: i) Equivalent length of 0.4 m pipe; ii) Equivalent size pipe 3600 m long. (06 Marks)

OR

- 10 a. Derive an expression for instantaneous rise in pressure in an elastic pipe due to sudden closure of valve. (08 Marks)
b. Water is to be supplied to the inhabitants of a college campus, through a supply main. The following data is given:
Distance of the reservoir from the campus = 3000 m
Number of inhabitants = 4000
Consumption of water per day of each inhabitants = 180 liters
Loss of head due to friction = 18 m
Coefficient of friction for the pipe, $f = 0.007$
If one half of the daily supply is pumped in 8 hours, determine the size of the supply main. (08 Marks)



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15CV34

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018 Basic Surveying

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define surveying. Explain briefly principles of surveying. (07 Marks)
- b. What is 'Ranging'? Explain indirect or reciprocal ranging with neat sketch. (06 Marks)
- c. A steel tape 20 m long standardized at 55°F with a pull of 10 kg was used for measuring a baseline. Find the correction per tape length, if the temperature at the time of measurement was 80°F and pull exerted was 16 kg. Weight of 1 cubic cm of steel is 7.86 gms. Weight of tape = 0.8 kg and $E = 2.109 \times 10^6 \text{ kg/cm}^2$ coefficient of expansion of tape per $1^\circ\text{F} = 6.2 \times 10^{-6}$. (03 Marks)

OR

- 2 a. Differentiate between plane and geodetic surveying. (06 Marks)
- b. In passing an obstacle in form of a pond, stations A and D, on the main line were taken on opposite sides of the pond. On the left of AD, a line AB 200 m long was laid down and a second line AC 250 m long was ranged on AD, the points B, D and C being in the same straight line. BD and DC were then chained and found to be 125 m and 150 m respectively. Find length of AD. (06 Marks)
- c. Distinguish between accuracy and precision in surveying. (04 Marks)

Module-2

- 3 a. What are the temporary adjustments to be carried out for theodolite? (08 Marks)
- b. Following bearings were observed with a compass. Calculate the interior angles. (05 Marks)

Line	Fore Bearing
AB	60°30'
BC	122°0'
CD	46°0'
DE	205°30'
EA	300°0'

- c. Define the terms: (i) True bearing. (ii) Magnetic bearing. (iii) Magnetic declination. (03 Marks)

OR

- 4 a. Explain step by step procedure of measuring horizontal angle by Repetition method. (08 Marks)
- b. The following are the bearings of closed traverse ABCDA. At what station do you suspect the local attraction? Find the corrected bearings of the sides. If magnitude of magnetic declination at the place is $2^\circ 20' \text{ W}$, compute the true bearings of the lines. (08 Marks)

Line	Fore bearing	Back bearing
AB	124°30'	304°30'
BC	68°15'	246°0'
CD	310°30'	135°15'
DA	200°15'	17°45'

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-3

- 5 a. Discuss transit method and Bawditch method. (06 Marks)
- b. The following data is available for a closed traverse ABCDEA. Check for angular error and correct it if necessary. Determine closing error and adjust the traverse using "Transit rule". Taking coordinates of station 'A' as (400, 400), compute coordinates of all stations. (10 Marks)

Line	Length (m)	Bearing
AB	130	92°
BC	158	174°
CD	145	220°
DE	308	279°
EA	337	48°

OR

- 6 a. The elevation of point 'P' is to be determined by observations from two adjacent stations of a tacheometric survey. The staff was held vertically upon the point, and the instrument is fitted within an anallactic lens, the constant of the instrument being 100. Compute the elevation of the point 'P' from the following data, taking both observations as equally trustworthy. Also calculate the distance of A and B from 'P'. (10 Marks)

Inst. station	Height of axis	Staff point	Vertical angle	Staff readings	Elevation of station
A	1.42	P	+2°24'	1.230, 2.055, 2.880	77.750 m
B	1.40	P	-3°36'	0.785, 1.800, 2.815	97.135 m

- b. Derive distance and elevation formulae for stadia tacheometry, when the staff held normal to line of sight and both for an angle of elevation and angle of depression. (06 Marks)

Module-4

- 7 a. Define the following terms:
 (i) Bench mark (ii) Parallax (iii) Line of collimation (iv) Back sight
 (v) MSL (vi) Reduced level (06 Marks)
- b. The following staff readings were observed successively with a level, the instrument having been moved after third, sixth and eighth readings. Enter the readings and calculate RL of points by Rise and Fall method if first readings was taken with a staff held on BM = 432.384 m
 2.228 m, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684 m. (10 Marks)

OR

- 8 a. What is sensitiveness of bubble tube? Explain any one method of determining sensitivity. (06 Marks)
- b. In order to determine the elevation of top 'Q' of a signal on a hill, observations were made from two stations 'P' and 'R'. The stations P, R and Q were on the same plane. If angles of elevation of the top 'Q' of signal measured at 'P' and 'R' were 25°35' and 15°05' respectively. Determine the elevation of the foot of the signal if height of signal above its base was 4 m. The staff readings upon the B.M (RL 105.42) were respectively 2.755 and 3.855 m when the instrument was at 'P' and at 'R'. The distance between 'P' and 'R' was 120 m. (10 Marks)



15CV34

Module-5

- 9 a. What are the characteristics of contours? (08 Marks)
b. The following perpendicular offsets were taken from a chain line to a hedge –

Chainage (m)	0	15	30	45	60	70	80	100	120	140
Offsets (m)	7.6	8.5	10.7	12.8	10.6	9.5	8.3	7.9	6.4	4.4

Calculate the area between survey line, the hedge and end offsets by,

- (i) Trapezoidal rule.
(ii) Simpson's rule.

(08 Marks)

OR

- 10 a. Discuss the methods for determining areas and volumes. (06 Marks)
b. A railway embankment 400 m long is 12 m wide at the formation level and has side slope of 2 to 1. The ground levels at every 100 m along the centre line are as under –

Distance	0	100	200	300	400
R.L	204.8	206.2	207.5	207.2	208.3

The formation level at zero chainage is 207.00 and the embankment has a rising gradient of 1 in 100. The ground is level across the centre line. Calculate the volume of earth work.

(10 Marks)

CBCS Scheme



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15CV/CT35

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018

Engineering Geology

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What is Engineering Geology? Discuss its role in Civil Engineering Projects. (08 Marks)
b. With a neat sketch, explain the structure and composition of the earth. (08 Marks)

OR

- 2 a. Explain briefly i) Rock-forming mineral ii) Economic mineral. (04 Marks)
b. Name the physical properties which are helpful to identify the minerals. Explain Luster and Fracture of a mineral, with suitable examples. (06 Marks)
c. Write the chemical composition, cleavages and uses of the following minerals :
i) Calcite ii) Quartz iii) Gypsum. (06 Marks)

Module-2

- 3 a. What are Igneous Rocks? Explain the classification of Igneous Rocks with suitable examples. Mention the Engineering considerations of Igneous Rocks. (08 Marks)
b. What is Rock Quality Designation (RQD)? How is RQD used for the rock mass classification? (08 Marks)

OR

- 4 a. With a neat sketch, explain the developments of folds, joints, faults and unconformities in Rocks. (08 Marks)
b. Mention the engineering considerations of folds, joints, faults and unconformities. (08 Marks)

Module-3

- 5 a. Discuss briefly the Geomorphological aspects in the selection of site for Dam construction. (08 Marks)
b. What are Tunnels? Explain the important Geological factors taken into account while Tunneling. (08 Marks)

OR

- 6 a. Explain briefly : i) Weathering of Rocks ii) Tectonic cause of Earth quake. (08 Marks)
b. What are the causes of Landslides? How can Landslides be prevented. (08 Marks)

Module-4

- 7 a. Briefly explain Hydrological cycle. (04 Marks)
b. Define Aquifers. Explain with neat sketches, various types of aquifers. (08 Marks)
c. Explain in brief zone of aeration and zone of saturation. (04 Marks)

OR

- 8 a. Explain in detail Ground water exploration by Electrical Resistivity method. (10 Marks)
b. Give an account of Artificial Recharge of ground water by various methods. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

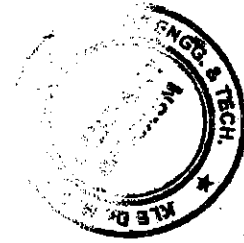
Module-5

- 9 a. Discuss the application of Remote sensing and GIS Technique in Civil Engineering Projects. (12 Marks)
b. Write a note on Impact of Mining on Environment. (04 Marks)

OR

- 10 Write a note on :
a. Natural Disaster and Mitigation.
b. Landsat Imagery.
c. Impact of Reservoirs on Environment.
d. Uses of Topographic maps. (16 Marks)

CBCS Scheme



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15CV36

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018 Building Materials and Construction

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Write the requirements of good building stones. (04 Marks)
b. Briefly explain the causes of deterioration of stone work. (06 Marks)
c. Briefly explain classification of bricks with respect to properties. (06 Marks)

OR

- 2 a. Write a note on classification of Mortar. (04 Marks)
b. Briefly explain the importance of size, shape and texture on coarse aggregates. (06 Marks)
c. Explain Flakiness Index and Elongation Index test on coarse aggregates. (06 Marks)

Module-2

- 3 a. Write the functions and requirements of good foundation. (05 Marks)
b. Explain with the help of sketches : i) Combined footing ii) Strap footing. (06 Marks)
c. Explain with sketch, any one type of Pile foundation. (05 Marks)

OR

- 4 a. With the help of sketches, write the features of English bond and Flemish bond. (06 Marks)
b. Briefly explain classification of stone masonry. (06 Marks)
c. Define a Cavity wall. Write the advantages of cavity wall. (04 Marks)

Module-3

- 5 a. Briefly explain classification of Lintels. (06 Marks)
b. With sketches, explain classification of Arches based on number of centers. (06 Marks)
c. What are the factors that affect the choice of a flooring materials? (04 Marks)

OR

- 6 a. Explain the procedure of laying Terrazo flooring. (04 Marks)
b. Write the requirements of good roof. (04 Marks)
c. With the help of neat sketch, explain King Post Truss. (08 Marks)

Module-4

- 7 a. With the help of neat sketch, explain :
i) Paneled Door ii) Collapsible Door. (08 Marks)
b. With the help of neat sketches, explain :
i) Panelled and Glazed window ii) Bay window. (08 Marks)

OR

- 8 a. With the help of neat sketches, explain types of stairs. (08 Marks)
b. Write short notes on :
i) Shoring ii) Underpinning. (08 Marks)

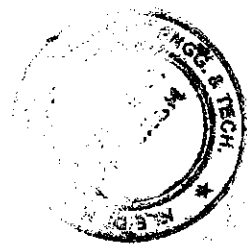
Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-5

- 9 a. Write the purposes of Plastering. (05 Marks)
b. Explain various types of Plaster finishes. (06 Marks)
c. Explain Stucco plastering. (05 Marks)

OR

- 10 a. Explain the constituents of Paint. (06 Marks)
b. Explain the procedure of pointing to plastered surface. (05 Marks)
c. Explain different methods of damp proofing. (05 Marks)



CBCS Scheme

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15MAT41

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Engineering Mathematics – IV

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Use of statistical tables is permitted.

Module-1

- 1 a. Employ Taylor's series method to find y at $x = 0.1$. Correct to four decimal places given $\frac{dy}{dx} = 2y + 3e^x$; $y(0) = 0$. (05 Marks)
- b. Using Runge Kutta method of order 4, find $y(0.2)$ for $\frac{dy}{dx} = \frac{y-x}{y+x}$; $y(0) = 1$, taking $h = 0.2$. (05 Marks)
- c. If $y' = 2e^x - y$; $y(0) = 2$, $y(0.1) = 2.010$, $y(0.2) = 2.040$ and $y(0.3) = 2.090$. Find $y(0.4)$ using Milne's predictor corrector formula. Apply corrector formula twice. (06 Marks)

OR

- 2 a. Use Taylor's series method to find $y(4.1)$ given that $(x^2 + y)y' = 1$ and $y(4) = 4$. (05 Marks)
- b. Using modified Euler's method find y at $x = 0.1$, given $y' = 3x + \frac{y}{2}$ with $y(0) = 1$, $h = 0.1$. Perform two iterations. (05 Marks)
- c. Find y at $x = 0.4$ given $y' + y + xy^2 = 0$ and $y_0 = 1$, $y_1 = 0.9008$, $y_2 = 0.8066$, $y_3 = 0.722$ taking $h = 0.1$ using Adams-Bashforth method. Apply corrector formula twice. (06 Marks)

Module-2

- 3 a. Given $y'' = xy'^2 - y^2$ find y at $x = 0.2$ correct to four decimal places, given $y = 1$ and $y' = 0$ when $x = 0$, using R-K method. (05 Marks)
- b. If α and β are two distinct roots of $J_n(x) = 0$, then prove that $\int_0^1 x J_n(\alpha x) J_n(\beta x) dx = 0$ if $\alpha \neq \beta$. (05 Marks)
- c. If $x^3 + 2x^2 - x + 1 = ap_0(x) + bp_1(x) + cp_2(x) + dp_3(x)$ then, find the values of a, b, c, d . (06 Marks)

OR

- 4 a. Apply Milne's method to compute $y(0.8)$ given that $y'' = 1 - 2yy'$ and the table.

x	0	0.2	0.4	0.6
y	0	0.02	0.0795	0.1762
y'	0	0.1996	0.3937	0.5689

- Apply corrector formula twice. (05 Marks)
- b. Show that $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \sin x$. (05 Marks)
 - c. Derive Rodrigue's formula $P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n} [(x^2 - 1)^n]$. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. Define analytic function and obtain Cauchy Riemann equation in Cartesian form. (05 Marks)
- b. Evaluate $\int_c \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)} dz$; c is the circle $|z| = 3$ by using theorem Cauchy's residue. (05 Marks)
- c. Discuss the transformation $w = e^z$ with respect to straight line parallel to x and y axis. (06 Marks)

OR

- 6 a. Find the analytic function whose real part is $u = \frac{x^4 y^4 - 2x}{x^2 + y^2}$. (05 Marks)
- b. State and prove Cauchy's integral formula. (05 Marks)
- c. Find the bilinear transformation which maps the points $z = 1, i, -1$ into $w = 2, i, -2$. (06 Marks)

Module-4

- 7 a. Find the constant c , such that the function $f(x) = \begin{cases} cx^2, & 0 < x < 3 \\ 0, & \text{otherwise} \end{cases}$ is a p.d.f. Also compute $p(1 < x < 2)$, $p(x \leq 1)$, $p(x > 1)$. (05 Marks)
- b. If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals, more than two will get a bad reaction. (05 Marks)
- c. x and y are independent random variables, x take the values 1, 2 with probability 0.7; 0.3 and y take the values -2, 5, 8 with probabilities 0.3, 0.5, 0.2. Find the joint distribution of x and y hence find $\text{cov}(x, y)$. (06 Marks)

OR

- 8 a. Obtain mean and variance of binomial distribution. (05 Marks)
- b. The length of telephone conversation in a booth has been an exponential distribution and found on an average to be 5 minutes. Find the probability that a random call made from this booth (i) ends less than 5 minutes, (ii) between 5 and 10 minutes. (05 Marks)
- c. The joint distribution of two discrete variables x and y is $f(x, y) = k(2x + y)$ where x and y are integers such that $0 \leq x \leq 2$; $0 \leq y \leq 3$. Find: (i) The value of k ; (ii) Marginal distributions of x and y ; (iii) Are x and y independent? (06 Marks)

Module-5

- 9 a. Explain the terms: (i) Null hypothesis; (ii) Type I and type II errors; (iii) Significance level. (05 Marks)
- b. A die thrown 9000 times and a throw of 3 or 4 was observed 3240 times. Is it reasonable to think that the die is an unbiased one? (05 Marks)
- c. Find the unique fixed probability vector for the regular Stochastic matrix:

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 1/6 & 1/2 & 1/3 \\ 0 & 2/3 & 1/3 \end{bmatrix}$$

(06 Marks)

OR

- 10 a. A certain stimulus administered to each of the 12 patients resulted in the following change in blood pressure 5, 2, 8, -1, 3, 0, 6, -2, 1, 5, 0, 4. Can it be concluded that the stimulus will increase the blood pressure. ($t_{0.05}$ for 11 d.f = 2.201) (05 Marks)
- b. It has been found that the mean breaking strength of a particular brand of thread is 275.6 gms with $\sigma = 39.7$ gms. A sample of 36 pieces of thread showed a mean breaking strength of 253.2 gms. Test the claim at 1+ and 5- level of significance. (05 Marks)
- c. A man's smoking habits are as follows. If he smokes filter cigarettes one week, he switches to non filter cigarettes the next week with probability 0.2. One the other hand, if he smokes non filter cigarettes one week there is a probability of 0.7 that he will smoke non filter cigarettes the next week as well. In the long run how often does he smoke filter cigarettes? (06 Marks)

** 2 of 2 **

CBCS Scheme



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15MATDIP41

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Additional Mathematics – II

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Find the rank of the matrix $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ by applying elementary row transformations. (06 Marks)
- b. Solve the following system of equations by Gauss-elimination method: $x + y + z = 9$, $x - 2y + 3z = 8$ and $2x + y - z = 3$. (05 Marks)
- c. Find the inverse of the matrix $\begin{bmatrix} 5 & -2 \\ 3 & 1 \end{bmatrix}$ using Cayley-Hamilton theorem. (05 Marks)

OR

- 2 a. Find the rank of the matrix $\begin{bmatrix} 1 & 3 & -1 & 2 \\ 0 & 11 & -5 & 3 \\ 2 & -5 & 3 & 1 \\ 4 & 1 & 1 & 5 \end{bmatrix}$ by reducing it to echelon form. (06 Marks)
- b. Solve the following system of equations by Gauss-elimination method: $x + y + z = 9$, $2x - 3y + 4z = 13$ and $3x + 4y + 5z = 40$. (05 Marks)
- c. Find the eigen values of $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$. (05 Marks)

Module-2

- 3 a. Solve $(D^4 - 2D^3 + 5D^2 - 8D + 4)y = 0$. (05 Marks)
- b. Solve $\frac{d^2y}{dx^2} - 4y = \cosh(2x - 1) + 3^x$. (05 Marks)
- c. Solve by the method of variation of parameters $y'' + a^2y = \sec ax$. (06 Marks)

OR

- 4 a. Solve $\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + 4\frac{dy}{dx} - 2y = e^x$. (05 Marks)
- b. Solve $(D^2 + 5D + 6)y = \sin x$. (05 Marks)
- c. Solve by the method of undetermined coefficients $y'' + 2y' + y = x^2 + 2x$ (06 Marks)

Module-3

- 5 a. Find the Laplace transform of $\cos t \cdot \cos 2t \cdot \cos 3t$. (06 Marks)
- b. Find the Laplace transform $f(t) = \frac{Kt}{T}$, $0 < t < \pi$, $f(t+T) = f(t)$. (05 Marks)

1 of 2

- c. Express $f(t) = \begin{cases} \cos t, & 0 < t < \pi \\ \sin t, & t > \pi \end{cases}$ in terms of unit step function, and hence find $L[f(t)]$ (05 Marks)

OR

- 6 a. Find the Laplace transform of (i) $t \cos at$, (ii) $\frac{1-e^{-at}}{t}$. (06 Marks)

- b. Find the Laplace transform of a periodic function a period $2a$, given that $f(t) = \begin{cases} t, & 0 \leq t < a \\ 2a-t, & a \leq t < 2a \end{cases}$ $f(t+2a) = f(t)$. (05 Marks)

- c. Express $f(t) = \begin{cases} 1, & 0 < t < 1 \\ t, & 1 < t \leq 2 \\ t^2, & t > 2 \end{cases}$ in terms of unit step function and hence find its Laplace transform. (05 Marks)

Module-4

- 7 a. Find the inverse Laplace transform of (i) $\frac{(s+2)^3}{s^6}$, (ii) $\frac{s+5}{s^2-6s+13}$. (06 Marks)

- b. Find inverse Laplace transform of $\log \left[\frac{s^2+4}{s(s+4)(s-4)} \right]$. (05 Marks)

- c. Solve by using Laplace transforms $\frac{d^2y}{dt^2} + k^2y = 0$, given that $y(0) = 2$, $y'(0) = 0$. (05 Marks)

OR

- 8 a. Find the inverse Laplace transform of $\frac{4s+5}{(s+1)^2(s+2)}$. (06 Marks)

- b. Find the inverse Laplace transform of $\cot^{-1} \left(\frac{s+a}{b} \right)$. (05 Marks)

- c. Using Laplace transforms solve the differential equation $y'' + 4y' + 3y = e^{-t}$ with $y(0) = 1$, $y'(0) = 1$. (05 Marks)

Module-5

- 9 a. If A and B are any two events of S, which are not mutually exclusive then $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. (05 Marks)

- b. The probability that 3 students A, B, C, solve a problem are $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ respectively. If the problem is simultaneously assigned to all of them, what is the probability that the problem is solved? (05 Marks)

- c. In a class 70% are boys and 30% are girls. 5% of boys, 3% of girls are irregular to the classes. What is the probability of a student selected at random is irregular to the classes and what is the probability that the irregular student is a girl? (06 Marks)

OR

- 10 a. If A and B are independent events then prove that \bar{A} and \bar{B} are also independent events. (05 Marks)
- b. State and prove Baye's theorem. (05 Marks)
- c. A Shooter can hit a target in 3 out of 4 shots and another shooter can hit the target in 2 out of 3 shots. Find the probability that the target is being hit:
(i) when both of them try (ii) by only one shooter. (06 Marks)

CBCS Scheme

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15CV42

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Analysis of Determinate Structures

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Differentiate between statically determinate and indeterminate structures. (06 Marks)
- b. What are linear and non-linear systems? Explain. (02 Marks)
- c. Determine the degree of static indeterminacy for the following structures [Fig.Q1(c)]:

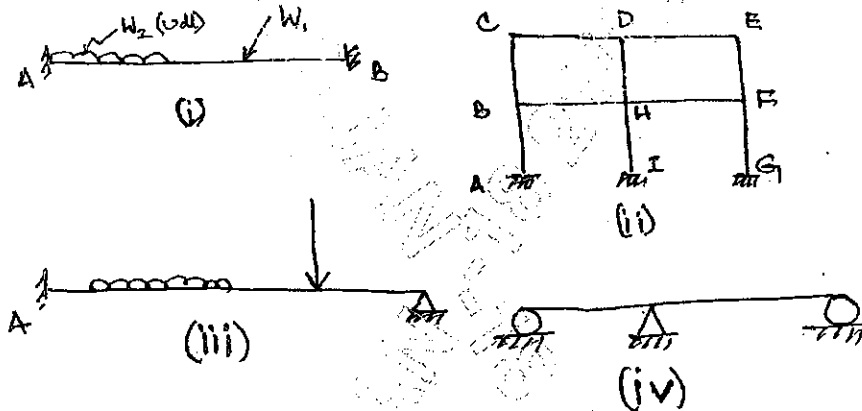


Fig.Q1(c)

(08 Marks)

OR

- 2 Determine the forces in all the members of the truss shown in the Fig.Q2 by the method of joints and verify the forces in members BC, CF and FE by the method of sections.

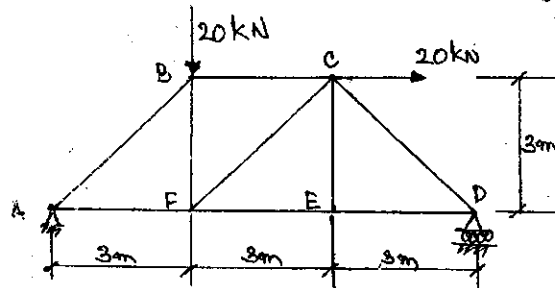


Fig.Q2

(16 Marks)

Module-2

- 3 a. Derive the moment-curvature equation for deflection. (06 Marks)
- b. A simply supported beam AB has a span of 5m and carries a point load of 50 kN at a distance of 3m from left end A as shown in Fig.Q3(b). Find the deflection under the load and also maximum deflection in the beam.

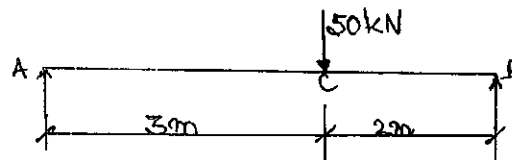


Fig.Q3(b)

(10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revelling of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 4 a. Determine the slope and deflection at the free end of a cantilever shown in Fig.Q4(a) by the moment area method.

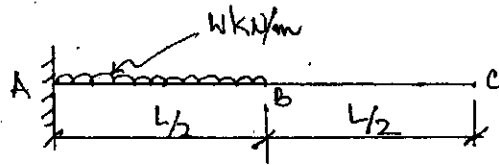


Fig.Q4(a)

(08 Marks)

- b. Determine the slope and deflection under the load for the beam shown in Fig.Q4(b) using conjugate beam method.

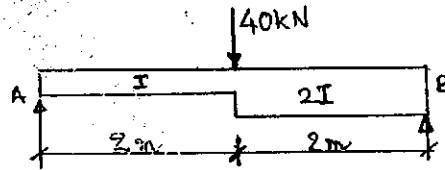


Fig.Q4(b)

(08 Marks)

Module-3

- 5 a. Obtain the expression for strain energy stored in a member when it is subjected to axial load. (08 Marks)
- b. Determine the deflection under the given 60 kN load acting on the beam as shown in Fig.Q5(b) by strain energy method.

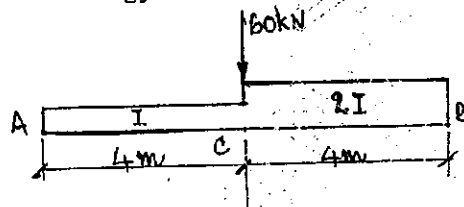


Fig.Q5(b)

(08 Marks)

OR

- 6 a. Find the value of vertical deflection at C for the structure shown in Fig.Q6(a) by Castiglione's theorem.

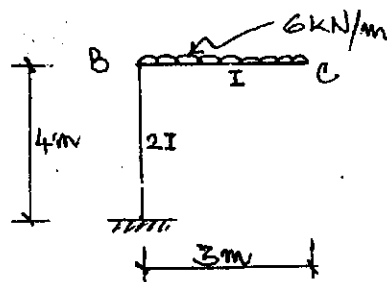


Fig.Q6(a)

(08 Marks)

- b. Determine the vertical and horizontal deflections at joint C of the truss shown in Fig.Q6(b). The cross sectional area of inclined member (tie) is 2000 mm^2 while the area of horizontal member is 1600 mm^2 . Take $E = 200 \text{ kN/mm}^2$.

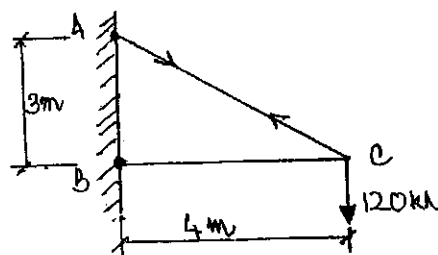
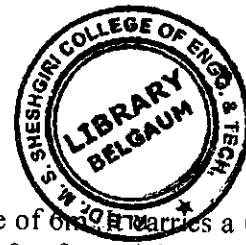


Fig.Q6(b)

(08 Marks)



15CV42

Module-4

- 7 A three hinged parabolic arch has a span of 30 m and rise of 6 m. It carries a udl of 3 kN/m over the left half of the span and a point load of 6 kN at 9 m from right end. Find the BM, normal thrust and radial shear at a section of 9 m from left end support. Also find the maximum bending moment along the span. (16 Marks)

OR

- 8 A cable is suspended between two points A and B 120 m apart and a central dip of 8 m. It carries a udl of 20 kN/m. Determine:
 i) The maximum and minimum tension in the cable.
 ii) Length of the cable.
 iii) The size of cable if the permissible stress of cable material is 200 N/mm². (16 Marks)

Module-5

- 9 a. Define a influence line diagram and mention its applications. (06 Marks)
 b. Draw the influence line diagrams for:
 i) Reactions at supports of a simply supported beam.
 ii) Shear force of a simply supported beam carrying concentrated unit load. (10 Marks)

OR

- 10 For a simply supported beam of span 25 m with the series of concentrated loads to be taken as rolling load system as shown in Fig.Q10. Compute the following by influence line principles.

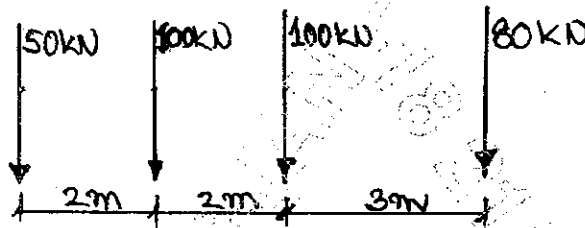
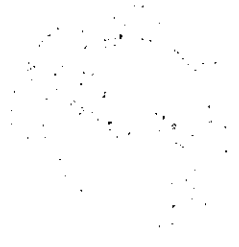
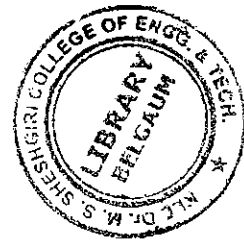


Fig.Q10

- i) Maximum reactions.
 ii) Maximum bending moment at 8 m from left support. (16 Marks)





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15CV43

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Applied Hydraulics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Using Buckingham's π -theorem, show that the velocity through a circular orifice is given by $V = \sqrt{2gH} \phi \left(\frac{D}{H}, \frac{\mu}{\rho V H} \right)$, where H is the head causing flow, D is the diameter of the orifice, μ is coefficient of viscosity, ρ is the mass density and g is the acceleration due to gravity. (10 Marks)
- b. A pipe of diameter 1.5 m is required to transport an oil of specific gravity 0.9 and viscosity 3×10^{-2} poise at the rate of 3000 l/s. Tests were conducted on a 15 cm diameter pipe using water at 20°C. Find the viscosity and rate of flow in the model. Viscosity of water at 20°C = 0.01 Poise. (06 Marks)

OR

- 2 a. A solid cylinder of diameter 4 m has a height of 4m. Find the meta centric height of the cylinder, if the specific gravity of the material of cylinder = 0.6 and it is floating in water with its axis vertical. State whether the equilibrium is stable or unstable. (08 Marks)
- b. A 1:40 model of an ocean tanker is dragged through fresh water at 2 m/s with a total measured drag of 12 N. The skin drag coefficient 'f' for model and prototype are 0.03 and 0.002 respectively in the equation $R_f = f.AV^2$. The wetted surface area of the model is 25 m². Determine the total drag on the prototype and power required to drive the prototype. Take $\rho_p = 1030 \text{ kg/m}^3$ and $\rho_m = 1000 \text{ kg/m}^3$. (08 Marks)

Module-2

- 3 a. What is meant by economical section of a channel? Derive the condition for the most economical rectangular section. (08 Marks)
- b. The discharge of water through a rectangular channel of width 8m is 15 m³/s. When depth of flow of water is 1.2 m, calculate:
 - i) Specific energy of the flowing water.
 - ii) Critical depth and critical velocity
 - iii) Value of minimum specific energy(08 Marks)

OR

- 4 a. Define specific energy, draw specific energy curve and then derive expressions for critical depth and critical velocity. (08 Marks)
- b. Find the diameter of a circular sewer pipe which is laid at a slope of 1 in 8000 and carries a discharge of 800 lps when flowing half full. Take the value of Manning's N = 0.02. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. A hydraulic jump forms at the downstream end of spillway carrying $17.93 \text{ m}^3/\text{s}$ discharge. If the depth before jump is 0.8 m , determine the depth after the jump and energy loss. Consider 1 m width of channel. (06 Marks)
- b. Determine the length of the back water curve caused by an afflux of 2 m in a rectangular channel of width 40 m and depth 2.5 m . The slope of the bed is given as 1 in 11000 . Take Manning's $N = 0.03$. (10 Marks)

OR

- 6 a. Find the slope of the free water surface in a rectangular channel of width 20 m having a depth of flow 5 m . The discharge through the channel is $50 \text{ m}^3/\text{s}$. The bed of the channel is having a slope of 1 in 4000 . Take the value of Chezy's constant $C = 60$. (08 Marks)
- b. What is gradually varied flow and derive an expression for gradually varied flow? Also mention the assumptions made for derivation. (08 Marks)

Module-4

- 7 a. A jet of water strikes an unsymmetrical moving curved vane tangential at one of the tips. Derive an expression for the force exerted by the jet in the horizontal direction of motion of vane. Also describe the velocity and obtain the expression for work done per second and efficiency. (08 Marks)
- b. Draw a neat sketch of hydroelectric power plant and mention the function of each component. (08 Marks)

OR

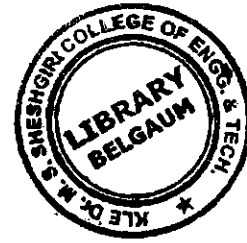
- 8 a. A pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 l/s under a head of 30 m . The buckets deflect the jet through an angle of 160° . Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98 . (08 Marks)
- b. Give a detailed classification of turbines. Also discuss about different heads and efficiencies. (08 Marks)

Module-5

- 9 a. Draw a neat sketch of Kaplan turbine and explain the function of each part in brief. (08 Marks)
- b. Derive an expression for the minimum starting speed of a centrifugal pump. (08 Marks)

OR

- 10 a. A Francis turbine with overall efficiency of 75% required to produce 148.25 KW power. It is working under a head of 7.62 m . The peripheral velocity $= 0.26\sqrt{2gh}$ and radial velocity of flow is $0.96\sqrt{2gh}$. The wheel runs at 150 rpm and hydraulic losses in the turbine are 22% of the available energy. Assume radial discharge. Determine:
- Guide blade angle at the inlet
 - The wheel vane angle at the inlet
 - Diameter of the wheel at the inlet
 - Width of the wheel at the inlet
- (08 Marks)
- b. Define multistage centrifugal pump and with neat sketch, explain the multistage centrifugal pumps used for (i) high heads (ii) high discharge. (08 Marks)



CBCS Scheme

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15CV/CT44

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Concrete Technology

Time: 3 hrs.

Max. Marks: 80

- Note:** 1. Answer FIVE full questions, choosing one full question from each module.
2. Use of I10262 is permitted.
3. Any missing data may be suitably assumed.

Module-1

- 1 a. List the ingredients of cement. State their importance. (08 Marks)
b. What are the products of hydration of cement? (04 Marks)
c. Mention the tests conducted on coarse aggregates. (04 Marks)

OR

- 2 a. Describe manufacturing sand and its role in reducing carbon foot print. (08 Marks)
b. Explain the importance of plasticizers and Fly Ash as Admixtures in concrete. (08 Marks)

Module-2

- 3 a. List the factors that affect workability of concrete. Mention the laboratory tests conducted to measure workability of a concrete sample. (08 Marks)
b. Explain the ill effects of segregation and bleeding in concrete. (08 Marks)

OR

- 4 a. Enumerate the role of curing in the performance of a concrete structural element. Name at least four methods of curing. (08 Marks)
b. Explain how heat of hydration is controlled in mass concrete works. (08 Marks)

Module-3

- 5 a. Describe the effect of water-cement ratio on strength of concrete. (08 Marks)
b. Brief the Internal and External factors influencing Durability of a concrete structure. (08 Marks)

OR

- 6 a. Write the process of disintegration of concrete due to acid attack. Suggest the remedial measures to control sulphate attack. (08 Marks)
b. Give the names of insitu concrete testing methods. Mention the principle and limitations of ultrasonic pulse velocity test. (08 Marks)

Module-4

- 7 a. Explain the concept of "Mix design" pertaining to concrete. (08 Marks)
b. Illustrate the steps to be followed as per IS recommendations method for a mix design. (08 Marks)

OR

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 8 Arrive at a mix proportion for a concrete of mix grade 20, to suite the following given data :
Max size of agg. = 20mm ; Slump required = 100mm ; Quality control = good ; Exposure condition = mild ; 53 grade OPC having SP.gravity = 3.15 ; Sp. Gravity of FA & CA = 2.55 and 2.70 respectively ; Water absorption = 0.5% and 1.0% for CA and FA respectively. FA is confirming to zone III. (16 Marks)

Module-5

- 9 a. Provide comparison between Insitu concrete and Ready mixed concrete (08 Marks)
b. Briefly explain the properties of "Fiber Reinforced Concrete". State the practical application of the same. (08 Marks)

OR

- 10 a. What should be the properties of materials to be used in "Light weight concrete" preparation? (08 Marks)
b. State the advantages of "SSC". List the tests to be carried out to determine the properties of SSC. (08 Marks)



CBCS Scheme

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15CV45

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Basic Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. With the help of the phase diagram, define the following : (03 Marks)
i) Void ratio ii) Porosity iii) Degree of saturation and iv) Water content.
- b. A sample have bulk density of 26 kN/m^3 , Specific gravity of 2.76 and water content 16%. Determine dry density, void ratio, porosity and degree of saturation. What is the density, if the soil is fully saturated due to rain? (06 Marks)
- c. How coarse grained soils are classified as per IS? Explain. If soil have $C_u = 7$, $C_c = 2$, % Gravel = 20% , Sand = 75% , classify the soil. (07 Marks)

OR

- 2 a. Considering soil as a three phase system, derive the relation $\gamma_d = \frac{G\gamma_w}{1+c}$. (05 Marks)
- b. Explain Consistency limits of soil. How do you describe the consistency if the soil has liquid limit of 55% , plasticity index of 30% and natural water content of 65%. (05 Marks)
- c. At a site the dry density of soil is 16 kN/m^3 , the weight of soil filled in a container of one liter in its loosest states and densest state are 15N and 17N respectively. Determine maximum and minimum void ratio of this soil. What is the relative density of natural soil at site? Take $G = 2.67$. (06 Marks)

Module-2

- 3 a. List the different types of clay minerals commonly found in soils. Explain any one with their structure. (04 Marks)
- b. Distinguish between standard and modified Proctor tests. (04 Marks)
- c. The following data referred to light compaction test as per IS. Take $\gamma_w = 10 \text{ kN/m}^3$.

Water content %	8.5	12.2	13.75	15.5	18.2	20.2
Dry unit weight kN/m^3	16.5	17.2	17.5	17.7	17.1	16.4

- If specific gravity of soil is 2.7 ① plot compaction curve and find i) OMC and ODD
ii) Plot 20% air void line iii) What is the range of water content that can be allowed to achieve dry density of 16.8 kN/m^3 at site. (08 Marks)

OR

- 4 a. Explain electrical diffuse double layer and adsorbed water. (04 Marks)
- b. Discuss the effect of compaction and different properties of soil. (06 Marks)
- c. During a compaction test a soil attains a maximum dry density of 18 kN/m^3 at a water content of 12%. Determine the degree of saturation and percent air voids at maximum dry density. Also find the theoretical maximum dry density corresponding to zero air voids at optimum moisture content. Take $G = 2.77$. (06 Marks)

Module-3

- 5 a. What are the factors affecting permeability? Explain any three. (04 Marks)
- b. With a neat sketch, explain the method of locating phreatic line for a homogeneous earth dam with horizontal filter. (06 Marks)
- c. A granular soil deposit is 7m deep over an impermeable layer. The ground water table is 4m below the ground surface. The deposit has a zone of capillary rise of 1.2m with a saturation of 50%. Plot the variations of total stress, pore water pressure and effective stress with the depth of deposit. Take $e = 0.6$ and $G = 2.65$. (06 Marks)

1 of 2

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OR

- 6 a. Write a note on : i) Characteristics of flow net and ii) Seepage velocity and discharge velocity. (06 Marks)
- b. Calculate the seepage loss in m^3/day for a hydraulic structure, if the flow net contains 5 flow lines and 9 equipotential lines and the head causing flow is 20m. K of soil is 2.6×10^{-6} cm/sec. (04 Marks)
- c. In a falling head permeameter test, the initial head is 40cm. The head drops by 5cm in 10 minutes, calculate the time required to run the test for the final head to be at 20cm. If the sample is 6cm in height and $50cm^2$ in cross sectional area, calculate coefficient of permeability taking area of stand pipe as $0.5cm^2$. (06 Marks)

Module-4

- 7 a. Define the following terms : i) Coefficient of compressibility ii) Coefficient of consolidation iii) Primary consolidation and iv) Over consolidated soil. (08 Marks)
- b. Explain Mass spring analogy of consolidation of soils. (04 Marks)
- c. An undisturbed sample of clay, 24mm thick consolidated 50% in 20 minutes, when tested in the laboratory with drainage allowed at top and bottom. The clay layer from which the sample was obtained is 4m thick in the field. How much time will it take to consolidate 90% with single drainage subjected to same as lab loading condition? (04 Marks)

OR

- 8 a. Explain Casagrande method of determination of pre consolidation pressure. (06 Marks)
- b. How do you determine coefficient of consolidation by square root time fitting method? (06 Marks)
- c. A layer of soft clay is 6m thick and lies under a newly constructed building. The weight of sand overlying the clay layer produces a pressure of $260kN/m^2$ and new construction increases the pressure by $100kN/m^2$. If the compression index is 0.5, compute the settlement. Water content and specific gravity of clay are 40% and 2.65 respectively. (04 Marks)

Module-5

- 9 a. Explain Mohr – Coulomb theory of shear strength. (04 Marks)
- b. In an unconfined compression test on soil sample of 100mm long and 50mm in diameter fails under a load of 150N at 10% strain. The failure plane makes an angle of 50° with the horizontal. Determine shear parameters. (06 Marks)
- c. The results of shear box test are as follows :

Trial No.	1	2	3	4
Normal stress kN/m^2	50	100	200	300
Shear stress kN/m^2	36	80	154	235

Determine the shear parameters. Would the failure occurs on the plane with in the soil mass when the shear stress is $122kN/m^2$ and normal stress is $246kN/m^2$. (06 Marks)

OR

- 10 a. Explain the classification of shear tests based on drainage condition. (06 Marks)
- b. A cylindrical specimen of dry sand was tested in a triaxial test. Failure occurred under a cell pressure of $130kN/m^2$ and deviator stress of $420 kN/m^2$. Find the following.
- Angle of shearing resistance.
 - Normal and shear stresses on the failure plane.
 - Inclination of failure plane with major and minor principal stress planes. (10 Marks)



CBCS Scheme

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15CV46

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Advanced Surveying

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. List the different methods of setting out simple circular curves. Explain the Linear method of setting out simple curve by the method of offset from long chord. (06 Marks)
- b. Two tangents intersect at chainage 1000mt. The deflection angle being 28 degree, calculate the necessary data to set out a simple circular curve of 200mt radius by Rankines method of deflection angles. Take per interval as 10mt. (10 Marks)

OR

- 2 a. What is a Transition curve? List the functions and essential requirements of an ideal Transition curve. (04 Marks)
- b. Two straights with a total deflection angle of 72° are to be connected by a compound curve of two branches of equal length. The Radius of the first branch is 300mt and that of the second branch is 400mt, chainage of intersection point is 1500 mt. Calculate the chainage of tangent points and that of Point of Compound Curvature (PIC). (06 Marks)
- c. Two parallel straight gant apart are to be connected by a Reverse curve. If the distance between the two tangent points is 72mt, find the common radius of the two branches. If however, radius of the first branch is 100mt, find the radius of the second branch. (06 Marks)

Module-2

- 3 a. List the various factors that are to be considered in the selection of site for Base line and stations in Triangulations survey. (08 Marks)
- b. Write a note on Classifications of Triangulations system. (08 Marks)

OR

- 4 a. State and explain Law of Weights. (08 Marks)
- b. Find the most probable value of the angles A and B from the following equations :
 $A = 40^\circ 15' 21.4''$; $B = 45^\circ 12' 18.4''$; $A + B = 85^\circ 27' 45.2''$. (08 Marks)

Module-3

- 5 a. Define the following terms : i) The celestial sphere ii) The azimuth iii) The sensible Horizon iv) The hour angle. (08 Marks)
- b. The standard time meridian in India is $82^\circ 30'E$. If the standard time at any instant is 20 hours 24 min 6 seconds, find the local mean time for two places having longitudes i) $20^\circ E$ ii) $20^\circ W$. (08 Marks)

OR

- 6 a. Define the following terms : (08 Marks)
i) The visible horizon ii) The Latitude (θ) iii) Hour circle iv) Zenith and Nadir.
- b. Find the GMT corresponding to following LMT : (08 Marks)
i) 9 hour 10 minutes 12 second AM at a place in longitude $42^\circ 36' W$.
ii) 4 hour 32 minutes 10 second AM at a place in longitude $56^\circ 32' E$.

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Define the following terms : i) Vertical photograph ii) Flying height iii) Perspective projection iv) Exposure station. (08 Marks)
- b. A vertical photograph was taken at an altitude of 1200mt above MSL. Determine the scale of the photograph for the terrain lying at elevation of 80mt and 300mt, if the Focal length of the camera is 15cm. (08 Marks)

OR

- 8 a. List the reasons for keeping overlap in photographs. (06 Marks)
- b. Describe how mosaic differs from a map. (04 Marks)
- c. The distance from the principal point to an image on a photograph is 6.44cm and the elevation of the object above the datum (sea level) is 250mt. What is the relief displacement at the point if the datum scale is 1 in 10,000 and the focal length of the camera is 20cm? (06 Marks)

Module-5

- 9 a. Explain the working principle of Total station and list the salient features of Total station. (08 Marks)
- b. Define Remote sensing. List the applications of Remote sensing. (08 Marks)

OR

- 10 a. What is GIS? With a neat sketch, explain the components of GIS. (08 Marks)
- b. Explain the working principle of GPS and distinguish between hand held GPS and differential GPS. (08 Marks)

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15CV/CT51

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Design of RC Structural Elements

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.

2. Use of code IS456:2000 and SP-16 is permitted.

Module-1

- 1 a. Explain: (i) Characteristic load; (ii) Characteristic strength; (iii) Partial safety factor. (06 Marks)
- b. What is stress block? Derive from the fundamentals the expressions for the area of stress block $0.36 f_{ck} b x_u$ and depth of centre of compressive force from the extreme fibre in compression $0.42 x_u$. (10 Marks)

OR

- 2 a. Explain: (i) Developmental length of bars; (ii) Short term deflection; (iii) Long term deflection (06 Marks)
- b. A rectangular simply supported beam of span 5 m is 300×650 mm in cross section and is reinforced with 3 bars of 20 mm on tension side at an effective cover of 50 mm. Determine the short deflection due to an imposed working load of 20 kN/m excluding self weight. Assume grade of concrete M20 and steel as Fe415. (10 Marks)

Module-2

- 3 a. Differentiate between under reinforced, over reinforced and balanced section. (06 Marks)
- b. A RCC beam of section $300 \text{ mm} \times 500 \text{ mm}$ is reinforced with 4 bars of 16 mm diameter with an effective cover of 50 mm. The beam is simply supported over a span of 5 m. Find the maximum permissible udl on the beam. Use M20 grade concrete and Fe 500 steel. (10 Marks)

OR

- 4 a. A RCC beam 250 mm wide and 450 mm deep is reinforced with 3 numbers of 20 mm dia bars of grade Fe415, on the tension side with an effective cover of 50 mm. If the shear reinforcement of 2 legged-8 mm dia stirrups at a spacing of 160 mm c/c is provided at a section, determine the design ultimate strength of the section. Assume M20 concrete. (07 Marks)
- b. A T-beam RC floor system consists of 120 mm thick slab supported by beams at 3m c/c. The effective width and depth of web is 300×580 mm as shown in Fig.Q4(b). Main reinforcement consists of 8 bars of 20 mm dia. The grade of concrete and steel used are M20 and Fe415 respectively. Determine the moment of resistance of T-beam, if it is used as simply supported beam of span 3.6 m.

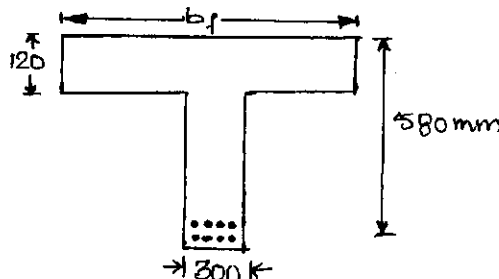


Fig.Q4(b)

(09 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 A rectangular beam is to be simply supported on supports of 230 mm width. The clear span of the beam is 6m. The beam is to have width of 300 mm. The super imposed load is 12 kN/m. Using M20 concrete and Fe415 steel. Design the beam. Apply check for deflection. (16 Marks)

OR

- 6 Design a rectangular beam of section 230 mm × 600 mm of effective span 6m. Effective cover of reinforcement should be kept as 50 mm. Imposed load on the beam is 40 kN/m. Use M20 concrete and Fe 415 steel. (16 Marks)

Module-4

- 7 Design a continuous RC slab for a classroom 7m wide and 14 m long. The roof is to be supported on RCC beams spaced at 3.5 m intervals. The width of beam should be kept 230 mm. The super imposed load is 3 kN/m² and finishing load expected is 1 kN/m². Use M20 concrete and Fe415 steel. (16 Marks)

OR

- 8 Design a dog legged stairs for an office building in a room measuring 2.8m * 5.8 m clear. Vertical distance between the floor is 3.6m. Width of flight is to be 1.25 m. Allow a live load of 3 kN/m². Sketch the details of reinforcement. Use M20 concrete and Fe 415 steel. Assume the stairs are supported on 230 mm walls at the end of outer edges of landing slabs. (16 Marks)

Module-5

- 9 A corner column 400 * 400 mm, is subjected to the factored loads $P_u = 1300$ kN, $M_{ux} = 190$ kN-m and $M_{uy} = 110$ kN-m. Design the reinforcement in the column, assuming M25 concrete and Fe 415 steel and effective cover of 60 mm. Assume it as short column. (16 Marks)

OR

- 10 Design a square footing for a short axially loaded column of size 300 mm * 300 mm carrying 600 kN load. Use M20 concrete and Fe415 steel. SBC of soil is 180 kN/m². Sketch the details of reinforcement. (16 Marks)

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15CV52

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Analysis of Indeterminate Structures

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 Analyze the continuous beam shown in Fig.Q1 by slope deflection method. Draw BMD and EC.

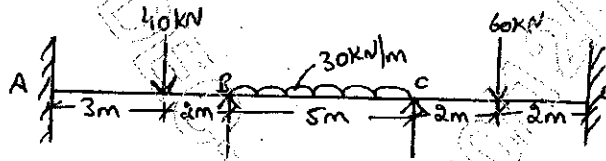


Fig.Q1

(16 Marks)

OR

- 2 Analyze the portal frame shown in Fig.Q2 by slope deflection method. Draw BMD.

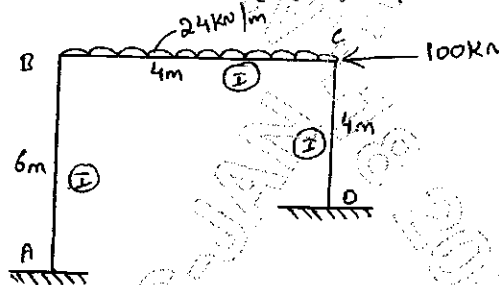


Fig.Q2

(16 Marks)

Module-2

- 3 Analyze the continuous beam by moment distribution method shown in Fig.Q3. The support 'B' sinks by 10 mm. Take $EI = 4000 \text{ kN-m}^2$. Draw BMD and EC.

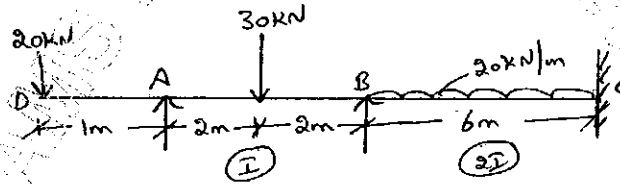


Fig.Q3

(16 Marks)

OR

- 4 Analyze the frame shown in Fig.Q4 by moment distribution method. Draw BMD.

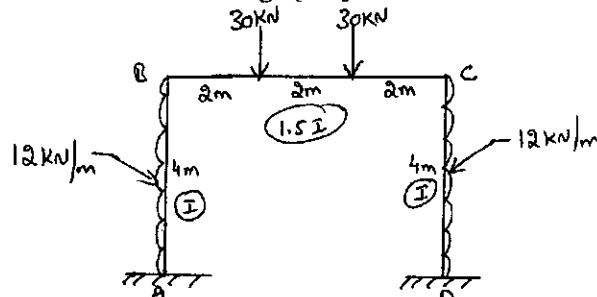


Fig.Q4

(16 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

5 Analyze the continuous beam by Kani's method. Shown in Fig.Q5. Draw BMD.

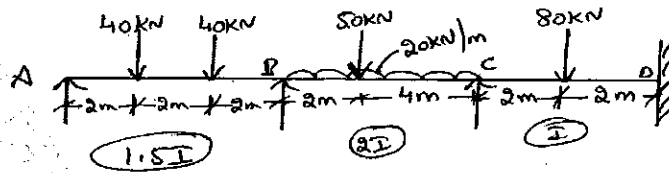


Fig.Q5 (16 Marks)

OR

6 Analyze the frame shown in Fig.Q6 by Kani's method. Draw BMD.

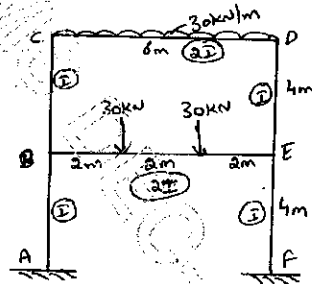


Fig.Q6 (16 Marks)

Module-4

7 Analyze the beam shown by flexibility matrix method. Draw BMD.

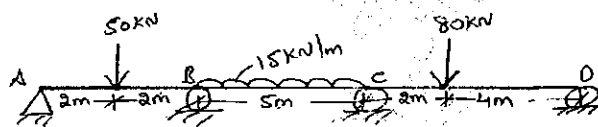


Fig.Q7 (16 Marks)

OR

8 Analyze the beam shown in Fig.Q8 by flexibility matrix method. Draw BMD.

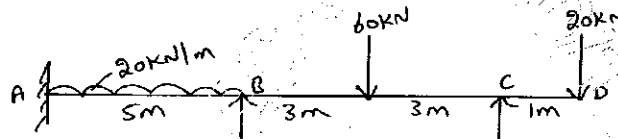


Fig.Q8 (16 Marks)

Module-5

9 Analyze the continuous beam shown in Fig.Q9 by stiffness matrix method. Draw BMD.

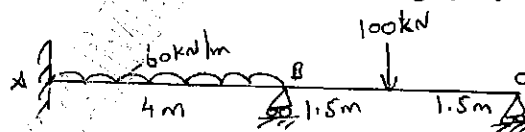


Fig.Q9 (16 Marks)

OR

10 Analyze the portal frame shown in Fig.Q10 by stiffness matrix method. Draw BMD.

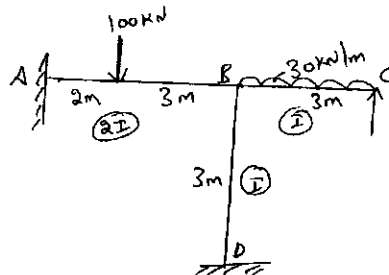


Fig.Q10 (16 Marks)



CBCS Scheme

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15CV53

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Applied Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Describe with neat sketch wash boring technique to explore soil. (08 Marks)
 b. The following sizes of sampling tubes are available in market.

Sample No.	I	II	III
Outer Diameter (mm)	75	110	50
Inner Diameter	72	107	35
Length (mm)	600	600	600

Out of these which one would you select for obtaining undistributed Soil sample from a base hole, Apply appropriate technique to get best undisturbed sample. (08 Marks)

OR

- 2 a. Explain with neat sketch, electrical resistivity method of soil exploration. (06 Marks)
 b. Predict the Ground water table given the following data: Depth upto which water is boiled out 18 m, Water rise in I day = 0.95 m, II day = 0.86 m and III day = 0.78 m, use the Hvorslev's method for predicting ground water table. (10 Marks)

Module-2

- 3 a. Compare Boussinesq's theory with Westergaard's theory with a logical graph analysis. (08 Marks)
 b. Find intensity of vertical pressure at a point 3 m directly below 25 kN point load acting on a horizontal ground surface. What will be the vertical pressure at a point 2 m horizontally away from the axis of loading and at same depth of 3 m? Use Boussinesq's equation. (08 Marks)

OR

- 4 a. Explain components of settlements. (12 Marks)
 b. A reinforced concrete foundation of dimensions 1.8m x 3.6m exerts a uniform pressure of 180 kN/m² on a soil mass, with E-value 45MN/m². Determine the value of Immediate settlement under the foundation. Take $\mu = 0.3$ and $I_f = 1.0$ (04 Marks)

Module-3

- 5 a. Compare Coulomb's Earth pressure theory over Rankin's Earth pressure theory. (06 Marks)
 b. Determine the active earth pressure using Rebhann's graphical method. (10 Marks)

OR

- 6 a. Explain the procedure for determination of factor of safety using method of slices for C- ϕ -soil. (12 Marks)
 b. An Embankment is inclined at an angle 35° and its height is 15 m. The angle of shearing resistance is 15° and the cohesion intercept is 40 kN/m². The unit weight of soil is 18 kN/m³. Examine the factor of safety with respect to cohesion. Consider Taylor's stability number = 0.06. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Determine the bearing capacity of the soil by using plate load test as per IS : 1888 guidelines. (08 Marks)
- b. A square footing located at a depth of 1.3 m below ground has to carry a safe load of 800 kN. Predict the size of footing which is safe against applied load. If the desired factor of safety is 3.0. Assume $e = 0.55$, Degree of Saturation = 50%, $G = 2.67$, $C = 8 \text{ kN/m}^2$. Use Terzaghi's analysis for general shear failure. Assume $\phi = 30^\circ$, $N_c = 37.2$, $N_q = 22.5$ and $N_r = 19.7$ (08 Marks)

OR

- 8 a. Generalize the assumptions made by Terzaghi's bearing capacity theory for development of bearing capacity equation. (08 Marks)
- b. Determine the bearing capacity of the soil by using standard penetration test as per IS : 2131 guidelines. (08 Marks)

Module-5

- 9 a. Classify the various type of Piles based on material and function. (10 Marks)
- b. Explain negative skin friction in pile foundation. (06 Marks)

OR

- 10 a. Explain with a neat sketch the construction and working of under reamed pile. (10 Marks)
- b. Justify with a neat sketch, how static formula summarize the load transfer mechanism in pile foundations. (06 Marks)

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Fifth Semester B.E. Degree Examination, December 2017
(CIVIL ENGINEERING)

COMPUTER AIDED BUILDING PLANNING AND DRAWING

Time: 3 Hours

Max. Marks: 80

Note: Answer any *TWO* full questions. Assume any missing data suitably.

Q1. Draw to scale a singly reinforced beam for the following details. Size of the beam 400mm X 550 mm, clear span 4500mm, the beam is reinforced with 4 nos of 16 mm dia bars as main reinforcement, two hanger bars of 12 mm dia and 8 mm dia 2LVS at 140 mm c/c. supported on wall 230mm thick.

- Longitudinal section showing the reinforcement details.
- Cross section at center of beam and face of support

(30 Marks)

OR

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

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

(30 Marks)

Q3. The line diagram of a Residential building is given in Fig Q3. Draw to scale the following :

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

(50 Marks)

OR

Q4. The line diagram of a Hospital building is given in Fig Q4. Draw to scale the following :

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

(50 Marks)

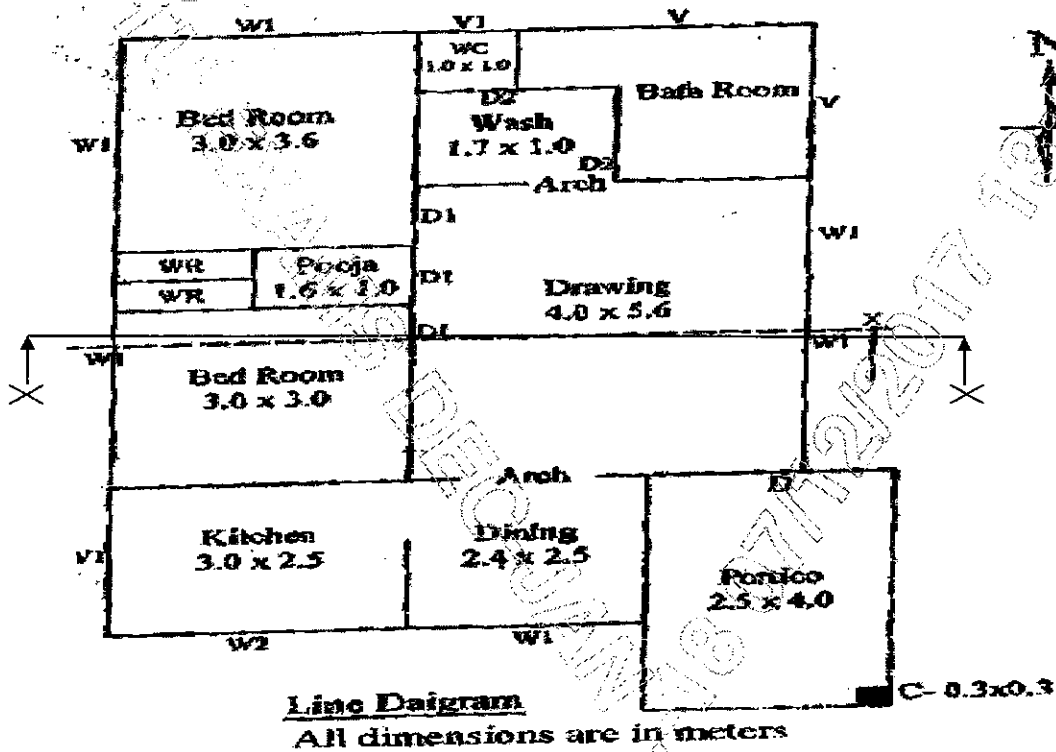


Fig. Q3

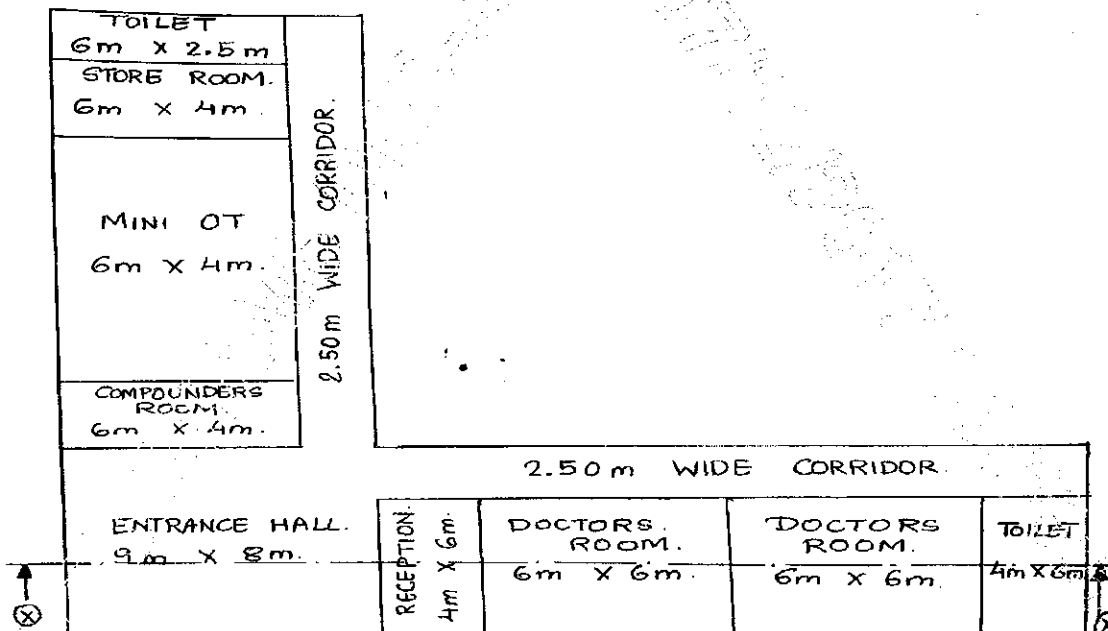


Fig. Q4



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15CV/CT551

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Air Pollution and Control

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define Air Pollution. Explain Primary and Secondary air pollutants. (08 Marks)
b. With respect to Air pollution, explain air borne contaminants. (08 Marks)

OR

- 2 a. Enumerate the effects of Air pollution on Human Health and Vegetation. (08 Marks)
b. Define Inversion. Briefly explain the different types of inversion with the aid of neat sketches. (08 Marks)

Module-2

- 3 a. Explain the structure and the composition of atmosphere. (08 Marks)
b. Define Lapse rate. Explain the different types of lapse rate. (08 Marks)

OR

- 4 a. What are the assumptions and limitations of the Gaussian Plume dispersion model? (08 Marks)
b. A Thermal power plant releases SO_2 at a rate of 138.8 g/s. The stack height is 120m. While the temperature of the stack gas is 150°C and the ambient air temperature is 35°C . The wind velocity at the stack height is 8.5m/s, While the stack gas velocity is 10m/s. The stack diameter is 3.5m. The atmospheric pressure is 1.005 bar. Estimate the effective stack height. (08 Marks)

Module-3

- 5 a. What is meant by Air sampling? Explain briefly sampling train. (08 Marks)
b. With the help of the neat sketch, explain the measurement of SPM in ambient air. (08 Marks)

OR

- 6 a. With the help of neat sketch, explain high volume air sampler for measurement of particulate matter. (08 Marks)
b. Briefly explain any one method of measuring SO_2 in the stack. (08 Marks)

Module-4

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

OR

- 8 a. With the help of neat sketch, explain the working principle of Electro Static Precipitation. (08 Marks)
b. A cement plant was emitting flue gas at the rate of 20,000 m^3/h . Assuming inlet gas velocities of 2m/s. Design a tubular ESP with 0.20m diameter with 7 cylinders to achieve the efficiency of 90% and 95%. (08 Marks)

Module-5

- 9 a. Explain briefly the emission of the gasoline driven vehicles and diesel driven vehicles. (08 Marks)
b. Define Noise Pollution. Explain the sources and control methods of Noise Pollution. (08 Marks)

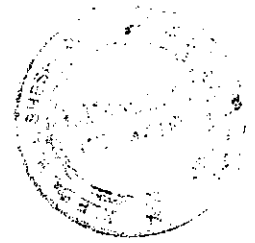
OR

10 Write short notes on any Four of the following :

- a. Acid rain and its effects.
b. Bhopal gas tragedy.
c. Air quality standards.
d. Noise Pollution standards.
e. Environmental policy.
f. Kyoto protocol.

(16 Marks)

CBCS Scheme



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15CV553

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Masonry Structures

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS – 1905 – 1987 code of practice for structural use of un reinforced masonry is permitted.

Module-1

- 1 a. Explain in brief various field and laboratory tests conducted on bricks. (08 Marks)
b. Briefly explain the factors effecting compressive strength of masonry. (08 Marks)

OR

- 2 a. Derive the expression for compressive strength of masonry based on elastic theory. (08 Marks)
b. With neat sketches briefly explain causes and remedial measures for cracks in masonry. (08 Marks)

Module-2

- 3 a. Explain the following terms with suitable values :
i) Permissible compressive stress
ii) Stress reduction factor
iii) Permissible tensile stress
iv) Permissible shear stress (08 Marks)
b. Explain with values of the following :
i) Effective thickness
ii) Effective height. (04 Marks)
c. A solid wall of thickness 200mm is 3m in height and 5m in length. The wall is fully restrained laterally and rotationally at top and bottom. No openings in the wall. Determine the effective thickness, effective height, effective length and slenderness ratio. (04 Marks)

OR

- 4 a. With neat sketches list different types of walls. (08 Marks)
b. Explain the arch action in lintels (04 Marks)
c. A solid wall with thickness 300mm is adequately bounded by piers as shown on Fig.4(c). The height of wall is 4m and length is 5m. The wall is fully restrained at top and bottom and no openings. Determine the stiffening co-efficient, effective thickness, effective height, effective length and slenderness ratio. (04 Marks)

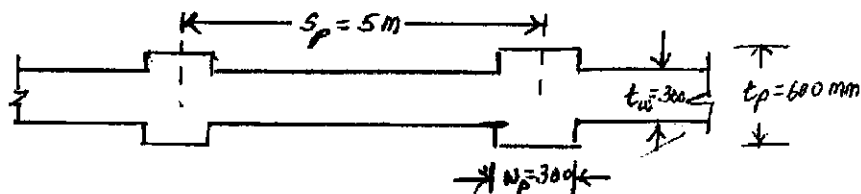


Fig.Q4(c)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. List the steps involved in the design of axially loaded walls without eccentricity. (04 Marks)
 b. Design an axially loaded interior solid cross-wall of a two storeyed building to carry 100mm thick RCC slabs with 3m ceiling height. The wall is fully restrained at top and bottom. The wall supports a 2.65m wide slab.
 Live load on roof = 1.5 kN/m^2 ; live load on floor = 2.0 kN/m^2 ; weight of 80mm thick terrace = 1.96 kN/m^2 ; weight of floor finish = 0.2 kN/m^2 . Refer Fig.Q5(b). (12 Marks)

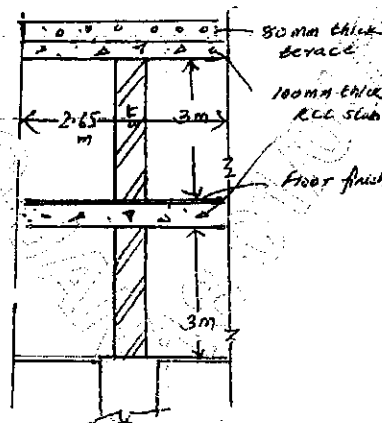


Fig.Q5(b)

OR

- 6 Design an interior cavity wall with cross-walls for a three storeyed building, the ceiling height of each storey being 3m. The wall is stiffened by intersecting walls 200mm thick at 3600mm centre to centre. Assume loading from roof = 16 kN/m and from each floor = 12.5 kN/m . Refer Fig.Q6 given below. (16 Marks)

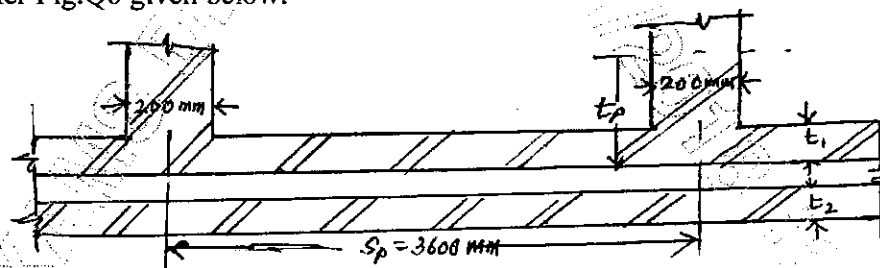


Fig.Q6

Module-4

- 7 a. Design neat sketches briefly explain stress distribution for various eccentricity :
 i) $e = 0$ ii) $0 < e < t/6$ iii) $e = t/6$ iv) $e > t/6$. (04 Marks)
 b. Design a solid wall with piers under a concentrated load for a workshop building 3.6m high carrying steel trusses at the top at 4.5m spacing. The wall is fully restrained at top and bottom. The loading shall be assumed as follows :
 Concentrated reaction from the roof trusses = 30 kN acting at the centre of wall
 Roof loading = 7 kN/m
 Wind load may be neglected. (12 Marks)

OR

- 8 a. Explain the design criteria of walls subjected to concentrated load. (04 Marks)
- b. Design an interior cross wall(AB) under eccentric loading for a single storyed building, supporting unequal concrete roof slab. The plan is shown in Fig.8(b). Assume triangular bearing pressure and roof loading as 10 kN/m^2 . The storey height is 3.8m and the wall is fixed to foundation block below. (12 Marks)

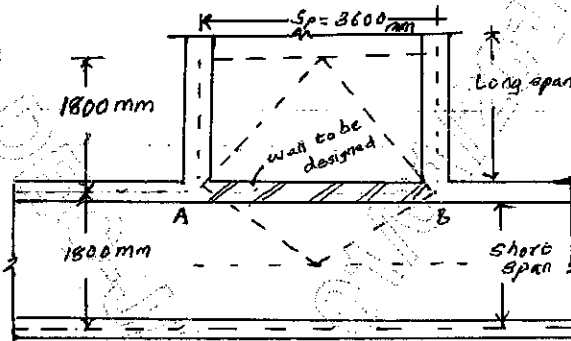


Fig. Q8(b)

Module-5

- 9 a. With neat sketches, explain modes of failure of infilled frames. (06 Marks)
- b. Design a shear wall under seismic loading, length of wall 4.5m and 3m high to resist a horizontal earthquake force in its plane. Assume seismic load to be uniformly distributed across the height of the wall. Earthquake acceleration = $0.1g$. The wall is tied with metal anchors at the top and bottom supports both top and bottom are partially restrained. (10 Marks)

OR

- 10 a. Mention various stability checks in the design of masonry retaining walls and briefly explain them. (04 Marks)
- b. Design a compound wall, the height of which, is 1.8m up to the top of coping. Assume wind pressure equal to 1000 N/m^2 and is uniformly applicable. The safe bearing pressure on the soil is 120 kN/m^2 . Hard bed is available at a depth of 900mm below ground level. Refer below Fig.Q10(b). (12 Marks)

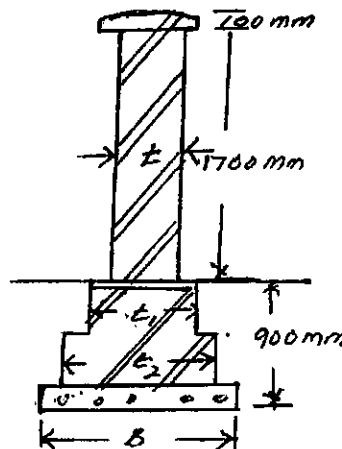


Fig.Q10(b)

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Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Theory of Elasticity

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Derive the differential equation of equilibrium in absence of body forces in three dimensions. (10 Marks)
- b. Write briefly about strain components. (03 Marks)
- c. Explain stress at a point with example. (03 Marks)

OR

- 2 a. Calculate principal strain and their direction using strain rosette $\epsilon_\phi = 2 \times 10^{-3}$, $\epsilon_{\alpha+\phi} = 1.35 \times 10^{-3}$, $\epsilon_{\alpha+\beta+\phi} = 0.95 \times 10^{-3}$ where $\alpha = \beta = 45^\circ$. (08 Marks)
- b. Obtain compatibility equations in terms of strain. (08 Marks)

Module-2

- 3 a. State and explain St.Venant's principle. (04 Marks)
- b. Explain plane stress and plane strain with example. (04 Marks)
- c. Investigate what problem of plane stress is solved by the given stress function, when applied to the region included in $y = 0$, $y = d$, $x = 0$ on positive x side.

$$\phi = \frac{-F}{d^3} xy^2 (3d - 2y) \quad (08 \text{ Marks})$$

OR

- 4 a. Write briefly about Airy's stress function. Obtain the stress distribution when applied to II degree polynomial. (08 Marks)
- b. Write note on:
- Generalized Hooke's law
 - Stress-strain relation. (08 Marks)

Module-3

- 5 a. A rectangular cantilever concrete beam of depth 'd' and width 'b' is having length 'l' measured from free end. It carries a vertical downward load of 'p' at free end. Derive the expressions for stresses at any point. (10 Marks)
- b. Write strain displacement relation for polar coordinates. (06 Marks)

OR

- 6 a. Derive equilibrium equations in terms of polar coordinates for two dimensional problems. (09 Marks)
- b. Obtain stress components in polar coordinates and show that they satisfy equilibrium conditions. (07 Marks)

Module-4

- 7 a. Derive the Lamé's equations for thick cylinder. (12 Marks)
b. Determine the stress components for axisymmetric stress problems. (04 Marks)

OR

- 8 Discuss the effect of circular hole on the stress distribution in an infinite plate subjected to tensile stress in x-direction only. (16 Marks)

Module-5

- 9 a. Obtain the stress components for torsion in elliptical section. (12 Marks)
b. Write briefly about semi-inverse method in torsion. (04 Marks)

OR

- 10 a. Explain membrane analogy for torsional members. (04 Marks)
b. Discuss torsion in circular section and also obtain stress, strain components with ' Ψ ' as warping function. (12 Marks)



CBCS Scheme

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15CV561

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Traffic Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- List the different road users characteristics and explain the concept of PIEV theory. (08 Marks)
 - Discuss various urban traffic problem that India is facing. List some remedial measures also. (08 Marks)

OR

- What are the different vehicular characteristics which affect road design? Explain. (08 Marks)
 - Write short notes on :
 - Fundamentals of traffic flow
 - Integrated planning of town. (08 Marks)

Module-2

- Mention various applications of "O and D" study. Explain road side interview method of collecting "O and D" data. (08 Marks)
 - Spot speed studies were carried out at a certain stretch of a road highway and the consolidated data collected are given below :

Speed range (km ph)	Number of vehicles observed	Speed arrange (km ph)	Number of vehicles observed
0 to 10	12	50 to 60	255
10 to 20	18	60 to 70	119
20 to 30	68	70 to 80	43
30 to 40	89	80 to 90	33
40 to 50	204	90 to 100	09

Determine :

- Upper and lower values of speed limit for regulation
- Design speed for checking the geometric design element of the highway. (08 Marks)

OR

- Explain the following terms :
 - Time headway
 - Space headway
 - Traffic volume
 - Level of service. (08 Marks)
 - Define the term "spot speed study". With neat sketch explain enoscope method of measuring spot speed study. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-3

- 5 a. What are the advantages and disadvantages of rotary intersection? (08 Marks)
- b. i) Define briefly signal "cycle" and "Interval"
- ii) The average normal flow of traffic on cross roads A and B during design period are 400 and 250 PCU per hour; the saturation flow values on these roads are estimated as 1250 and 1000 PCU per hour respectively. The all red time required for pedestrian crossing is 12 secs. Design two phase traffic signal by Webster's method. Sketch phase diagram also. (08 Marks)

OR

- 6 a. Mention various classifications of traffic signs. Explain any two of them with neat sketches. (08 Marks)
- b. Write short notes on :
- i) Road markings
- ii) Channelized intersections
- iii) Unchannelized intersections. (08 Marks)

Module-4

- 7 a. i) What are the major sources of traffic related noise pollution? Explain.
- ii) Explain controlling methods of noise pollution by traffic. (08 Marks)
- b. What are the major air pollutants due to road traffic? Explain consequences of each. (08 Marks)

OR

- 8 a. i) Write various objective of road accidents studies (04 Marks)
- ii) Explain in detail the causes for road accidents. (04 Marks)
- b. Write short notes on :
- i) Promotion of non – motorized transport
- ii) Measures to decrease accidents. (08 Marks)

Module-5

- 9 a. Define traffic congestion. Explain different method of traffic restrain (reduction). (08 Marks)
- b. Explain Intelligent transport system for traffic management. (08 Marks)

OR

- 10 a. Suggest some traffic regulatory measures suitable for urban areas. (08 Marks)
- b. Write short notes on :
- i) Requirement of good pricing system
- ii) Travel demand management
- iii) Area traffic control
- iv) Traffic system management. (08 Marks)

2 of 2



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Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Remote Sensing & GIS

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define Remote Sensing, with a neat sketch and explain the process of remote sensing system. (08 Marks)
- b. With a neat sketch and explain the electromagnetic spectrum. (08 Marks)

OR

- 2 a. Explain the energy interactions in the atmosphere. (08 Marks)
- b. Explain the elements of visual interpretation techniques. (08 Marks)

Module-2

- 3 a. Explain the different types of platforms used in remote sensing. (06 Marks)
- b. What is resolution of a sensor? Describe all sensor resolutions. (10 Marks)

OR

- 4 a. Explain digital image processing. (06 Marks)
- b. Write a note on IRS, Landsat, IKonos and Cartosat. (10 Marks)

Module-3

- 5 a. Define GIS. Describe the key components of GIS. (08 Marks)
- b. Explain the different steps involved in GIS operations. (08 Marks)

OR

- 6 a. What is a map projections? Explain the types of map projections. (08 Marks)
- b. Write a note on Geospatial data and projected coordinate system. (08 Marks)

Module-4

- 7 a. What is vector data model? How to represent the simple spatial features in vector data model. (08 Marks)
- b. Write a note on topology and coverage. Mention their importance. (08 Marks)

OR

- 8 a. Explain the different raster data structures. (08 Marks)
- b. What is raster data model? Explain the different types of raster data used in GIS. (08 Marks)

Module-5

- 9 a. What is land use land cover? Explain the applications of remote sensing in land use land cover analysis. (08 Marks)
- b. How remote sensing and GIS are used in change detection study? (08 Marks)

OR

- 10 a. Explain the applications of RS and GIS in natural resource management. (08 Marks)
- b. Explain the following: Urban palnning, Traffic management (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

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15CV564

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018 Occupational Health and Safety

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define the following : i) Safety ii) Hazard iii) Accident iv) Risk. (08 Marks)
b. Write a note on :
i) Need for accident investigation ii) Methods of acquiring accident facts. (08 Marks)

OR

- 2 a. Comment on Light – to – Know laws. (08 Marks)
b. List the different steps to be considered in accident investigation process. (08 Marks)

Module-2

- 3 a. What do you understand by ergonomics? Write a brief note on task analysis. (08 Marks)
b. Discuss the hazard prevention and control. (08 Marks)

OR

- 4 a. Define Ergonomics and comment on OSHA's Ergonomics guidelines. (08 Marks)
b. Write a brief note on Work site analysis programme for ergonomics. (08 Marks)

Module-3

- 5 a. Define Fire hazard and discuss the sources of fire hazard. (08 Marks)
b. Write a brief note on Electrical Safety and Product Safety. (08 Marks)

OR

- 6 a. List and explain various methods of Extinguishing fire. (08 Marks)
b. Outline the general do's and don't's during electrical fire accident. (08 Marks)

Module-4

- 7 a. Write a note on use of personal protective equipments for health and safety considerations. (08 Marks)
b. Discuss ISO : 14000 standard with its requirements. (08 Marks)

OR

- 8 a. Explain various types of respiratory protective devices. (08 Marks)
b. Write a brief note on Total Quality Management. (08 Marks)

Module-5

- 9 a. Discuss briefly the various Safety Consideration in the construction Industry. (08 Marks)
b. Write a brief note on Health problems in handling of chemicals in Water and waste water treatment plants. (08 Marks)

OR

- 10 a. Write a brief note on Hazard prevention and control in RMC plants. (08 Marks)
b. Explain various health and safety consideration to be adopted in Managing Municipal Solid Waste. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



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10CV61

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Environmental Engineering - I

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Explain in detail the various types of water demands. (06 Marks)
- b. With the help of a diagram, describe the hourly variation of water demand. (06 Marks)
- c. The following data have been collected from the census department for a city. Calculate the probable population of the city in the year 2020 by using geometrical increase method:

Year	Population
1960	35,00,000
1970	46,60,000
1980	99,50,000
1990	1,56,00,000
2000	1,63,00,000
2010	1,84,00,000

(08 Marks)

- 2 a. What are intake structures? Describe with neat sketch a intake structure. (08 Marks)
- b. Describe the working of a simple hand operated reciprocated pump. (06 Marks)
- c. Estimate the size of supply conduct for a city with population of 5,00,000. Assume water consumption as 270 l/c/d and flow velocity through the pipe as 1.2 m/sec. (06 Marks)

- 3 a. What is meant by turbidity of water? Explain how to determine the optimum coagulant dosage in the laboratory using Jar Test apparatus. (10 Marks)
- b. Explain the significance of the following parameters of water, with their standards:
 - i) Hardness of water
 - ii) Chlorides
 - iii) Fluoride
 - iv) Turbidity
 - v) Nitrates

(10 Marks)

- 4 a. Draw the water treatment flow chart indicating the impurities removed at each unit and discuss briefly of them. (10 Marks)
- b. Design a sedimentation tank for a water works which supplies 1.5×10^6 liters/day. Velocity of flow is 15 cm/min and depth of water in tank is 3.5 m. Sedimentation period is 5 hours. Assume an allowance for sludge as 50 cm. (10 Marks)

PART - B

- 5 a. Explain the theory of filtration process for the treatment of water. (10 Marks)
- b. Design a set of 8 rapid gravity filters for treating water at water works, which has to supply water to a town of population 3,00,000. Per capital demand if the town is 270 liters/day. The rate of filtration of the rapid gravity filter may be taken as 4500 litres/hour/sq.m. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 6 a. Explain lime soda process for removal of hardness. (08 Marks)
b. Discuss briefly on:
i) Pre and Post chlorination
ii) Super chlorination
iii) Dechlorination (06 Marks)
c. Write the requirements of a good disinfectants. (06 Marks)
- 7 a. Explain methods for removing fluoride from water. (10 Marks)
b. List the different layout of distribution system of water. Explain any two methods. (10 Marks)
- 8 a. Differentiate between port fire hydrant and flush fire hydrant. (10 Marks)
b. Write short notes on:
i) Back wash of RSF
ii) Break point chlorination (10 Marks)



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10CV62

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Design and Drawing of RC Structures

Time: 4 hrs.

Max. Marks:100

Note: 1. Answer any TWO full questions from PART-A
and any ONE question PART-B.

2. Use of IS-456(2000) and SP-16 is permitted.

PART - A

1. A simply supported two way slab with clear dimensions 5.0m × 6.0m is supported on all sides by 230 mm thick wall. Following are the reinforcement details:

Short span : Positive steel = #12 mm @ 125 mm c/c

Negative steel = #12 mm @ 125 mm c/c
for a length of 1.5 m.

Longer span : Positive steel = #12 mm @ 140 mm c/c

Negative steel = #12 mm @ 140 mm c/c
for a length of 1.5 m.

Torsional reinforcements in the form of corner mat # 10 mm at 150 mm c/c is provided at top and bottom in all corners.

Edge strip reinforcement #8 @ 230 mm c/c

Thickness of slab 150 mm.

Draw to a suitable scale.

- Plan showing reinforcement details. (10 Marks)
- C/S at midspan along shorter span. (05 Marks)
- C/S at midspan along longer span. (05 Marks)

2. A dog legged staircase is to be detailed with the following details:

Size of staircase room 2100 mm × 4500 mm

Width of flight = 1000 mm

Width of landing = 1000 mm

Number of treads in each flight = 10

Tread = 250 rise = 150 mm

Wall thickness = 230 mm

Waist slab thickness = 160 mm

Main steel 12 mm HYSD bars at 100 mm c/c and distribution steel for each flight = 8 mm @ 200 c/c. First flight starts from ground floor level and foundation 750 mm below GFL and second flight rests on wall.

Draw to a suitable scale:

- Plan (06 Marks)
- Sectional details of 1st and 2nd flight. (14 Marks)

- 3 A rectangular column of size 300 mm × 450 mm is provided with square isolated footing of size 2.60 m × 2.60 m. Height of column above GL = 3.6 m. Depth of foundation = 1.2 m below GL.

Details of Column:

Longitudinal steel = 10 numbers of 16 mm dia HYSD bars

Transverse steel = 8 mm dia ties at 200 mm c/c.

Details of footing:

Depth of footing at column face 600 mm and is tapered to 300 mm at the edge of footing.

Reinforcements = #12 mm HYSD bars at 150 mm c/c.

Draw to a suitable scale:

- Plan of column and footing showing reinforcement. (06 Marks)
- Sectional elevation. (10 Marks)
- Bar bending schedule. (04 Marks)

PART – B

- 4 Two reinforce columns A = 350 mm × 350 mm and B = 400 mm × 400 mm in size carry axial service loads of 600 kN and 850 kN respectively. The columns are spaced at 3.6 m c/c. SBC of soil is 150 kN/m². The property line is 0.9 m from the centre of column A. Design the beam and slab type combined footing. (40 Marks)

Draw longitudinal section, plan and typical cross sections to a suitable scale. Use M20 grade of concrete and Fe 415 steel. (20 Marks)

- 5 Design a counter fort retaining wall with the following details.

Height of wall above GL = 6.0 m

Depth of hard soil level = 1.2 m

Angle of repose of the soil = 30°

SBC of the soil = 180 kN/m²

Density of soil = 18 kN/m³

Spacing between counterforts = 3.0 m c/c

Length of base slab = 4.5 m

Length of toe = 1.1 m

Coefficient of friction, $\mu = 0.55$

Materials: concrete M20 grade, Steel Fe415. (40 Marks)

Draw to a suitable scale:

- Cross section through counterfort. (10 Marks)
- Cross section mid way between counterforts. (05 Marks)
- Sectional plan. (05 Marks)

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10CV63

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Transportation Engineering – II

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. What are the factors considered for laying new railway line? (06 Marks)
b. With the aid of sketches briefly explain the types of rails. (06 Marks)
c. Define permanent way. What are the ideal requirements of permanent way? (08 Marks)
- 2 a. What are the advantages of welding of rails? (06 Marks)
b. With a neat sketch, explain
(i) Dog spike (ii) Screw spike (06 Marks)
c. Define sleeper density. For a rail of 12.80 metre length, calculate the quantity of materials required per km length of track. Assume sleeper density as $n + 3$. (08 Marks)
- 3 a. Determine the maximum train load that can be handled by a locomotive having four pairs of driving wheels of an axle load of 28 tonnes each. On a straight track the train runs at a speed of 90 kmph. Also determine the reduction in speed of train when it is moving on upward gradient of 1 in 200. If the train moves on upward gradient with 4° curve, what would be the reduction of speed? (08 Marks)
b. What are the objects of providing transition curve? Explain briefly the essential requirement of ideal transition curve. (06 Marks)
c. A 6° curve branches off from 3° main curve in an opposite direction in the layout of B.G. yard. If the speed on the branch line is restricted to 35 kmph, determine the speed restricted on main line. Assume permissible deficiency in cant as 7.6 cm (06 Marks)
- 4 a. Draw a neat sketch of "Right hand turnout" and show the various parts on it. (06 Marks)
b. Find the lead and radius of curve for a B.G. turnout having $d = 136$ mm, $\theta = 1^{\circ}34'27''$ and number of crossing as 1 in $8\frac{1}{2}$. (04 Marks)
c. Write a note on:
(i) Marshalling yards (ii) Locomotive yards. (10 Marks)

PART – B

- 5 a. List and explain the aircraft characteristics which affect planning and design of airports. (10 Marks)
b. What is wind rose diagram? Explain any one method of constructing wind rose diagram. (10 Marks)
- 6 a. With the aid of sketch explain the procedure of instrument landing system. (06 Marks)
b. Explain the various factors affecting on locations of exit taxiway. (06 Marks)
c. Determine the corrected length of runway for an airport site using the following data: (08 Marks)
(i) Basic runway length = 2600 metres.
(ii) Airport elevation = 500 meters.
(iii) Airport reference temperature = 21°C
(iv) Runway effective gradient = 0.2%

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 7 a. Explain the method of transfer of centre line into tunnel and providing grade. (10 Marks)
b. With the aid of sketch, explain the needle beam method of tunneling. (06 Marks)
c. What are the advantages of cement concrete lining? (04 Marks)
- 8 a. What are the factors to be considered for selection of harbor site? (06 Marks)
b. What is dry dock? Explain the construction and uses of dry dock. (08 Marks)
c. Compare with sketches, the wall type break water and mound type break water. (06 Marks)

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10CV64

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Geotechnical Engineering – II

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. What are the objectives of soil exploration? With a neat sketch, explain any one method. (06 Marks)
- b. What are the objectives of dewatering? With a neat sketch, explain any one method. (06 Marks)
- c. A sampling tube has inner diameter of 70 mm and cutting edge diameter of 68 mm. Their outside diameters are 72 mm and 74 mm respectively. Determine the area ratio, inside clearance and outside clearance of the samples. This tube is pushed to the bottom of the bore hole to a distance of 550 mm with a length of sample recorded being 530 mm. Find the recovery ratio. (08 Marks)
- 2 a. Distinguish between Boussinesq's and Westergaard's theory of stress distribution. (06 Marks)
- b. Explain construction and uses of Newmark's chart. (08 Marks)
- c. A water tank is supported by a ring foundation having outer diameter of 10 m and inner diameter of 7.5 m. The ring foundation transmits a load intensity of 160 kN/m². Compute the vertical stress induces at a depth of 4 m below the centre of ring foundation using Boussinesq's analysis. (06 Marks)
- 3 a. List the characteristics and uses of flow net. (06 Marks)
- b. Explain the graphical method of determining phreatic line in homogenous earth dam with horizontal filter. (08 Marks)
- c. For an earth dam of homogenous section with horizontal filter. The coefficients of permeability in x and y directions are 8×10^{-7} cm/s and 3.6×10^{-7} cm/s respectively. The flow nets constructed include 4 flow channels and 18 potential drops. Determine the discharge through the dam in m³/day if the treat during seepage was 14 m. (06 Marks)
- 4 a. Distinguish between the active and passive earth pressure. (04 Marks)
- b. With a neat sketch explain the procedure to determine the lateral earth pressure by Culmann's graphical method. (08 Marks)
- c. A retaining wall of 8 m height retains sandy material. The properties of sand are $e = 0.6$, $\phi = 30^\circ$ and $G = 2.65$. The water table is at a depth of 2.5 m from the ground surface. Draw the earth pressure diagram and determine the magnitude of total active earth pressure. (08 Marks)

PART – B

- 5 a. With neat sketch, explain different types of slope failures. (06 Marks)
- b. Explain Swedish slip circle method for cohesive soils. (06 Marks)
- c. A 5m deep canal has side slopes of 1:1. The properties of soil are $C_u = 20$ kN/m², $\phi_u = 10^\circ$, $e = 0.8$ and $G = 2.8$. If Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when canal runs full. Also find the same in case of draw down if Taylor's stability number for this condition is 0.137. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

- 6 a. Define ultimate bearing capacity, safe bearing capacity and allowable bearing capacity. (06 Marks)
- b. With a neat sketch, explain plate load test. (06 Marks)
- c. Determine the safe bearing capacity of a square footing with 2.1 m width placed at a depth of 1.5 m in a soil with moist unit weight of 17 kN/m^3 , $C = 15 \text{ kN/m}^2$ and $\phi = 20^\circ$. Take $N_C = 11.8$, $N_q = 3.9$ and $N_r = 1.7$, what is the change in bearing capacity if the water table raises to 0.5 m above the base of footing? Assume factor of safety as 3. (08 Marks)
- 7 a. Explain the terms:
- Immediate settlement
 - Primary consolidation settlement
 - Secondary consolidation settlement
 - Differential settlement
- (08 Marks)
- b. Estimate the immediate settlement of a footing size $(2 \times 3) \text{ m}$ resting at a depth of 2m in a sandy soil. The compression modulus of soil is 10 N/mm^2 . The footing is expected to transmit a unit pressure of 160 kN/m^2 . Assume $\mu = 0.28$ and $I_f = 1.06$. (06 Marks)
- c. A square footing of width 1.2 m rests on a saturated clay layer of 4 m deep liquid limit of clay is 30%, unit weight is 17.8 kN/m^2 , moisture content is 28% and specific gravity is 2.68. Determine the settlement if the footing carries a load of 300 kN. (06 Marks)
- 8 a. Explain the factors influencing the selection of depth of foundation. (06 Marks)
- b. Discuss the proportioning of combined footings. (06 Marks)
- c. Design a friction pile group to carry a load of 3000 kN including the weight of pile cap at a site where the soil is uniform clay to a depth of 20 m underlain by rock. Average unconfined compressive strength of clay is 70 kN/m^2 . With liquid limit 60%. A factor of safety of 3 is required against shear failure. (08 Marks)

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10CV65

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Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Hydraulic Structures and Irrigation Design Drawing

Time: 4 hrs.

Max. Marks:100

- Note:** 1. Answer any *TWO* full questions form PART A and *ONE* question from PART B
2. Draw neat diagram wherever necessary
3. Missing data may suitably be assumed.

PART – A

- 1 a. Define: i) Yield, ii) Trap efficiency iii) Density currents. (03 Marks)
b. The construction cost for certain possible heights of dam at a given site have been estimated and are given in table, along with storage capacity at these heights. Determine the most economical height of dam :

Height (m)	10	20	30	40	50	60	65
Construction cost (million Rs.)	4	8	12	18	27	39	50
Storage (million cum)	50	110	180	250	350	500	600

- c. Explain briefly environmental effects of construction of a reservoir. (05 Marks)
(07 Marks)
- 2 a. What are the modes of failure of gravity dam? Explain. (07 Marks)
b. Design the practical profile of a gravity dam of stone masonry, given the following data :
RL of base of dam = 1250.00m
RL of FRL = 1280.00m
Height of wave = 1.5m
Safe compressive strength = 1200kN/m²
Specific gravity = 2.4
Sketch the profile. (08 Marks)
- 3 a. List the design criteria for earth dams. (07 Marks)
b. Explain the steps in fixing the preliminary dimensions of an earth dam. (08 Marks)

PART – B

- 4 Design a surplus weir with stepped apron of a tank with the following details :
Catchment area = 20km²
Maximum water level = 124.000m
Full tank level = 123.000m
Ground level at weir site = 122.000m
GL below proposed weir upto a reach of 5m = 121.000m
Tank bund level = 125.500m
Top width of tank bund = 2.0m
Side slopes of bund on either side = 2H:1V
Hard foundation available at 120.000m
Ryve's coefficient = 9
Hydraulic gradient = 1:5

(25 Marks)

1 of 2

Draw to a suitable scale :

- Half plan at top and half plan at foundation. (20 Marks)
- Half elevation and half sectional elevation. (15 Marks)
- Cross section across the weir. (10 Marks)

5 Design details of a canal regulator is as follows :

Particulars	u/s	d/s
Full supply discharge	16m ³ /s	13m ³ /s
Bed width	10m	10m
Full supply level	12.000m	11.500m
Top level of Bank	13.000m	12.500m
Canal bed level	10.000m	10.000m
Top width of bank	2m	2m
Canal side slopes	2H:1V	2H:1V

Bligh's coefficient = 10

General GL at the site = 12.00m

Good soil for foundation is at 9.000m

Design Ventway, Gates, Apron, and Protection works.

(25 Marks)

Draw to a suitable scale:

- Half plan at top and half plan at foundation. (20 Marks)
- Half elevation and half sectional elevation. (15 Marks)
- Sectional elevation through regulator vent. (10 Marks)



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10CV71

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Environmental Engineering - II

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.
2. Assume any suitable missing data.

PART - A

- 1 a. Define Dry Weather Flow and explain the various factors affecting the dry weather flow. (05 Marks)
b. Differentiate between Conservancy system and Water carriage system. (05 Marks)
c. A population of 50,000 is residing in a town having an area of 100 hectares. If the average impermeability coefficient for this area is 0.55, and time of concentration of the design rain is 40 minutes, calculate the discharge for which the sewers of a proposed combined system will be designed for the town in question. Assume rate of water supply is 150 lpcd and 80% of water supplied will reach the sewers and peak flow of sewage is 3 times the average flow. Use US Ministry of Health formula for calculating rainfall intensity. (10 Marks)
- 2 a. Explain the factors to be considered while selecting the sewer material. What are the commonly used sewer materials? (06 Marks)
b. Briefly explain any two testing of sewer lines. (04 Marks)
c. A town has a population of one lakh with a per capita average sewage flow as 300 lpcd. Design a sewer running 0.6 times full depth at peak discharge. The sewer is to be laid at a slope of 1 in 625. Take Manning's N as 0.013 and peak factor as 3. (10 Marks)
- 3 a. With neat sketches, explain the following sewer appurtenances :
i) Deep manhole ii) Automatic flushing tank. (10 Marks)
b. Explain the basic principles considered in house drainage work. (10 Marks)
- 4 a. Define BOD. Deduce an expression for the first stage BOD. (10 Marks)
b. Calculate 3 day BOD and ultimate BOD of a sample of sewage for the following test data :
i) DO of raw sewage = 0.6 mg/l ii) DO of dilution water = 6mg/l
iii) DO of mix of dilution water and sewage after 3 days of incubation = 1.1 mg/l.
iv) Dilution ratio = 3%. Assume $K_D = 0.12/\text{day}$ at test temperature. (10 Marks)

PART - B

- 5 a. Explain the phenomena of self purification of streams. What are the factors affecting self purification process. (08 Marks)
b. Disposal by dilution is adopted for a city which discharges $150\text{m}^3/\text{S}$ of sewage into a river which is fully saturated with oxygen and is flowing at the rate of $1000\text{m}^3/\text{s}$ during its lean period with a velocity of 0.2m/s. The 5 - day BOD of the sewage is $300\text{mg}/\text{l}$. Find when and where the critical DO deficit will occur in the downstream and what is its amount. Assume $f = 4$, $K_D = 0.1/\text{day}$ and saturation DO = $9.2\text{mg}/\text{l}$. (12 Marks)

1 of 2

10CV71

- 6 a. Explain the working of a Grit chamber and Skimming tank with figures. (10 Marks)
b. Design a primary sedimentation tank of circular cross – section, for a sewage of 10MLD, detention period of 2 hours and assume the surface loading rate to be $30\text{m}^3/\text{m}^2/\text{d}$. (10 Marks)
- 7 a. Explain the working of conventional activated sludge process (ASP) with flow diagram. (10 Marks)
b. The average flow of a sedimented sewage is 4.5 MLD and have its 5-day BOD as $150\text{mg}/\ell$. The sewage is ready to be applied on a standard rate trickling filter. The surface loading is $3000\ \ell/\text{m}^2/\text{d}$ and the organic loading is $150\text{gm}/\text{m}^3/\text{d}$. Determine the volume, depth and efficiency of the standard rate trickling filter. (10 Marks)
- 8 Write notes on :
a. Sludge digestion tank.
b. Oxidation ditch.
c. Reuse and Recycle of wastewater.
d. Sludge drying bed. (20 Marks)



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Grid for USN entry: 10 empty boxes.

10CV72

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018 Design of Steel Structures

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.
2. Use of IS – 800 – 2007, SP(6) – 1 or Steel table permitted.

PART – A

1. a. Distinguish between two major philosophy of design. (08 Marks)
 b. What are the preliminary loads to be considered in the design of steel structures? (08 Marks)
 c. Mention the classification of sections as per IS 800 : 2007. (04 Marks)
2. a. Write a note on HSFG bolts. (06 Marks)
 b. Two plates of 10mm and 18mm thick are to be joined by double cover butt joint. Design the joint for the data. Factored design load = 750kN, bolt diameter = 20mm, grade of steel = Fe410 cover plates on each side 8mm, grade of bolts 4.6. (14 Marks)
3. a. What are the requirements of an ideal welded joint? (06 Marks)
 b. An I section bracket is connected to the flange of column. Determine the load if the flange weld is 16mm and the web weld is 10mm. (14 Marks)

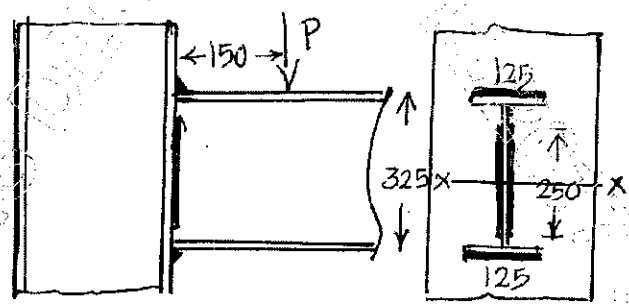


Fig.Q3(b)

4. a. Define : i) Plastic hinge ii) Mechanism and iii) Shape factor. (06 Marks)
 b. Determine the collapse load for a fixed beam subjected to udl using upper-bound theorem. (04 Marks)
 c. Determine the plastic moment capacity of the beam shown in Fig.Q4(c). (10 Marks)

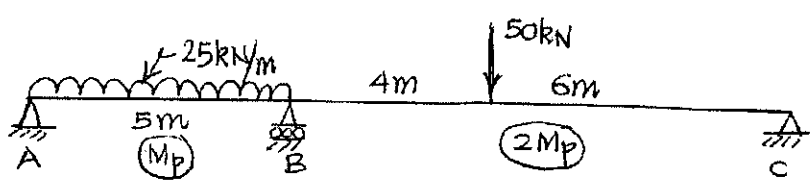


Fig Q4(c)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification. appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

PART – B

- 5 a. Determine the tensile capacity of the tie member $2L_s$ ISA $100 \times 65 \times 10$ mm connected long legs to a gusset plate using four bolts of 20mm diameter when. (10 Marks)
- Angles are on both sides of the gusset plate with tack bolts
 - Angles are on the same side of the gusset plate with tack bolts.
 - With tack bolts.
- b. Design a single angle section of a tension member of a roof truss to carry a factored load of 225 kN. The member is subjected to possible reversal of stresses due to the action of wind. The length of member is 3m. Use M20 bolts of property class 4.6 in a single line. The yield and ultimate strength of steel are 250MPa and 410MPa respectively. (10 Marks)
- 6 a. Explain briefly :
- Imperfection factor
 - Stress reduction factor. (06 Marks)
- b. Design a laced column with two channels back to back of 8m to carry an axial load of 1000kN. The columns are hinged at the ends. (14 Marks)
- 7 Design a gusseted base for a columns ISHB350@661N/m carrying a factored an axial load of 2500kN. The base plate rests on M20 grade concrete. M24 dia bolts of grade 4.6. (20 Marks)
- 8 A simply supported beam carries a udl of 15 kN/m including self weight and live load of 25kN/m in addition to a concentrated load of 75kN over a clear span of 9.7m, base plate 300mm. Available rolled section ISWB600@133.7ks/m. The beam is laterally supported. Design the beam. (20 Marks)



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10CV/CT73

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Estimation and Valuation

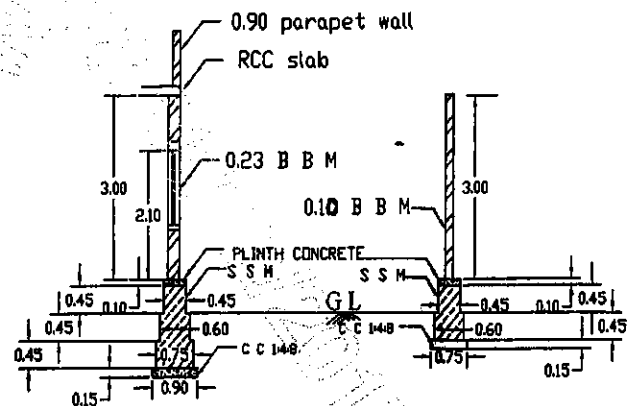
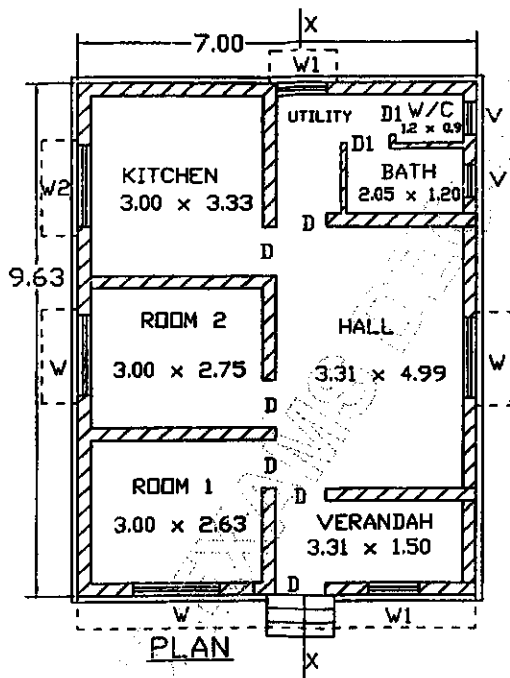
Time: 3 hrs.

Max. Marks:100

- Note: 1. Part – A Q.No. 1 which is compulsory, Answer any FOUR questions by Selecting any TWO from part B and TWO from part C each.**
2. Missing data, if any, may be suitably assumed.

PART – A

- 1 The plan and cross section of walls of residential building are as shown in Fig. Q1. Work out the quantities and prepare the cost abstract of the following items of work by centre line method.
- Earth work excavation for foundation in ordinary soil @ Rs 115/m³.
 - Cement concrete Bed 1:4:8 @ Rs 2850/-m³
 - Size stone masonry in foundation and basement with CM1:6 @ Rs 2800/-m³ and Rs 3450/-m³ (Basement)
 - First class brick masonry for super structure is CM 1:6 @3800/-m³ (only for main wall)



FOUNDATION DETAILS

DETAILS OF OPENINGS

D	0.90 x 2.10	W	1.50 x 1.20
D1	0.75 x 2.10	W1	0.90 x 1.20
V	0.60 x 0.45	W2	1.50 x 0.90

Fig Q1

(40 Marks)

PART – B

- 2 a. List and explain briefly various types of estimate.
 b. Write a note on cost of materials.

(11 Marks)

(04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 3 The details of man hole is as shown in Fig. Q3. Estimate the quantities for the following item of work
- Earth work excavation in foundation
 - Cement concrete 1:3:6 floor and foundation
 - First class Brick work with C.M.1:4
 - 20mm thick cement plaster 1:3 in floor and channel.
- (15 Marks)

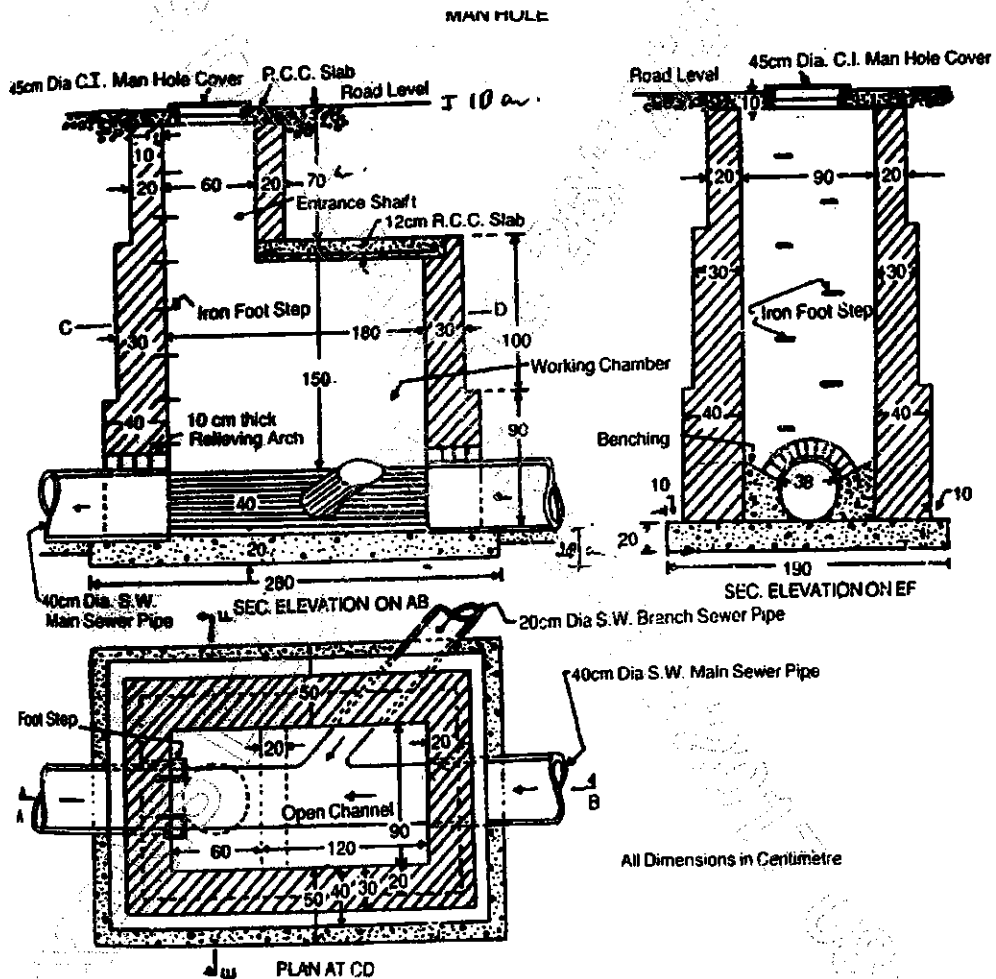


Fig Q3

- 4 Write specifications for any three of the following :
- Burnt Brick masonry in CM 1:6
 - Mosaic or Terrazzo Floor
 - Painting work
 - Earth work excavation.

(15 Marks)



10CV/CT73

PART - C

- 5 Carry out rate analysis for any three of the following :
- a. PCC (1:3:6) for foundations using 20mm and down size aggregates.
 - b. First class brick masonry for super structure is CM1:4
 - c. 12mm thick plastering for walls with CM1:5
 - d. 20mm thick DPC with CM1:5.
- (15 Marks)
- 6 Estimate the quantity of earth work for a portion of road work from the following data, using mid sectional area method : Formation width = 4m ; side slope 2:1 is filling ; side slope 1.5:1 is cutting
- | | | | | | | | | |
|-----------------------|--------|----------------------------------|------|-------|-------|-------|-------|-------|
| Chainage m | 0 | 40 | 80 | 120 | 160 | 200 | 240 | 280 |
| RL of ground m | 100.6 | 100.2 | 99.8 | 100.2 | 100.8 | 101.9 | 102.4 | 102.5 |
| RL of formation level | 101.00 | Raising gradient 1 to 400 -----> | | | | | | |
- (15 Marks)
- 7 Write a note on any three of the following :
- a. EMD and security deposit
 - b. Technical sanction
 - c. Measurement books
 - d. Method of valuation.
- (15 Marks)

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Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Design of Prestressed Concrete Structures

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.
 2. Use of IS : 1343 – 1980 is permitted.

PART – A

1.
 - a. Explain the necessity of using high strength concrete and high tensile steel in prestressed concrete structures. (08 Marks)
 - b. Distinguish between pretensioning and post tensioning. (06 Marks)
 - c. Explain with neat sketches, Freyssinet system of pre-stressing. (06 Marks)

2.
 - a. Explain the concept of load balancing with different cable profiles. (06 Marks)
 - b. A rectangular concrete beam, 100mm wide by 250mm deep spanning over 8m is prestressed by a straight cable carrying an effective pre-stressing force of 250kN located at an eccentricity of 40mm. The beam supports a live load 1.2kN/m.
 - i) Calculate the resultant stress distribution for the central cross section of the beam. The density of concrete is 24kN/m^3 .
 - ii) Find the magnitude of prestressing force with an eccentricity of 40mm which can balance the stresses due to dead and live loads at the bottom fibre of the central section of the beam. (14 Marks)

3.
 - a. List the various types of losses in PSC beams and write the equations used to determine them. (06 Marks)
 - b. A pretensioned beam, 200mm wide and 300mm deep is prestressed by 10 wires of 7mm diameter, initially stressed to 1200N/mm^2 , with their centroids located 100mm from the soffit. Find the maximum stress in concrete immediately after transfer, allowing only for elastic shortening of concrete.
 If the concrete undergoes a further shortening due to creep and shrinkage, while there is a relaxation of five percent of steel stress, estimate the final percentage loss of stress in the wires using IS:1343 regulations. Use following data : $E_s = 210\text{kN/mm}^2$; $E_c = 5700 \sqrt{f_{ck}}$, $f_{ck} = 42\text{N/mm}^2$; Creep coefficient is 1.6 and total residual shrinkage strain is 3×10^{-4} . (14 Marks)

4.
 - a. List the factors influencing deflections. (04 Marks)
 - b. Obtain an expression for computing deflection at midspan in a PSC beam with trapezoidal tendons with eccentricity 'e' at mid third points, with linear variation towards support. The Mohr's theorem. (04 Marks)
 - c. A concrete beam having rectangular section 100mm wide and 300mm deep is prestressed by a parabolic cable carrying an initial force of 240kN. The cable has an eccentricity of 50mm at the centre of span and is concentric at the supports. If the span of the beam is 10m and live load is 2kN/m. estimate short term deflection at the centre of span. Assuming $E = 38\text{kN/mm}^2$ and creep coefficient $\phi = 2.0$, loss of prestress is 20 percent of the initial stress after 6 months. Estimate the long term deflection at the centre of span at this stage, assuming that the dead and live loads are simultaneously applied after the release of prestress. (12 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – B

- 5 a. Explain with sketches, the different types of flexural failures in PSC beam. (06 Marks)
- b. A post tensioned beam with unbounded tendons is of rectangular section 400mm wide with an effective depth of 800mm. The cross sectional area of the pre-stressing steel is 2840mm². The effective pre-stress in steel after all losses is 900N/mm². The effective span of the beam is 16m. If $f_{ck} = 40\text{N/mm}^2$, estimate the ultimate moment of resistance of the section using IS : 1343. (07 Marks)
- c. A post tensioned pre-stressed concrete T-beam with unbounded tendons is made up of a flange 300mm wide and 150mm thick and the width of the rib is 150mm. The effective depth of the section is 320mm. The beam is pre-stressed by 24wires of 5mm diameter having a characteristic strength of 1650N/mm². The effective stress after all losses is 900N/mm². If the cube strength of concrete is 56N/mm². Estimate the flexural strength of the section using IS:1343 – 1980. Assume $\left(\frac{L}{\delta}\right)$ ratio as 20. (07 Marks)
- 6 a. Explain the types of shear cracks in structural concrete. (06 Marks)
- b. A concrete beam of rectangular section 200mm wide and 650mm deep is prestressed by a parabolic cable located at an eccentricity of 120mm at midspan and zero at the supports. If the beam has a span of 12m and carries a uniformly distributed live load of 4.5kN/m, find the effective force necessary in the cable for zero shear stress at the support section. For this condition, calculate the principal stresses. The density of concrete is 25kN/m³. (14 Marks)
- 7 a. Explain the concept of stress distribution in End block. (08 Marks)
- b. The end block of a post tensioned beam is 300mm wide and 400mm deep. Ten cables each made up of 12 wires of 5mm diameter strands are stressed to 1200N/mm². The wires are located at constant eccentricity of 100mm below the centroidal axis. Design the end block and detail the reinforcement. If the anchorage plate is 200mm×200mm and diameter of the duct is 100mm, permissible stress in concrete at transfer is 20N/mm², permissible shear stress in steel is 94.5N/mm². Determine the thickness of anchorage pate. (12 Marks)
- 8 A prestressed beam has an unsymmetrical I-section with an overall depth of 1840mm. The top and bottom flange widths are 1800 and 820mm respectively. The thickness of the top flange varies from 180mm at the ends to 430mm at the junction of web, which is 1800mm thick. The thickness of the bottom flange varies from 150mm at the ends to 450mm at the junction of the web. The beam is designed for a simply supported span of 40m. the permissible compressive stress at the transfer and working load is limited to 16N/mm², while the tensile stress at the transfer and working load is limited to zero and 1.4N/mm², respectively. The loss ratio is 0.80 calculate :
- a. The permissible uniformly distributed imposed load
- b. The magnitude of the prestressed face if at the mid-span section if is located 130mm from the soffit and
- c. The vertical limits within which the cable must is at midspan and support sections. (20 Marks)

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2 of 2



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10CV751

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018

Matrix Methods of Structural Analysis

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Distinguish flexibility from stiffness method. (04 Marks)
 b. Explain briefly principle of contragradience. (04 Marks)
 c. Prove that the product of flexibility and stiffness matrices is a unit matrix. (04 Marks)
 d. Explain axial, bending and rotational flexibility coefficients with example. (08 Marks)
- 2 Analyze the continuous beam shown in Fig.Q2 by flexibility method. Also draw the BMD. (20 Marks)



Fig.Q2

(20 Marks)

- 3 Using force transformation matrix, analyze the frame shown in Fig.Q3. Draw BMD. (20 Marks)

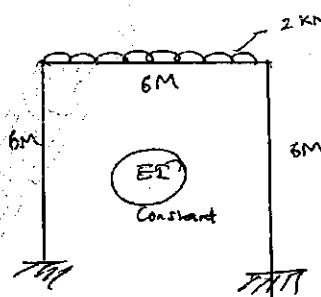


Fig.Q3

(20 Marks)

- 4 Developing element flexibility matrix, determine element forces for the truss shown in Fig.Q4. AE is constant for all members. (20 Marks)

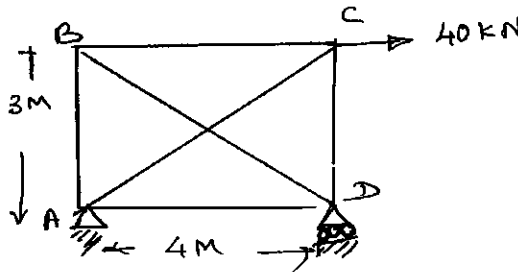


Fig.Q4

(20 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART - B

- 5 a. Mention the properties of stiffness matrix (any four only). (04 Marks)
 b. Analyze the truss shown in Fig.Q5(b) by stiffness method. "A" = hinge support, "D" = Roller support

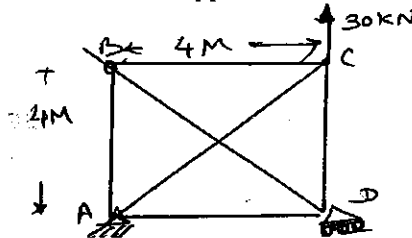


Fig.Q5(b)

(16 Marks)

- 6 Analyze the beam shown in Fig.Q6 by stiffness method. Generate transformation matrix, system stiffness matrix, system deformation for the same.

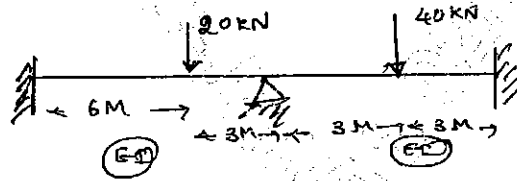


Fig.Q6

(20 Marks)

- 7 Write short notes on:
 a. Direct stiffness method
 b. Transformation of member fine matrix
 c. System stiffness matrix
 d. Static and kinematic indeterminacy. (20 Marks)

- 8 Analyze the frame shown in Fig.Q8 by direct stiffness method. Assume $E = 200 \text{ GPa}$, $I_{zz} = 1.33 \times 10^{-5} \text{ m}^4$, $A = 0.01 \text{ m}^2$. Flexural rigidity and axial rigidity are same for all members.

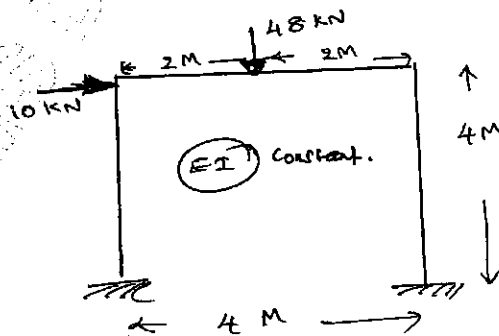


Fig.Q8

(20 Marks)



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Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Highway Geometric Design

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

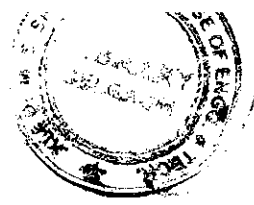
- 1 a. Briefly discuss the various design factors to be considered for geometric design of highways. (10 Marks)
b. Enumerate the concept of PCU in geometric design of Highways. List out the factors governing PCU. Give some typical values as recommended by IRC. (10 Marks)
- 2 a. What is camber? List the functions of camber. Discuss the factors governing the camber. Discuss shapes of camber with the help of neat sketch. (10 Marks)
b. Write a note on following and mention the IRC standards :
i) Carriage way ii) Right of way. (10 Marks)
- 3 a. With sketches indicate the circumstances in which sight distance is affected, describe how the sight distance required at an uncontrolled intersection is estimated. (10 Marks)
b. The speed of overtaking and overtakes vehicles are 70kmph and 40kmph, respectively on a two way traffic road. If the acceleration of overtaking vehicles is 0.99 m/sec^2 .
i) Calculate safe overtaking sight distance.
ii) Mention the minimum length of overtaking zone
iii) Draw a neat sketch of overtaking zone and show the position of the sign posts. (10 Marks)
- 4 a. Write note on mechanical widening and psychological widening. (06 Marks)
b. What is transition curve? Explain types of transition curve. (06 Marks)
c. Calculate the length of transition curve and the shift using the following data. Design speed of 65 kmph, radius of circular curve = 220m. Allowable rate of introduction of super elevation 1 in 150, pavement is rotated about the centre line and pavement width including extra widening is = 7.5m. (08 Marks)

PART – B

- 5 a. What are the circumstances in which a valley curve is formed? Indicate with sketches. (06 Marks)
b. Derive the expression for calculating length of valley curve of parabolic shape for comfort condition. (06 Marks)
c. A vertical summit curve is formed at the intersection of two gradients, +3.0 and -5.0 percent. Design the length of summit curve to provide stopping sight distance for a design speed of 80kmph. Assume data as per IRC. (08 Marks)
- 6 a. Explain the need of grade separated intersection and give advantages and disadvantages of grade separated intersection. (10 Marks)
b. With a neat sketch, explain channelized intersection also discuss advantages of channelized intersection. (10 Marks)

1 of 2

- 7 a. Draw a neat diagram of rotary intersection (roundabout) and show the different elements? (10 Marks)
- b. Draw a neat sketch of
- i) Diamond interchange
 - ii) Half clover leaf and explain any two advantages of each. (10 Marks)
- 8 a. With sketches explain the methods of sub surface drainage with respect to
- i) Lowering of water table
 - ii) Control of seepage flow. (10 Marks)
- b. A longitudinal channel with a trapezoidal cross section is to be constructed in a cut section. The longitudinal slope is 1 in 2500, soil is clay with Manning's coefficient as 0.024. take discharge of $3\text{m}^3/\text{sec}$ and velocity of flow as 0.6m/s . (10 Marks)



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10CV757

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Solid Waste Management

Time: 3 hrs.

Max. Marks:100

*Note: Answer any FIVE full questions, selecting
atleast TWO questions from each part.*

PART – A

- 1 a. Explain the classification of functional elements of a solid waste management system with the help of flow diagram. (07 Marks)
- b. Estimate the energy content of a solid waste sample in unit energy content on dry basis and Ash free dry basis. Assume Ash 5%. (07 Marks)

Component	% by mass	% moisture content	Energy [kJ/kg]
Food waste	15	70	4650
Paper	45	06	16750
Cardboard	10	05	16300
Plastic	10	02	32600
Garden trimmings	10	60	6500
Wood	05	20	18600
Tin cans	05	03	700

- a. Briefly discuss on the various methods used to estimate waste quantities. (06 Marks)

- 2 a. With a neat sketch, explain hauled container system. (06 Marks)
- b. Discuss the factors influencing the solid waste generation rates. (06 Marks)
- c. The student population of a school is 881. The school has 30 standard classrooms, assuming five day school work with solid waste pick-ups on Wednesday and Friday before school starts in the morning, determine the size of the storage container required. Assume the rate of waste generated is equal to 0.11kg/cap.d plus 3.6kg per room and that the density of uncompacted municipal solid waste are 120.0kg/m³, standard container sizes are 1.5m³, 2.5m³, 3.0m³ and 4.6m³. (08 Marks)

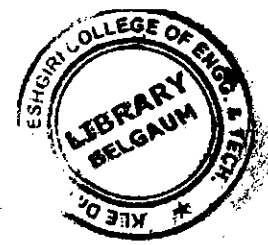
- 3 a. Discuss on the factors that must be considered in the design of transfer station. (08 Marks)
- b. Explain the mechanical volume reduction and chemical volume reduction. (08 Marks)
- c. List the principal components in the design of large municipal incinerators. (04 Marks)

- 4 a. Enumerate on various techniques of component separation. (07 Marks)
- b. With a neat sketch, explain municipal incinerators. (07 Marks)
- c. Explain the effect of 3T's in incineration process of solid waste. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – B

- 5 a. What are the important factors for the design considerations in anaerobic composting? (08 Marks)
- b. Briefly discuss on the difference between Indore and Bangalore process of composting of municipal solid waste. (04 Marks)
- c. Determine the amounts of oxygen required to oxidize 1 tonne of waste and also to stabilize Ammonia in having the chemical equation : $C_{50}H_{100}O_{40}N$, use equation :
- $$C_aH_bO_cN_d + \frac{4a - b - 2c + 3d}{4} H_2O \rightarrow \frac{4a + b - 2c - 3d}{B} CH_4 + \frac{4a - b + 2c + 3d}{B} CO_2 + dNH_3$$
- (08 Marks)
- 6 a. Explain the various factors to be considered in selection of a site for sanitary land fill. (08 Marks)
- b. Explain the area method and trench method of landfilling techniques stating merits and demerits. (08 Marks)
- c. Determine the landfill area required for municipality with a population of 50,000 given that :
 Solid waste generation = 360 gm/person/day
 Compacted density of land fill = 504 kg/m³
 Average depth of compacted solid waste = 3m. (04 Marks)
- 7 a. Explain the various ways of control of gas movement in landfills. (08 Marks)
- b. Define liachate and list out the factors that affect the composition of liachate. (04 Marks)
- c. List the advantages and disadvantages of open dumping and ocean disposal of solid waste. (08 Marks)
- 8 a. Outline the importance of recycle and reuse of plastic materials with examples. (06 Marks)
- b. Explain the categories of biomedical waste and method of disposal. (07 Marks)
- c. Explain the environmental significance of reuse and recycle solid waste. (07 Marks)



10CV763

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Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Pavement Materials & Construction

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Explain desirable properties of Road aggregates used for construction. (06 Marks)
b. Brief the classification of road aggregate's based on petrology. (06 Marks)
c. List various tests on road aggregates. Explain impact test procedure in detail. (08 Marks)
- 2 a. Explain the manufacturing process of Bitumen with neat figure. (06 Marks)
b. Differentiate between Bitumen and Tar. (06 Marks)
c. List out tests conducted on Bitumen? Explain softening point test on bitumen with neat diagram. (08 Marks)
- 3 a. Explain briefly the preparation of Bitumen Emulsion. What are types of Bitumen Emulsion? With application of each type. (10 Marks)
b. List out types of adhesion tests. Explain in brief about Immersion trafficking test with neat diagram. (10 Marks)
- 4 a. Briefly explain the desirable properties of bituminous mix. (08 Marks)
b. Explain the Marshall method of bituminous mix design. (12 Marks)

PART – B

- 5 a. Discuss the use of different compacting equipments. Explain with neat diagram, working principle of sheep foot Roller with advantages. (12 Marks)
b. Explain the working principle of,
(i) Dozers.
(ii) Drag line. (08 Marks)
- 6 a. Bring out construction steps involved in subgrade preparation. What are the quality control checks carried out. (12 Marks)
b. Enumerate the steps in the formation of an embankment. (08 Marks)
- 7 a. Write the specification of materials and construction procedure for WBM roads. (10 Marks)
b. Explain briefly the construction steps involved in bituminous concrete with quality control tests. (10 Marks)
- 8 a. With the neat figures, explain the following types of joints in rigid pavements:
(i) Expansion joint
(ii) Longitudinal joint.
(iii) Construction joint. (12 Marks)
b. Enumerate the steps involved in construction of cement concrete pavements. (08 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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10CV765

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Air Pollution and Control

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1 a. Explain the Emission inventory source classification. Give examples. (08 Marks)
b. A car emits CO as exhaust gas at 2% by volume. Calculate the concentration of CO in $\mu\text{g}/\text{m}^3$ at 0°C and 25°C at 1 atmospheric pressure. (05 Marks)
c. Write a note on Photochemical Smog. (03 Marks)
- 2 a. Explain Air Pollutant on materials. (10 Marks)
b. Explain the cause for Bhopal gas tragedy. Also explain the after effects of the tragedy. (10 Marks)
- 3 a. Explain the effects of topography on pollutant dispersion. (10 Marks)
b. With a neat sketch, explain different types of Environmental Lapse Rate. (08 Marks)
c. Write the equation for Gaussian plume model for $X(x, y, z)$. (02 Marks)
- 4 a. An anemometer measures a wind speed of 5m/s at a height of 10m above ground. Find the wind speed at a height of 150m if the change in temperature is :
i) $-15^\circ\text{C}/1000\text{m}$ ii) $+5^\circ\text{C}/1000\text{m}$. (05 Marks)
b. What are the factors to be considered to select site for the construction of industry? (10 Marks)
c. Explain the working principle of Sound level meter. (05 Marks)

PART – B

- 5 a. With a neat sketch, explain method of using Ringelmann chart. (10 Marks)
b. Design a gravity settler to remove all the iron particulate from a dust laden gas stream with the data given as $d_p = 35\mu\text{m}$ gas = air at ambient conditions. $Q = 3.6 \text{ m}^3/\text{s}$, $\rho_p = 7.62 \text{ g/cc}$. (10 Marks)
- 6 a. Explain how particulate pollutants are measured. (10 Marks)
b. Explain the operational problems associated with fabric filters. (10 Marks)
- 7 a. What are Ozone holes? Explain the effects of Ozone holes. (10 Marks)
b. With a neat sketch, explain Box model for indoor air pollution. (10 Marks)
- 8 a. With a neat sketch, explain fixed bed unit to remove gaseous air pollutants. (10 Marks)
b. How Automobile Emission are Controlled? (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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10CV767

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Structural Dynamics

Time: 3 hrs.

Max. Marks:100

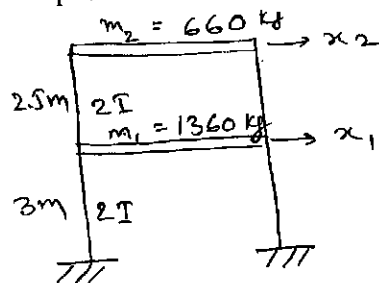
Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

1. a. Explain critical damping, over-damping and under damping pertaining to single degree of freedom system. (05 Marks)
b. Differentiate between: (i) Forced vibrations and free vibrations. (05 Marks)
(ii) Random excitation and harmonic excitation. (05 Marks)
c. A machine of 80 kg mass is mounted on a spring whose total stiffness is 50 kN/m and total damping is 10 kN/m. Find the motion $U(t)$ for initial displacement of 20 mm and initial velocity of 100 mm/sec. (10 Marks)
2. a. Explain the logarithmic damping and derive the expression for the same. (05 Marks)
b. A SDOF system consists of mass 20 kg, stiffness of the spring 2200 N/m and a dashpot with a damping coefficient of 60 N-S/m is subjected to a harmonic excitation of $F = 200 \sin 5t$. Write the complete solution of the equation of motion. (15 Marks)
3. a. Explain the dependence of transmissibility on frequency ratio and damping ratio with a qualitative graph relating to all the above mentioned three quantities. What is the range of frequency ratio for which isolation is effective? (08 Marks)
b. An engine weighing 1000 N including reciprocating parts is mounted on springs. The weights of the reciprocating parts is 22 N and the stroke is 90 mm. The engine speed is 720 rpm. Neglecting damping find the stiffness of the springs, so that the force transmitted to the foundation is 5% of the amplitude force. If under the actual working conditions the damping reduces the amplitude of successive vibration by 25% determine the force transmitted at 720 rpm. (12 Marks)
4. a. Derive an expression for Duhamul's integral in respect of response of single degree of freedom system to general dynamic loading. (10 Marks)
b. State and prove principle of orthogonality of modes. (10 Marks)

PART - B

5. Determine the natural frequencies and mode shapes for the structure as shown in Fig. Q5. Draw the mode shapes. (20 Marks)



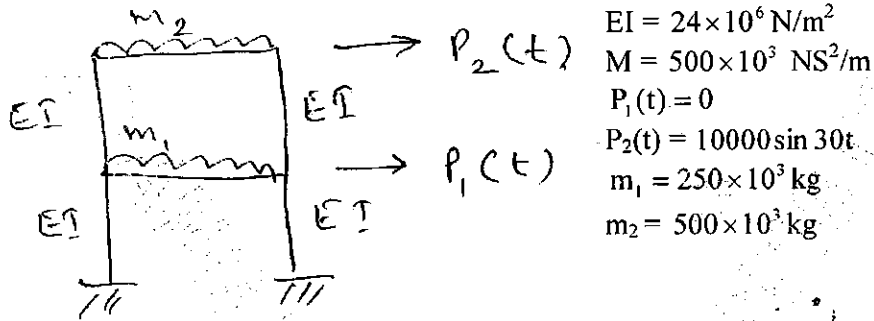
$I = 5 \times 10^5 \text{ mm}^4$
 $E = 2.5 \times 10^4 \text{ N/mm}^2$

Fig. Q5

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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6 Compute the response due to harmonic loading for the shear frame shown in Fig. Q6.

(20 Marks)



$EI = 24 \times 10^6 \text{ N/m}^2$
 $M = 500 \times 10^3 \text{ NS}^2/\text{m}$
 $P_1(t) = 0$
 $P_2(t) = 10000 \sin 30t$
 $m_1 = 250 \times 10^3 \text{ kg}$
 $m_2 = 500 \times 10^3 \text{ kg}$

Fig. Q6

7 For a three storied shear building subjected to harmonic loading. Compute the response, given the results of the free vibration analysis. Neglect axial deformation in all structural elements.

Given : Stiffness of floors

$K_1 = K_2 = 160 \times 10^6 \text{ N/m}$

$K_3 = 240 \times 10^6 \text{ N/m}$

$M_1 = M_2 = M_3 = 20 \times 10^3 \text{ kg}$

Natural frequencies are $\omega_1 = 43.87 \text{ rad/s}$, $\omega_2 = 120.15 \text{ rad/s}$, $\omega_3 = 167 \text{ rad/s}$.

Mode shapes :

$[\phi_1] = \begin{bmatrix} 1.00 \\ 0.76 \\ 0.34 \end{bmatrix}$, $[\phi_2] = \begin{bmatrix} 1.00 \\ -0.80 \\ -1.16 \end{bmatrix}$, $[\phi_3] = \begin{bmatrix} 1.00 \\ -2.43 \\ 2.51 \end{bmatrix}$

(20 Marks)

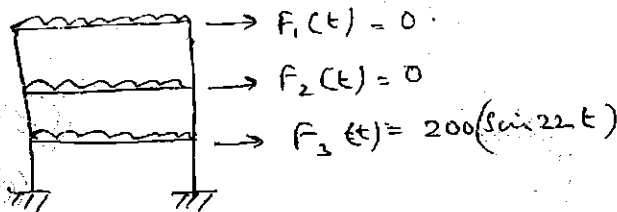


Fig. Q7

- 8 a. Derive the governing differential equation of motion for a free flexural vibration of beam. (10 Marks)
- b. Explain the lumped mass and consistent mass formulation for vibration of beam. (10 Marks)



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10CV81

Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Advanced Concrete Technology

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Use of IS 10262-2009 is permitted.**

PART - A

- 1 a. Enumerate the importance of Bogue's compounds. (06 Marks)
- b. Calculate the Gel/space-ratio from the following data:
 - i) Weight of cement = 600 gm
 - ii) Percentage of hydration = 90%
 - iii) Water cement ratio = 0.5 (06 Marks)
- c. What are the factors affecting the strength and elasticity of concrete? (08 Marks)
- 2 a. Explain the mechanism of deflocculation of cement particles by using plasticizers with neat sketches. (06 Marks)
- b. How do you determine the optimum dosage of super-plasticizer using Marsh Cone? (06 Marks)
- c. What are mineral admixtures? Explain: (i) GGBS, (ii) Fly Ash. (08 Marks)
- 3 a. Explain the factors affecting the mix design of concrete. (06 Marks)
- b. Design a concrete mix for M30 from the following data:
 - Type of cement = OPC 53 grade
 - Maximum size of aggregate = 20 mm
 - Minimum cement content = 310 kg/m³
 - Maximum W/C ratio = 0.45
 - Workability = 50-75 mm slump
 - Exposure condition = normal
 - Degree of supervision = good
 - Water absorption = 0.5% (CA)
 - Free surface moisture = Nil (CA)
 - Specific gravity of cement = 3.15
 - Specific gravity of CA = 2.80
 - Specific gravity of FA = 2.60
 - Specific gravity of super plasticizer = 1.2
 - Missing data may be suitably assumed. (14 Marks)
- 4 a. Explain Alkali-Aggregate reaction. (06 Marks)
- b. List the methods of controlling sulphate attack. (06 Marks)
- c. Define durability. Explain the factors affecting durability. (08 Marks)

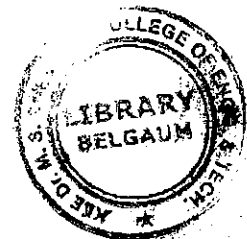
PART - B

- 5 a. Explain briefly advantages of RMC. (06 Marks)
- b. What are the advantages of SCC? (06 Marks)
- c. List the factors affecting the workability. Explain any one workability test conducted on S.C.C. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- 6 a. What is Ferrocement? What are the various applications of Ferrocement? (06 Marks)
b. What are the different types of fibers used in concrete? (06 Marks)
c. What is aspect ratio? How does it influence workability and strength of FRC? (08 Marks)
- 7 a. Explain high density concrete. (06 Marks)
b. What is high performance concrete? (06 Marks)
c. Explain:
i) Pumice
ii) Volcanic cinders. (08 Marks)
- 8 a. What are the factors which affect the compressive strength of concrete? (08 Marks)
b. Explain any two tests on Hardened concrete. (12 Marks)

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10CV82

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Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Design and Drawing of Steel Structures

Time: 4 hrs.

Max. Marks:100

- Note :** 1. Answer any ONE full questions from Part – A and ONE full question from Part - B.
2. Use of IS 800 – 2007 , SP(6) (1) – 1984 or Steel Tables permitted.

PART – A

- 1 a. An un – stiffened seated connection for beam ISLB 500 @ 75kg/m to the flange of a column ISHB400 @ 82.2 kg/m is done using 2 rows of 2 – 16 mm diameter bolts with an angle ISA 110×110×10 mm. Top cleat angle is ISA 100×100×8 mm with 2 – 16 mm diameter bolts on each leg. Draw to a suitable scale i) Front view ii) Side view. (14 Marks)
- b. A cross beam ISLB 350 @ 0.495kN/m is connected to main beam ISMB 500 @ 0.869kN/m, such that top of flanges are at same level. The framed connection has the following details : i) Connecting cleat angle - 2 ISA 150 × 115 × 10.
ii) The connection between cleat angle of length 115mm and web of the cross beam is connected by 5mm fillet weld. Depth of the weld is 180mm.
iii) The connection between the cleat angle of length 150mm and web of the main beam is connected by 8mm fillet weld. Depth of the weld is 250mm.
iv) Clearance between cross beam and web of main beam is 12mm.
Draw to a suitable scale i) Front view ii) Side view. (16 Marks)
- 2 a. Draw to a suitable scale the front and side elevations of a welded bracket from the following data :
* Column → ISHB 350 @ 710.2N/m
* Bracket → ISLB 350 @ 485.6N/m
* Projection of bracket from flange of the column → 350mm
* Depth of bracket at free end → 150mm
* Size of weld → 8mm
* Bracket is welded to the flange of column. (10 Marks)
- b. A column ISHB 450 @ 0.925kN/m is supported by Gusseted base. Dimension of the base plate is 1200 × 800 × 22mm with 1200mm edge placed parallel to column flange. Gusset plate is 16mm thick. Gusset angles are of ISA 150 × 115 × 15 mm two in number with 150mm leg connected to Gusset plate. Connection between column flange and Gusset plate has 18 numbers of 18mm bolts in two rows and same number of bolts for connection between Gusset plate and Gusset angle. Provide 6 numbers of 18mm diameter bolts to connect Gusset angle to base plate. Provide two web cleat angles of ISA 100 × 100 × 8mm connected by 3 numbers of 18mm bolts for each leg. Also, 4 numbers of 25mm anchor bolts are provided. Draw to a suitable scale i) Top view ii) Side view iii) Sectional elevation. (20 Marks)

1 of 2

PART - B

3 Draw a simply supported crane Gantry Girder for the following data :

- i) Span of crane Girder = 18m.
- ii) Span of Gantry Girder = 7m.
- iii) Capacity of the crane = 230 kN.
- iv) Self wt. of crane excluding the crab = 200kN.
- v) Weight of crab = 60kN.
- vi) Wheel base distance = 3.2m.
- vii) Self weight of Rail = 0.25 kN/mm.
- viii) Height of Rail = 80mm.
- ix) Minimum Hook approach = 1.00 mt.

(40 Marks)

Draw to a suitable scale :

- a. Plan details.
- b. Side elevation.
- c. Section through Gantry.

(30 Marks)

4 Design a welded plate girder of span 24 mt, carrying super imposed load of 50kN/m and two concentrated loads of 150 kN each at one third points of the span. Assume the girder as laterally supported throughout and yield strength = 250 MPa. Provide two curtailments. (40 Marks)

Draw to a suitable scale :

- i) Plan for full span (sectional)
- ii) Front Elevation.
- iii) Cross section at support and mid span.

(30 Marks)



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10CV833

Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Pavement Design

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.
2. Use of Charts is permitted.

PART - A

- 1 a. Describe the desirable characteristics of pavements. (06 Marks)
b. Explain the three important design strategies of pavements. (06 Marks)
c. Bringout a comparison between the important characteristics of flexible and rigid pavements. (08 Marks)
- 2 a. What is frost action? What are its effects and remedial measures? (06 Marks)
b. List the principles, assumptions and limitations of Boussinesq's theory. (06 Marks)
c. A plate load test was carried out on subgrade using 300 mm dia plate and corresponding to deflection of 5 mm, the load sustained on the plate per unit area was 0.8 N/mm². The test was repeated on base coarse of thickness 300 mm and unit load sustained was 0.45 N/mm² at the same deflection. [Use chart Fig.Q2(c)]
 - i) Find the EP/ES ratio.
 - ii) What should be the thickness of base coarse so as to sustain wheel load of 50 kN and contact pressure of 0.6 N/mm² so that maximum deflection does not exceed 5 mm?

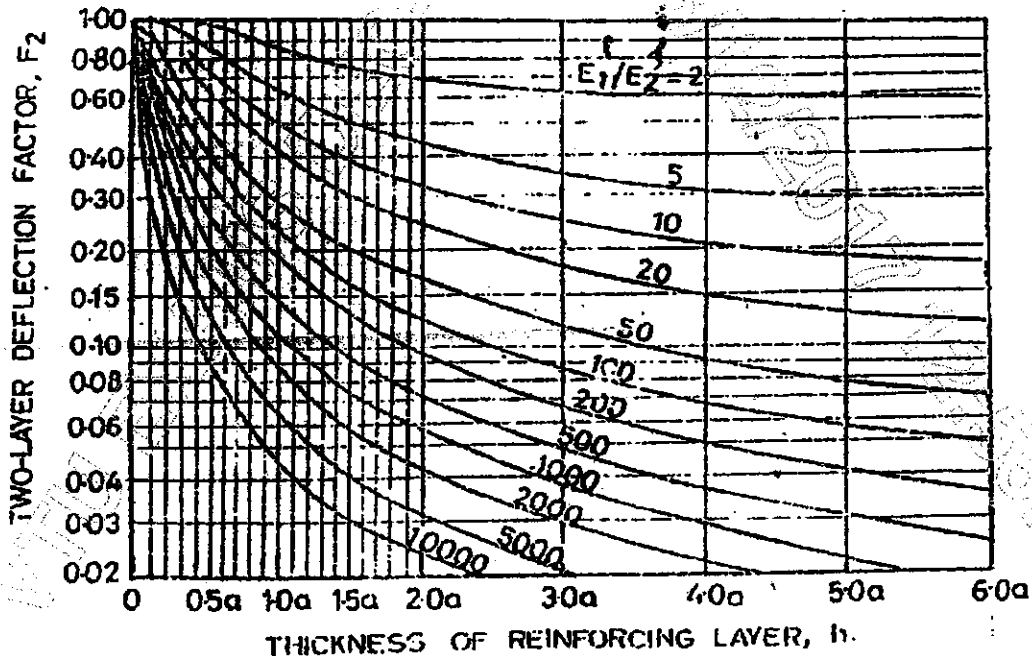
 $a = \text{RADIUS OF LOADED AREA.}$ **DEFLECTION FACTORS BY BURMISTER TWO-LAYER THEORY.**

Fig.Q2(c)

(08 Marks)

1 of 2

- 3 a. Describe the significance of wheel load and tyre pressure in pavement design. (06 Marks)
 b. Explain the step by step procedure of determining ESWL by equivalent deflection criteria. (06 Marks)
 c. Calculate the design repetitions for 20 years period for various wheel loads equivalent to 22.68 kN wheel load using the following survey data on a four lane road. (08 Marks)

Wheel load, kN	ADT, both directions	% of traffic volume
22.68	Traffic volume	13.17
27.22	considering	15.30
31.75	growth = 215	11.36
36.29		14.11
40.82		6.21
45.36		5.84

- 4 a. Explain the principle and design steps of McLeod method of pavement design. (08 Marks)
 b. Design a flexible pavement consisting of 80 mm thick bituminous surface with 100 N/mm^2 , WBM base coarse of E value 40 N/mm^2 and 200 mm moorum subbase coarse with E value 20 N/mm^2 by Kansas method using the following data:
 Design wheel load = 60 kN
 $P = 0.7 \text{ N/mm}^2$
 E value of subgrade = 9 N/mm^2
 Traffic coefficient = $11/6$
 Rainfall coefficient = 0.9 (12 Marks)

PART - B

- 5 a. With a sketch, explain how warping stresses are developed in CC pavements. Indicate the Bradbury's equations used to determine warping stresses at the three critical locations. (08 Marks)
 b. A CC pavement of 200 mm thickness has longitudinal joint at 3.5 m and transverse joint at 4.5 m spacing. Modulus of subgrade reaction is 0.1 N/mm^3 and modulus of elasticity of CC is $3 \times 10^4 \text{ N/mm}^2$. Find the wheel load stresses at interior edge and corner regions of the slab due to wheel load of 51 kN with radius of contact area 150 mm. Also find the location of crack development. Use Westergaard's equations. (12 Marks)
- 6 a. What are the uses of tie bars in cc pavements? Indicate the steps in design of tie bars. (08 Marks)
 b. The design thickness of a cc pavement is 260 mm considering a design axel load (98th percentile load) of 120 kN on single axel and M40 concrete with characteristic compressive strength of 40 N/mm^2 . The radius of relative stiffness is found to be 622 mm. If the elastic modulus of dowel bar steel is $2 \times 10^5 \text{ N/mm}^2$, modulus of dowel concrete interaction is 415 N/mm^3 and joint width is 18 mm, design the dowel bars for 40% load transfer considering edge loading. (12 Marks)
- 7 a. Describe the general causes of flexible pavement failures. (06 Marks)
 b. Explain the following: i) Alligator cracking; ii) Reflection cracking. (06 Marks)
 c. Describe the step by step procedure of conducting Benkelman beam deflection studies for structural evaluation of flexible pavement and subsequent determination of overlay thickness. (08 Marks)
- 8 a. Explain the causes and maintenance of the following in rigid pavements:
 i) Cracks ii) Joints (08 Marks)
 b. Explain the common types of failure in rigid pavements. (12 Marks)



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10CV835

Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Industrial Waste Water Treatment

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.
2. Any missing data may be assumed suitably.

PART - A

- 1 a. Differentiate between Domestic waste water and industrial waste water. (06 Marks)
b. Explain types of sampling. (06 Marks)
c. Explain effluent and stream standard with examples. (08 Marks)
- 2 a. Explain different zones of pollution in streams. (10 Marks)
b. A town discharges 80 cumecs of sewage into a stream having a rate of flow of 1200 cumecs during lean days, at a 5-day BOD of sewage at the given temperature is 250mg/l. Find the amount of critical Dissolved oxygen deficit and its location in the downstream portion of the stream. Assume deoxygenation coefficient K as 0.1 and coefficient of self purification as 3.5. Assume saturated D.O at given temperature as 9.2 mg/l? (10 Marks)
- 3 a. Explain different method of strength Reductions. (10 Marks)
b. Explain methods used for Neutralization of Acidic and Alkaline wastes. (10 Marks)
- 4 a. Explain any two method used for Removal of suspended solids. (06 Marks)
b. List the methods used for sludge disposal. Explain any two methods briefly. (06 Marks)
c. Write short notes on : i) Reverse osmosis ii) Ion exchange. (08 Marks)

PART - B

- 5 a. What are the advantages and disadvantages of combined treatment of industrial waste water with municipal waste water? (10 Marks)
b. With a flow diagram, explain the units used for treatment of cotton textile mill waste. (10 Marks)
- 6 a. Explain the treatment options for Distillery waste water in India. (10 Marks)
b. Explain the sources and characteristics of tannery waste. (10 Marks)
- 7 a. Explain with a flow diagram, treatment option for Sugar Mill Waste. (10 Marks)
b. Discuss effect of Dairy waste on receiving stream. Also suggest suitable treatment option for Dairy Industry. (10 Marks)
- 8 a. Explain How pharmaceutical wastes is treated. (10 Marks)
b. Explain with a flow diagram the treatment of paper and pulp mill waste. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.





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Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018**Environmental Impact Assessment**

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Define the following terms: (i) EIA, (ii) EIS, (iii) FONSI. (06 Marks)
b. Write a note on “need for EIA studies.” (04 Marks)
c. With the aid of a flow diagram, establish the relation between EIA, EIS and FONSI. (10 Marks)
- 2 a. Explain in detail, the step-by-step procedure for conducting EIA. (12 Marks)
b. Explain the following limitations of EIA:
i) General limitations.
ii) Methodological limitations. (08 Marks)
- 3 a. With the help of a flow diagram, explain the frame work of impact assessment. (08 Marks)
b. List the methodologies adopted in EIA. Explain any two methodologies along their merits and demerits. (12 Marks)
- 4 a. Briefly explain the procedure for assessment of impacts on surface water environment. (10 Marks)
b. Discuss the various steps involved in assessment and prediction of impact on air environment. (10 Marks)

PART – B

- 5 a. Differentiate between REIA and CEIA. (08 Marks)
b. Briefly explain EMP and DMP. (04 Marks)
c. Bring out clearly the guidelines of EIA for a developmental project. (08 Marks)
- 6 a. Discuss the importance of public participation in environmental decision making. List the advantages and disadvantages of public participation in EIA studies. (12 Marks)
b. What are the practical considerations to be considered in preparing environmental impact statement and assessment? (08 Marks)
- 7 a. Outline the salient features of a project activity and environmental parameters relationship. (10 Marks)
b. Comment on objectives and scope of environmental impact assessment studies. (10 Marks)
- 8 a. Briefly explain environmental impact quantification of water resource development projects. (10 Marks)
b. Quantify the environmental impact for infrastructure and construction activities. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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