



**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-2018/JANUARY-2019**



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Third Semester B.E. Degree Examination, Dec. 2018/Jan. 2019
Engineering Mathematics - III

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Find the Fourier series expansion for the periodic function $f(x)$, if in one second (08 Marks)
- $$f(x) = \begin{cases} 0; & -\pi < x < 0 \\ x; & 0 < x < \pi \end{cases}$$
- b. Expand the function $f(x) = x(\pi - x)$ over the interval $(0, \pi)$ in half range Fourier cosine series. (06 Marks)
- c. The following value of function y gives the displacement in inches of a certain machine part for rotations x of a flywheel. Expand y in terms of Fourier series upto the second harmonic.

Rotations	x	0	$\pi/6$	$2\pi/6$	$3\pi/6$	$4\pi/6$	$5\pi/6$	π
Displacement	y	0	9.2	14.4	17.8	17.3	11.7	0

(06 Marks)

OR

- 2 a. Find the Fourier series expansion for the function : (08 Marks)
- $$f(x) = \begin{cases} \pi x; & 0 \leq x \leq 1 \\ \pi(2 - x); & 1 \leq x \leq 2 \end{cases}$$
- and deduce $\frac{\pi^2}{8} = \sum_{n=1}^{\infty} \frac{1}{(2n-1)^2}$. (08 Marks)
- b. Expand in Fourier series $f(x) = (\pi - x)^2$ over the interval $0 \leq x \leq 2\pi$. (06 Marks)
- c. The following table gives the variations of periodic current over a period T .

t (secs)	0	$T/6$	$T/3$	$T/2$	$2T/3$	$5T/6$	T
A (Amps)	1.98	1.30	1.05	1.30	-0.88	-0.25	1.98

Expand the function (periodic current) by Fourier series and show that there is a direct current part of 0.75 amp and also obtain amplitude of first harmonic. (06 Marks)

Module-2

- 3 a. Find Fourier transform of $f(x) = \begin{cases} 1 - x^2; & |x| < 1 \\ 0; & |x| > 1 \end{cases}$ (08 Marks)
- and hence evaluate $\int_0^{\infty} \frac{x \cos x - \sin x}{x^3} dx$. (08 Marks)
- b. Find Fourier Cosine transform of the function : (06 Marks)
- $$f(x) = \begin{cases} 4x; & 0 < x < 1 \\ 4 - x; & 1 < x < 4 \\ 0; & x > 4 \end{cases}$$
- c. Find z-transforms of: i) $a^n \sin n\theta$ ii) $a^{-n} \cos n\theta$. (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.

OR

- 4 a. Find Fourier sine transform of $f(x) = e^{-|x|}$ and hence evaluate : $\int_0^{\infty} \frac{x \sin mx}{1+x^2} dx, m > 0$. (08 Marks)
- b. Find z-transform of $u_n = \cos h\left(\frac{n\pi}{2} + \theta\right)$. (06 Marks)
- c. Solve the difference equation using z-transforms $u_{n+2} + 6u_{n+1} + 9u_n = 2^n$. Given $u_0 = u_1 = 0$. (06 Marks)

Module-3

- 5 a. If θ - is the acute angle between the two regression lines relating the variables x and y, show that $\text{Tan}\theta = \left(\frac{1-r^2}{r}\right) \left(\frac{\sigma_x \sigma_y}{\sigma_x^2 \sigma_y^2}\right)$. (08 Marks)
- Indicate the significance of the cases $r = \pm 1$ and $r = 0$.
- b. Fit a straight line $y = ax + b$ for the data.

x	12	15	21	25
y	50	70	100	120

- c. Find a real root of the equation by using Newton-Raphson method near $x = 0.5$, $xe^x = 2$, perform three iterations. (06 Marks)

OR

- 6 a. Compute the coefficient of correlation and equation of regression of lines for the data :

x	1	2	3	4	5	6	7
y	9	8	10	12	11	13	14

- b. The Growth of an organism after x - hours is given in the following table :

x (hours)	5	15	20	30	35	40
y (Growth)	10	14	25	40	50	62

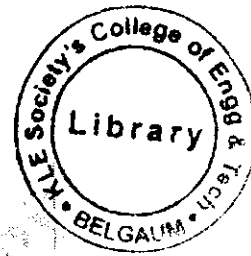
- Find the best values of a and b in the formula $y = ae^{bx}$ to fit this data. (06 Marks)
- c. Find a real root of the equation $\cos x = 3x - 1$ correct to three decimals by using Regula - False position method, given that root lies in between 0.6 and 0.7. Perform three iterations. (06 Marks)

Module-4

- 7 a. Find $y(8)$ from $y(1) = 24$, $y(3) = 120$, $y(5) = 336$, $y(7) = 720$ by using Newton's backward difference interpolation formula. (08 Marks)
- b. Define $f(x)$ - as a polynomial in x for the following data using Newton's divided difference formula. (06 Marks)

x	-4	-1	0	2	5
f(x)	1245	33	5	9	1335

- c. Evaluate the integral $I = \int_0^6 \frac{dx}{4x+5}$ using Simpson's $\frac{1}{3}$ rd rule using 7 ordinates. (06 Marks)



OR

- 8 a. For the following data calculate the differences and obtain backward difference interpolation polynomial. Hence find $f(0.35)$. (08 Marks)

x	0.1	0.2	0.3	0.4	0.5
f(x)	1.40	1.56	1.76	2.0	2.28

- b. Using Lagrange's interpolation find y when $x = 10$.

x	5	6	9	11
y	12	13	14	16

(06 Marks)

- c. Evaluate $\int_0^1 \frac{x}{1+x^2} dx$ by Weddle's rule considering seven ordinates. (06 Marks)

Module-5

- 9 a. Verify the Green's theorem in the plane for $\int_C (x^2 + y^2)dx + 3x^2y dy$ where C - is the circle $x^2 + y^2 = 4$ traced in positive sense. (08 Marks)
- b. Evaluate $\int_C (\sin z dx - \cos x dy + \sin y dx)$ by using Stokes theorem, where C - is the boundary of the rectangle $0 \leq x \leq \pi$, $0 \leq y \leq 1$ and $z = 3$. (06 Marks)
- c. Find the curve on which the functional : $\int_0^1 [y'^2 + 12xy]dx$ with $y(0) = 0$, $y(1) = 1$ can be extremised. (06 Marks)

OR

- 10 a. Given $f = (3x^2 - y)i + xzj + (yz - x)k$ evaluate $\int_C f \cdot dr$ from $(0, 0, 0)$ to $(1, 1, 1)$ along the paths $x = t$, $y = t^2$ and $z = t^3$. (08 Marks)
- b. Derive Euler's equation in the form $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$. (06 Marks)
- c. Prove that the shortest distance between two points in a plane is a straight line. (06 Marks)

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Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Additional Mathematics - I

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Prove that $(1 + \cos\theta + i \sin\theta)^n + (1 + \cos\theta - i \sin\theta)^n = 2^{n+1} \cos^n\left(\frac{\theta}{2}\right) \cos\left(\frac{n\theta}{2}\right)$ (08 Marks)
- b. Express $\sqrt{3} + i$ in the polar form and hence find its modulus and amplitude. (06 Marks)
- c. Find the sine of the angle between vectors $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} - 3\hat{j} + 2\hat{k}$ (06 Marks)

OR

- 2 a. Express $\frac{3+4i}{3-4i}$ in the form $x + iy$. (08 Marks)
- b. If the vector $2\hat{i} + \lambda\hat{j} + \hat{k} = 0$ and $4\hat{i} - 2\hat{j} - 2\hat{k}$ are perpendicular to each other, find λ . (06 Marks)
- c. Find λ , such that the vectors $2\hat{i} - \hat{j} + \hat{k}$, $\hat{i} + 2\hat{j} - 3\hat{k}$, $3\hat{i} + \lambda\hat{j} + 5\hat{k}$ are coplanar. (06 Marks)

Module-2

- 3 a. If $y = e^{a \sin^{-1} x}$, prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2+a^2)y_n = 0$ (08 Marks)
- b. With usual notations, prove that $\tan\phi = r \frac{d\theta}{dr}$. (06 Marks)
- c. If $u = \log_e \frac{x^2+y^2}{x^2-y^2}$, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 1$. (06 Marks)

OR

- 4 a. Using Maclaurin's series, expand $\tan x$ upto the term containing x^5 . (08 Marks)
- b. Find the pedal equation of $r = a(1 - \cos\theta)$. (06 Marks)
- c. If $u = x + 3y^2 - z^3$, $v = 4x^2yz$ and $w = 2z^2 - xy$, find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$ at $(1, -1, 0)$. (06 Marks)

Module-3

- 5 a. Obtain a reduction formula for $\int_0^{\pi/2} \cos^n x \, dx$, ($n > 0$). (08 Marks)
- b. Evaluate $\int_0^a \frac{x^7}{\sqrt{a^2 - x^2}} \, dx$ (06 Marks)
- c. Evaluate $\int_1^2 \int_1^3 xy^2 \, dx \, dy$ (06 Marks)

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OR

- 6 a. Obtain a reduction formula for $\int_0^{\pi/2} \sin^n x \, dx$, ($n > 0$). (08 Marks)
- b. Evaluate $\int_0^{2a} x^2 \sqrt{2ax - x^2} \, dx$ (06 Marks)
- c. Evaluate $\int_{-1}^1 \int_0^{x+z} \int_{x-z}^{x+z} (x+y+z) \, dx \, dy \, dz$ (06 Marks)

Module-4

- 7 a. A particle moves along the curve $x = 2t^2$, $y = t^2 - 4t$ and $z = 3t - 5$, where 't' is the time. Find its velocity and acceleration vectors and also magnitude of velocity and acceleration at $t = 1$. (08 Marks)
- b. In which direction of the directional derivative of x^2yz^3 is maximum at $(2, 1, -1)$ and find the magnitude of this maximum. (06 Marks)
- c. Show that $\vec{F} = (y+z)\hat{i} + (x+z)\hat{j} + (x+y)\hat{k}$ is irrotational. (06 Marks)

OR

- 8 a. If $\phi = xy^2z^3 - x^3y^2z$, find $\nabla\phi$ and $|\nabla\phi|$ at $(1, -1, 1)$. (08 Marks)
- b. If $\vec{F} = (x+y+1)\hat{i} + \hat{j} - (x+y)\hat{k}$, show that $\vec{F} \cdot \text{Curl}\vec{F} = 0$. (06 Marks)
- c. If $x = t^2 + 1$, $y = 4t - 3$, $z = 2t^2 - 6t$ represents the parametric equation of a curve, find the angle between the tangents at $t = 1$ and $t = 2$. (06 Marks)

Module-5

- 9 a. Solve: $\left(x \tan \frac{y}{x} - \frac{y}{x} \sec^2 \frac{y}{x} \right) dx = x \sec^2 \frac{y}{x} dy$ (08 Marks)
- b. Solve: $xy(1+xy^2) \frac{dy}{dx} = 1$ (06 Marks)
- c. Solve: $\frac{dy}{dx} + \frac{y \cos x + \sin y + y}{\sin x + x \cos y + x} = 0$ (06 Marks)

OR

- 10 a. Solve: $(3y + 2x + 4)dx - (4x + 6y + 5)dy = 0$ (08 Marks)
- b. Solve: $(1+y)dx = (\tan^{-1}y - x)dy$ (06 Marks)
- c. Solve: $(y \log y)dx + (x - \log y)dy = 0$. (06 Marks)

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Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Strength of Materials

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Show that volumetric strain is equal to algebraic sum of the strains in three mutually perpendicular directions in case of cuboid. (05 Marks)
- b. Calculate the diameter of steel rod needed to carry a load of 8 kN, if the extension is not to exceed 0.04 percent. Assume $E = 210 \text{ GN/m}^2$. (05 Marks)
- c. A reinforced concrete column 300 mm × 300 mm in size has 4 reinforcement bars of steel 20 mm in diameter. Calculate the safe load, the column can carry if the permissible stress in concrete is 5.2 MN/m^2 , $\frac{E_{\text{steel}}}{E_{\text{concrete}}} = 18$. (10 Marks)

OR

- 2 a. Derive an expression for change in length in case of a uniformly varying circular cross section whose diameter varies from d_1 to d_2 over a length 'L' subjected to an axial force F. (06 Marks)
- b. A rod is 2 m long at a temperature of 10°C . Find the expansion of the rod when the temperature is raised to 80°C . If this expansion is prevented, find the stress induced in the material of the rod. Take $E = 1.0 \times 10^5 \text{ MPa}$ and $\alpha = 12 \times 10^{-6} / ^\circ\text{C}$. (05 Marks)
- c. A bar of cross section $10\text{mm} \times 10\text{mm}$ is subjected to an axial pull of 8000 N. The lateral dimension of the bar is found to be changed to $9.9985\text{mm} \times 9.9985\text{mm}$. If the modulus of rigidity is $0.8 \times 10^5 \text{ N/mm}^2$, determine the Poisson's ratio and modulus of elasticity. (09 Marks)

Module-2

- 3 a. Derive expressions for hoop stress and longitudinal stress in case of thin cylinder. (08 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 stress and their planes (iii) Normal and shear stresses on the inclined plane AB. (12 Marks)

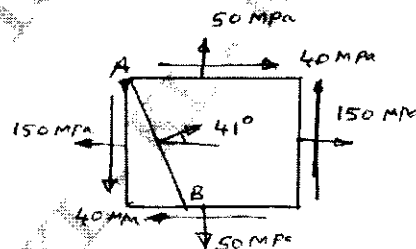


Fig. Q3 (b)

OR

- 4 a. At a point in a strained material the normal stresses are σ_x and σ_y , which are tensile in nature and shear stress acting is τ_{xy} , derive expressions for normal stress and shear stress on an inclined plane making an angle ' θ ' with the vertical plane. (10 Marks)
- b. The inside diameter of thick cylinder is 200 mm. If the internal pressure is 8 N/mm^2 and maximum permissible stress in cylinder wall is 20 N/mm^2 , what is the minimum thickness required. If the internal pressure is to be increased to 12 N/mm^2 without exceeding maximum stress, what is the external pressure to be applied? (10 Marks)

1 of 2

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Module-3

- 5 a. A cantilever of length 'l' is subjected to a load intensity of w/m at fixed end, uniformly varying to zero at free end. Considering a section 'X' at a distance 'x' from free end, write shear force and bending moment equations and using them draw shear force diagram and bending moment diagram. (10 Marks)
- b. Draw shear force diagram and bending moment diagram for the Cantilever beam shown in Fig. Q5 (b). (10 Marks)

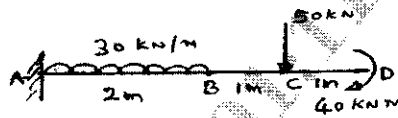


Fig. Q5 (b)

OR

- 6 a. What is Pure bending? Explain with examples. (05 Marks)
- b. Draw shear force diagram and bending moment diagram for the beam shown in Fig. Q6 (b). (15 Marks)

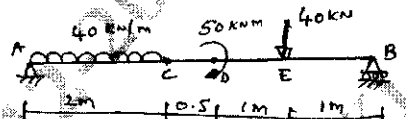


Fig. Q6 (b)

Module-4

- 7 a. Explain maximum strain energy theory (Beltrami and Haigh). (05 Marks)
- b. Derive the expression for power transmitted by the shaft. (05 Marks)
- c. A solid shaft has to transmit 120 kW of power at 160 rpm. If the shear stress is not to exceed 60 MPa and the twist in a length of 3 m must not exceed 1°, find the suitable diameter of the shaft. $G = 80$ GPa. (10 Marks)

OR

- 8 a. Derive with usual notations the torsion equation,

$$\frac{T}{J} = \frac{\tau_{\max}}{R} = \frac{G\theta}{L}$$
 (10 Marks)
- b. The cross section of a bolt is required to resist an axial tension of 15 kN and a transverse shear of 15 kN. Estimate the diameter of the bolt by (i) Maximum principal stress theory and (ii) Maximum shear stress theory. The elastic limit of the material is 300 N/mm². Poisson's ratio = 0.25 and factor of safety = 3. (10 Marks)

Module-5

- 9 a. Derive Euler's crippling load when both ends of column are hinged. (06 Marks)
- b. A horizontal beam of the section shown in Fig. Q9 (b) is 4 m long and is simply supported at the ends. Find the maximum uniformly distributed load it can carry if the compressive and tensile stresses are not to exceed 60 MPa and 30 MPa respectively. (14 Marks)

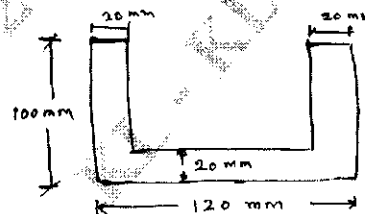


Fig. Q9 (b)

OR

- 10 a. Define : (i) Neutral axis (ii) Section modulus
 (iii) Flexural rigidity (iv) Moment of resistance (08 Marks)
- b. Compare the crippling loads as found from Euler's and Rankine's formula for a mild steel tube of length 3 m, of internal diameter 5 cm and thickness of metal 0.25 cm. Both ends are pin jointed. $E = 2.1 \times 10^2$ KN/mm². Take $\alpha = \frac{1}{7500}$, $\sigma_c = 300$ N/mm². (12 Marks)

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17CV33

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Fluid Mechanics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1
 - a. Define the term 'fluid'. Distinguish between liquid and gases. (06 Marks)
 - b. Derive the expression for surface tension on a liquid droplet. (06 Marks)
 - c. The dynamic viscosity of an oil, used for lubrication between a shaft and sleeve is 0.6Ns/m^2 . The shaft diameter is 0.4m and rotates at 190rpm . Calculate the power lost in the bearing a sleeve length of 90mm . Take the thickness of the oil film as 1.5mm . (08 Marks)

OR

- 2
 - a. Explain the working of a Bourdon's pressure gauge with a diagram. (06 Marks)
 - b. State and prove Pascal's law. (08 Marks)
 - c. A differential manometer is connected at the two points A and B of two pipes as shown in Fig.Q.2(c). The pipe A contains a liquid of sp.gr = 1.5 while pipe B contains a liquid of sp.gr = 0.9. The pressures at A and B are $9.81 \times 10^4 \text{ N/m}^2$ and 17.65 N/m^2 respectively. Find the difference in mercury level in the differential manometer. (06 Marks)

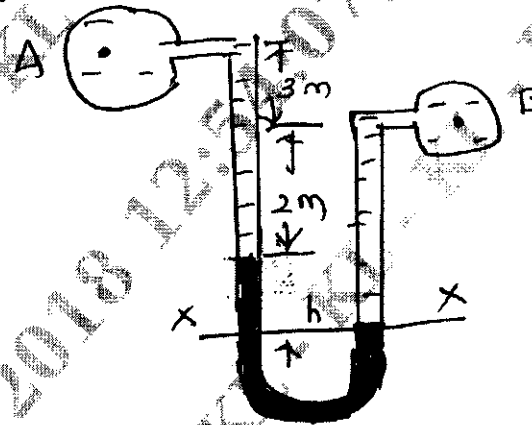


Fig.Q.2(c)

Module-2

- 3
 - a. Define: i) Total pressure ii) Centre of pressure. (04 Marks)
 - b. Derive the expression for the total pressure and center of pressure on a vertically immersed plane surface. (08 Marks)
 - c. The velocity potential function $\phi = \frac{-xy^3}{3} - x^2 + x^3y + y^2$.
 - i) Find the velocity component in x and y directions.
 - ii) Show that ϕ represents a possible case of fluid flow. (08 Marks)

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

- 4 a. Derive continuity equation in Cartesian coordinates for 3 dimensional flow. (08 Marks)
 b. A rectangular plane surface 1m wide and 3m deep lies in water in such a way that its plane makes an angle of 30° with the free surface of water. Determine the total pressure and the depth of center of pressure when the upper edge of the plate is 2m below the free surface. (06 Marks)
 c. What is flownet? The stream function for a two dimensional flow is given by $\psi = 2xy$. Find the velocity potential function ' ϕ '. (06 Marks)

Module-3

- 5 a. State the assumptions made in deriving the Euler's equation of motion. Hence obtain Bernoulli's equation from Euler's equation with a neat sketch. (10 Marks)
 b. A pipe of diameter 400mm carries water at a velocity of 25m/s. The pressure at the points A and B are given as 29.43 N/cm^2 and 22.563 N/cm^2 respectively, while the datum head at A and B are 28m and 30m. Find the loss of head between A and B. (05 Marks)
 c. Show that for a pitot tube actual velocity $V = C_v \sqrt{yh}$ with usual notations. (05 Marks)

OR

- 6 a. Derive the equation for discharge through a venturimeter. (08 Marks)
 b. Water flow at the rate of $0.147 \text{ m}^3/\text{s}$ through a 150mm diameter orifice inserted in a 300mm diameter pipe. If the pressure gauges fitted upstream and down stream of the orifice plate have shown readings of 176.58 kN/m^2 and 88.29 kN/m^2 respectively, find the coefficient of discharge 'C' of the orifice meter. (05 Marks)
 c. A 45° reducing bend is connected in a pipe line, the diameters at the inlet and outlet of the bend being 600mm and 300mm respectively. Find the force exerted by water on the bend if the pressure intensity at the inlet to the bend is 8.829 N/cm^2 and rate of flow of water is 600 lit/sec. (07 Marks)

Module-4

- 7 a. Define hydraulic coefficient C_c , C_v and C_d for an orifice and obtain the relation between them. (08 Marks)
 b. Derive the expression of discharge through a triangular notch. (08 Marks)
 c. Find the discharge over a Cipolletti weir of length 2.0m when the head over the weir is 1m. Take $C_d = 0.62$. (04 Marks)

OR

- 8 a. What are the advantages of triangular notch over rectangular notch? How do you classify mouth pieces? (06 Marks)
 b. A jet of water, issuing from a sharp-edged vertical orifice under a constant head of 10.0cm at a certain point, has the horizontal and vertical coordinates measured from the Vena-Contracta as 20.0cm and 10.5cm respectively. Find the value of C_v . Also find the value of C_c if $C_d = 0.60$. (06 Marks)
 c. What is broad crested weir? Show that under maximum discharge conditions $h = 2/3 H$ with usual notations for a broad crested weir. (08 Marks)



Module-5

- 9 a. Derive Darcy's equation for head loss through pipes. (08 Marks)
- b. Explain: i) Pipes in parallel ii) Pipes in series. (04 Marks)
- c. The rate of water flow of water through a horizontal pipe is $0.025 \text{ m}^3/\text{s}$. The diameter of the pipe which is 200mm is suddenly enlarged to 400mm. The pressure intensity in the smaller pipe is 11.772 N/cm^2 . Compute:
 - i) Loss of head due to sudden enlargement (08 Marks)
 - ii) Pressure intensity in the large pipe. (08 Marks)

OR

- 10 a. Explain the terms:
 - i) Hydraulic gradient and (04 Marks)
 - ii) Total energy line. (08 Marks)
- b. Derive the expression for pressure loss due to sudden closure of the valve when the pipe is elastic. (08 Marks)
- c. For a pipe network shown in Fig.Q.10(c) find the flow in each pipe. The value of 'n' mg/c assumed as 2.0. (08 Marks)

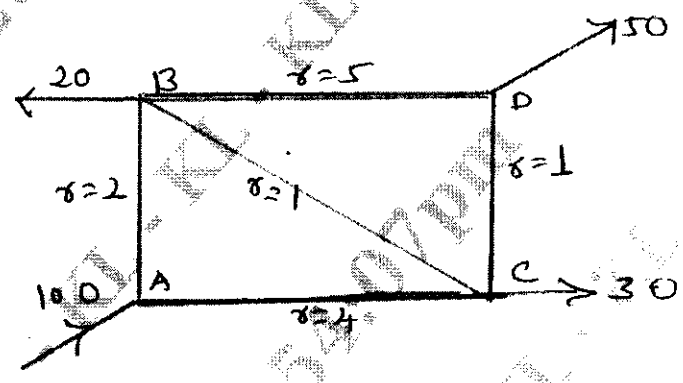


Fig.Q.10(c)



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17CV34

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Basic Surveying

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define surveying. Enumerate the applications of surveying. (10 Marks)
 b. Discuss the classification of surveying. (10 Marks)

OR

- 2 a. Explain Indirect method of ranging with a sketch. (10 Marks)
 b. A big pond obstructs the chain line AB. A line AL was measured on the left of the line AB for circumventing the obstacle. The length of AL was 901 m. Similarly the line AM was measured on the right of the line AB whose length was 1100 m. Points M, B, L are in straight line. Length's of the links BL and BM are 502 m and 548 m respectively. Find the distance AB. (10 Marks)

Module-2

- 3 a. Distinguish between:
 i) True meridian and magnetic meridian
 ii) Whole Circle bearing and Quadrantal bearing. (05 Marks)
 b. A closed compass traverse ABCDEA was conducted round a forest and the following bearings were observed with a compass. Calculate the interior angles. Apply check and plot the traverse (not to scale).

Line	AB	BC	CD	DE	EA
Fore bearing	60°30'	122°00'	46°00'	205°30'	300°00'

- (10 Marks)
- c. The magnetic bearing of a line was found to be N 60°30' W in 2002, when the declination was 5°10' E. Find its present magnetic bearing, if declination is 3° W. (05 Marks)

OR

- 4 a. Explain briefly the applications of theodolite. (08 Marks)
 b. Explain the repetition method of measuring the horizontal angle using transit theodolite and errors eliminated by that method. (12 Marks)

Module-3

- 5 a. What is meant by balancing of traverse? Explain the Bowditch method of adjusting the traverse. (10 Marks)
 b. A tacheometer, fitted with an analectic lens and having the multiplying constant 100, was set up at station C to determine the gradient between two points A and B and the following observations were taken keeping the staff vertical.

Staff @	Vertical angle	Stadia readings
A	+4°20'0"	1.300, 1.610, 1.920
B	0°10'40"	1.100, 1.410, 1.720

If the horizontal angle ACB is 35°20' determine the gradient between A and B. (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.

OR

- 6 a. Derive the distance and elevation formulae for stadia tacheometry, when the staff is held vertical and the line of sight being inclined upwards and downwards. (08 Marks)
- b. Describe the closing error in a compass traverse. Explain how the closing error is adjusted by transit rule. (06 Marks)
- c. The bearings of PQ and QR are $18^{\circ}36'$ and $60^{\circ}24'$ respectively. The coordinates of the ends P and R are:

Point	North coordinate	East Coordinate
P	300.0	400.0
R	1432.8	1257.2

Find the length of PQ and QR.

(06 Marks)

Module-4

- 7 a. Explain the effects of curvature and refraction in leveling. (08 Marks)
- b. The following observations were made on a hill top to ascertain its elevation. The height of the target F was 5m.

Instrument Station	Staff reading on BM	Vertical Angle	Remarks
O ₁	2.550	$18^{\circ}6'$	RL of
O ₂	1.670	$28^{\circ}42'$	BM = 345.58

The instrument stations were 100 M apart and were in line with 'F'.

(12 Marks)

OR

- 8 a. The following consecutive readings were taken with a dumpy level and 4m leveling staff on a continuously sloping ground at a common interval of 30m: 0.415, 1.025, 2.085, 2.925, 3.620, 0.715, 2.115, 3.090, 0.405, 1.525, 2.005, 3.650. The first point was 185.575 M above MSL. Rule out a page of level book and enter the readings. Calculate the reduced levels of all the points by "Height of instrument method". Also calculate the gradient of line joining first and last points. (10 Marks)
- b. Derive the expressions for the horizontal distance, vertical distance and the elevation of an elevated object, when the base is inaccessible and instrument stations are not in the same vertical plane with the object. (10 Marks)

Module-5

- 9 a. The following perpendicular offsets were taken from a chain line to an irregular boundary

Chainage	0	10	20	30	40	50	60	70
Offset	14.2	28.5	35.8	30.6	29.0	27.6	33.5	26.0

Compute the area of by: i) Mid ordinate rule (ii) Trapezoidal rule (iii) Simpson's rule

(12 Marks)

- b. Write short notes on digital planimeter. (08 Marks)

(08 Marks)

OR

- 10 a. Describe the different characteristics of contours. (08 Marks)
- b. Explain the interpolation of contours. List the methods of contouring. (04 Marks)
- c. A road embankment is 30 m wide at the top with side slopes of 2:1. The ground levels at 100 m intervals along a line AB are as under: A 170.30, 169.10, 168.50, 168.10, 166.50 B. The formation level at 'A' is 178.70M with uniform falling ground of 1 in 50 from 'A' to 'B'. Determine the volume of earthwork by prismoidal formula. Assume the ground to be in cross-section. (08 Marks)

2 of 2

CBCS SCHEME



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17CV/CT35

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Engineering Geology

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Describe the role of geology in the Civil Engineering Projects. (06 Marks)
b. With neat sketch, explain the different zones of the interior of the EARTH. (06 Marks)
c. Define a mineral with examples. Describe the following physical properties of minerals :
i) Lustre ii) Cleavage. (08 Marks)

OR

- 2 Describe how the physical properties are helpful in their identification of minerals in the field with examples. (20 Marks)

Module-2

- 3 a. What are Rocks? Based on their origin, how the rocks have been classified and how are they formed with examples. (04 Marks)
b. With the help of neat sketches, describe the forms of igneous rocks. (08 Marks)
c. Describe any two rocks their geological properties and add their engineering uses :
i) Granite ii) Sand stone iii) Marble. (08 Marks)

OR

- 4 What are folds? How are they caused? With neat sketch, mention the parts of the fold. Describe the different types of folds with figures. Also add a note on their civil engineering considerations. (20 Marks)

Module-3

- 5 a. What is Weathering? Describe the mechanical and chemical weathering. (10 Marks)
b. Give detailed account of geological work done by rivers. (10 Marks)

OR

- 6 a. What is an Earthquake? Describe the tectonic causes of earthquake and write note on the effects of earthquakes. (10 Marks)
b. Write note on causes of landslides. (05 Marks)
c. Write brief note on coastal land forms. (05 Marks)

Module-4

- 7 a. Define Ground water. Describe the hydrological cycle. Explain the factors influencing the surface runoff and infiltration. (10 Marks)
b. Discuss the ground water survey by Electrical Resistivity method, with a circuit diagram. (10 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 Write notes on :
- a. Water table and perched water table.
 - b. Aquifer and its types.
 - c. Specific yield and retention.
 - d. Porosity and Permeability.
- (20 Marks)

Module-5

- 9 a. What is Remote Sensing? Write its application in Civil Engineering. (08 Marks)
b. What is Geographical Information System? Name the different components of Geographical Information System. (06 Marks)
c. Write a note on Application of Global Positioning System (GPS) in Civil Engineering. (06 Marks)

OR

- 10 Write a note on :
- a. Impact of Mining, Quarring on Environment. (10 Marks)
 - b. Natural disasters and their mitigation. (10 Marks)

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Third Semester B.E. Degree Examination, Dec.2018/Jan.2019 Building Materials and Construction

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain physical and chemical classification of rocks. (08 Marks)
b. List and explain Laboratory tests on bricks. (06 Marks)
c. Explain bulking of sand. (06 Marks)

OR

- 2 a. Which are the constituents of good brick earth? Explain. (06 Marks)
b. What is Quarrying of stone? Explain methods of Quarrying. (08 Marks)
c. Explain the importance of shape, size and texture of coarse aggregates in cement concrete making. (06 Marks)

Module-2

- 3 a. What is foundation? Explain the functions of foundation. (06 Marks)
b. Explain strip footing and strap footing with sketches. (06 Marks)
c. What are the special features of English bond? Explain with 1½ brick thick wall. (08 Marks)

OR

- 4 a. What is pile foundation? Explain with sketches the classification of pile foundation based on its function. (06 Marks)
b. Differentiate between Random rubble masonry and coursed rubble masonry. (06 Marks)
c. Draw the plan of 1½ brick thick Flemish bond and explain its salient features. (08 Marks)

Module-3

- 5 a. Explain the following with sketches:
(i) RCC lintel (ii) Stone lintel. (06 Marks)
b. Discuss various modes of failure of an arch and what are its remedies? (06 Marks)
c. Draw the sketch of king post wooden roof truss (half part) and label its parts. (08 Marks)

OR

- 6 a. Mention the types of sloped roof. Explain any three types of sloped roof with sketches. (08 Marks)
b. What are the requirements of good floor? What are the components of ground floor with mosaic flooring? (06 Marks)
c. What is an arch? Draw the sketch of elemental arch. (06 Marks)

Module-4

- 7 a. Explain salient features of framed and panelled door with sketch (Double shutter). (08 Marks)
b. Differentiate between Bay window and corner window with sketches. (06 Marks)
c. What are the requirements of good stair? (06 Marks)

OR

- 8 a. Design a stair-case for a residential building using stair hall $2.5\text{m} \times 5\text{m}$. The vertical distance between the floors is 3.6m. Sketch the plan of staircase. (08 Marks)
- b. What is shoring? Explain Raking shore with a sketch. (06 Marks)
- c. What are the requirements of locating door and windows? (06 Marks)

Module-5

- 9 a. Discuss the defects in plastering. (08 Marks)
- b. Name and explain the constituents of oil paint. (06 Marks)
- c. What are causes of dampening in the building and what are its remedies? (06 Marks)

OR

- 10 a. Explain the objects of plastering and types of plaster finishing. (08 Marks)
- b. Explain the procedure of painting for the following :
- (i) New wood work surface
- (ii) New plastered surface (06 Marks)
- c. Differentiate between stucco plastering and lathe plastering. (06 Marks)

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CBCS SCHEME



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Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Engineering Mathematics – IV

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Using Taylor's series method solve $\frac{dy}{dx} = x^2 + y^2$ with $y(0) = 1$ and hence find $y(0.1)$ and consider upto 3rd degree. (06 Marks)
- b. Using modified Euler's method solve $\frac{dy}{dx} = 1 + \frac{y}{x}$ with $y(1) = 2$ then find $y(1.2)$ in two steps. (05 Marks)
- c. Given $\frac{dy}{dx} = \frac{x+y}{2}$, give that $y(0) = 2$, $y(0.5) = 2.636$, $y(1) = 3.595$ and $y(1.5) = 4.968$ then find value of y at $x = 2$ using Milne's predictor and corrector formulae. (05 Marks)

OR

- 2 a. Using modified Euler's method solve $\frac{dy}{dx} = x + \sqrt{y}$, with $y(0) = 1$ then find $y(0.2)$ with $h = 0.2$. (06 Marks)
- b. Solve $\frac{dy}{dx} = \frac{y-x}{y+x}$, with $y(0) = 1$ and hence find $y(0.1)$ by taking one steps using Runge-Kutta method of fourth order. (05 Marks)
- c. Given $\frac{dy}{dx} = \frac{(1+x^2)y^2}{2}$ given that $y(0) = 1$, $y(0.1) = 1.06$, $y(0.2) = 1.12$ and $y(0.3) = 1.21$ then evaluate $y(0.4)$ using Adam's - Bash forth method. (05 Marks)

Module-2

- 3 a. Given $\frac{d^2y}{dx^2} = \frac{2dy}{dx} - y$, $y(0) = 1$, $y'(0) = 2$, evaluate $y(0.1)$ and $y'(0.1)$ using Runge-Kutta method of fourth order. (05 Marks)
- b. Solve the Bessel's differential equation : $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + (x^2 - n^2)y = 0$ leading to $J_n(x)$. (05 Marks)
- c. Express $x^3 + 2x^2 - 4x + 5$ in terms of Legendre polynomials. (05 Marks)

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

- 4 a. Using Milne's method, obtain an approximate solution at the point $x = 0.8$ of the problem $\frac{d^2y}{dx^2} = 1 - 2y \frac{dy}{dx}$ using the following data :

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

(06 Marks)

- b. If α and β are two distinct roots of $J_n(x) = 0$ then P-T $\int_0^1 x J_n(\alpha x) J_n(\beta x) dx = \begin{cases} 0 & \text{if } \alpha \neq \beta \\ \end{cases}$.
- (05 Marks)
- c. With usual notation, prove that $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \sin x$.
- (05 Marks)

Module-3

- 5 a. State and prove Cauchy-Riemann equation in Cartesian form. (06 Marks)
- b. Find analytic function $f(z)$ whose imaginary part is $v = \left(r - \frac{1}{r}\right) \sin \theta$. (05 Marks)
- c. Discuss the transformation of $\omega = e^z$. (05 Marks)

OR

- 6 a. State and prove Cauchy's integral formula. (06 Marks)
- b. Evaluate $\oint_C \frac{z^2}{(z+1)(z-2)} dz$ where C is $|z| = 3$ using Cauchy's residue theorem. (05 Marks)
- c. Find the bilinear transformation which maps $z = -1, 0, 1$ into $\omega = 0, i, 3i$. (05 Marks)

Module-4

- 7 a. Derive mean and variance of the binomial distribution. (06 Marks)
- b. A random variable x has the following probability mass function.

x	0	1	2	3	4	5
P(x)	k	3k	5k	7k	9k	11k

- i) find k ii) find $p(x < 3)$ iii) find $p(3 < x \leq 5)$. (05 Marks)
- c. The joint distribution of two random variable x and y as follows :

	y	-4	2	7
x	1	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$
	5	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$

- Compute: i) $E(x)$ and $E(y)$ ii) $E(xy)$ iii) $\text{cov}(xy)$. (05 Marks)

2 of 3



OR

- 8 a. 2% of the fuses manufactured by a firm are found defective. Find the probability that a box containing 200 fuses contains. i) no defective fuses ii) 3 or more defective fuses. (06 Marks)
- b. In a test on 2000 electric bulbs. It was found that the life of a particular brand was distributed normally with an average life of 2049 hours and S.D 60 hours. Estimate the number of bulbs likely to burn $(P(0 < z < 1.83) = 0.4664$ $P(1.33) = 0.4082$, $P(2) = 0.4772$)
 i) more than 2150 ii) less than 1960 iii) more than 1920 but less than 2160 hours. (05 Marks)
- c. The joint probability distribution of two random variable X and Y given by the following table:

X \ Y	1	3	9
2	$\frac{1}{8}$	$\frac{1}{24}$	$\frac{1}{12}$
4	$\frac{1}{4}$	$\frac{1}{4}$	0
6	$\frac{1}{8}$	$\frac{1}{24}$	$\frac{1}{12}$

Find marginal distribution of X and Y and evaluate cov(XY).

(05 Marks)

Module-5

- 9 a. Define: i) Null hypothesis ii) significance level iii) Type-I and Type-II error. (06 Marks)
- b. Ten individual are chosen at random from a population and their height in inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71. Test the hypothesis that mean height of the universe is 66 inches. Given that $(t_{0.05} = 2.262$ for 9d.f) (05 Marks)
- c. Find the unique fixed probability vector for the regular stochastic matrix :

$$A = \begin{bmatrix} \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\ \frac{1}{2} & 0 & \frac{1}{2} \\ 0 & 1 & 0 \end{bmatrix}$$

(05 Marks)

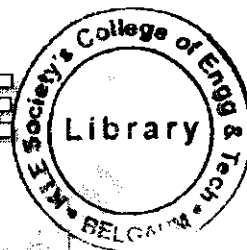
OR

- 10 a. A coin is tossed 1000 times and head turns up 540 times. Decide on the hypothesis that the coin is unbiased. (06 Marks)
- b. Four coins are tossed 100 times and following results were obtained :

No. of heads	0	1	2	3	4
Frequency	5	29	36	25	5

Fit a binomial distribution for the data and test the goodness of fit $(\chi_{0.05}^2 = 9.49)$. (05 Marks)

- c. A student's study habit are as follows. If he studies one night, he is 70% sure not to study the next night. On the other hand if he does not study one night he is 60% sure not to study the next night. In the long run how often does he study? (05 Marks)



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Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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 matrix $A = \begin{bmatrix} 2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ (05 Marks)

- b. Solve by Gauss elimination method:
 $2x + y + 4z = 12$ $4x + 11y - z = 33$ $8x - 3y + 2z = 20$ (05 Marks)

- c. Find all the eigen values of the matrix
 $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ (06 Marks)

OR

- 2 a. Find the values of K, such that the matrix A may have the rank equal to 3:
 $A = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 2 & 4 & K \\ 1 & 4 & 10 & K^2 \end{bmatrix}$ (05 Marks)

- b. Solve by Gauss elimination method
 $x_1 - 2x_2 + 3x_3 = 2$ $3x_1 - x_2 + 4x_3 = 4$ $2x_1 + x_2 - 2x_3 = 5$ (05 Marks)

- c. Find all the eigen values and corresponding eigen vectors of the matrix
 $A = \begin{bmatrix} -19 & 7 \\ -42 & 16 \end{bmatrix}$ (06 Marks)

Module-2

- 3 a. Find C.F of $(4D^4 - 8D^3 + 7D^2 + 11D + 6)y = 0$. (05 Marks)
- b. Solve the initial value problem $\frac{d^2x}{dt^2} + 4\frac{dx}{dt} + 29x = 0$
 Subject to the conditions $x(0) = 0, \frac{dx}{dt}(0) = 15$. (05 Marks)
- c. Using the method of undetermined coefficients, solve $(D^2 - 4D + 3)y = 20 \cos x$ (06 Marks)

OR

- 4 a. Solve $(D^2 - 2D + 4)y = e^x \cos x$. (05 Marks)
- b. Solve $(D^2 + 4)y = x^2 + 2^{-x}$. (05 Marks)
- c. Using the method of variation of parameters, find the solution of $(D^2 - 2D + 1)y = e^x / x$. (06 Marks)

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. Find the Laplace transform of $\frac{\cos 3t - \cos 4t}{t}$. (05 Marks)
- b. Find $L\{t \sin^2 t\}$ (05 Marks)
- c. Express the following function in terms of Heaviside unit step function and hence find the Laplace transform where
- $$f(t) = \begin{cases} t^2 & 0 < t \leq 2 \\ 4t & t > 2 \end{cases}$$
- (06 Marks)

OR

- 6 a. Find $L\left[\frac{e^{-t} \sin t}{t}\right]$. (05 Marks)
- b. Using Laplace transform evaluate $\int_0^{\infty} e^{-t} t \sin^2 3t dt$. (05 Marks)
- c. If $f(t) = \begin{cases} t & 0 \leq t \leq a \\ 2a - t & a \leq t \leq 2a \end{cases}$ $f(t+2a) = f(t)$, show that $L[f(t)] = \frac{1}{s^2} \tan h\left(\frac{as}{2}\right)$. (06 Marks)

Module-4

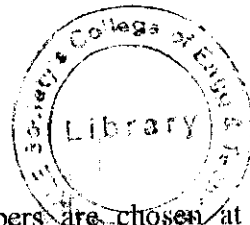
- 7 a. Find inverse Laplace transform of $\frac{s+5}{s^2-6s+13}$. (05 Marks)
- b. Find inverse Laplace transform of $\log\left[\frac{s^2+4}{s(s+4)(s-4)}\right]$. (05 Marks)
- c. Solve by using Laplace transform method $y''(t) + 4y(t) = 0$, given that $y(0) = 2, y'(0) = 0$. (06 Marks)

OR

- 8 a. Find $L^{-1}\left[\frac{s^2}{(s^2+1)(s^2+4)}\right]$. (05 Marks)
- b. Find $L^{-1}\left[\frac{(s+2)e^{-s}}{(s+1)^4}\right]$. (05 Marks)
- c. Solve by using Laplace transform method $y'' + 5y' + 6y = 5e^{2x}$, $y(0) = 2, y'(0) = 1$. (06 Marks)

Module-5

- 9 a. There are 10 students of which three are graduates. If a committee of five is to be formed, what is the probability that there are (i) only 2 graduates (ii) atleast 2 graduates? (05 Marks)
- b. In a school 25% of the students failed in the first language, 15% of the students failed in second language and 10% of the students failed in both. If a student is selected at random find the probability that :
- He failed in first language if he had failed in the second language.
 - He failed in second language if he had failed in the first language. (05 Marks)
- c. In a bolt factory there are four machines A, B, C and D manufacturing respectively 20%, 15%, 25%, 40% of the total production. Out of these 5%, 4%, 3% and 2% are defective. If a bolt drawn at random was found defective what is the probability that it was manufactured by A or D. (06 Marks)



OR

- 10 a. From 6 positive and 8 negative numbers, 4 numbers are chosen at random (without replacement) and multiplied. What is the probability that the product is a positive number? (05 Marks)
- b. Three students A, B, C write an entrance examination. Their chances of passing are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability that (i) atleast one of them passes (ii) all of them passes. (05 Marks)
- c. Three major parties A, B, C are contending for power in the elections of a state and the chance of their winning the election is in the ratio 1:3:5. The parties A, B, C respectively have probability of banning the online lottery $\frac{2}{3}$, $\frac{1}{3}$, $\frac{3}{5}$. What is the probability that there will be a ban on the online lottery in the state? What is the probability that the ban is from the party 'C'? (06 Marks)

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Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019 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. Explain briefly about different types of structural forms with the aid of neat sketches. (06 Marks)
- b. What is linear and non-linear structural system? (03 Marks)
- c. Analyse the pin jointed plane truss as shown in Fig.Q1(c) by method of joints and hence tabulate the member forces. (07 Marks)

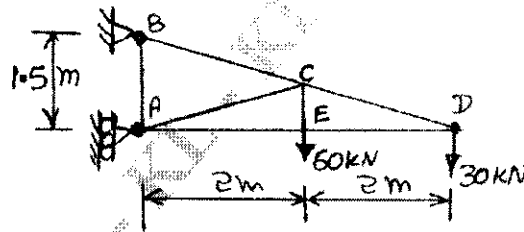


Fig.Q1(c)

OR

- 2 a. Explain briefly the following : (06 Marks)
 - i) Conditions of equilibrium
 - ii) Determinate and indeterminate structures
 - iii) Degree of freedom.
- b. List the assumptions made in the analysis of pin jointed plane truss. (03 Marks)
- c. Determine the force in the members CD, DF, EF and CF for the pin jointed plane truss as shown in Fig.Q2(c) by the method of sections. (07 Marks)

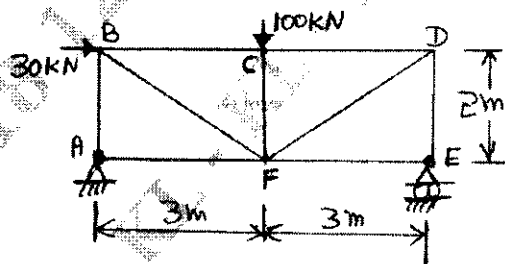


Fig.Q2(c)

Module-2

- 3 a. Derive the second order differential expression $EI \frac{d^2y}{dx^2} = m$ with usual notations. (06 Marks)
- b. Calculate the deflection at point C and slope at point A for the beam loaded as shown in Fig.Q3(b) by moment area method. (07 Marks)

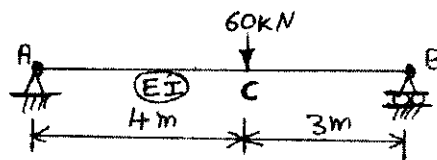


Fig.Q3(b)

- c. State the moment area theorems. (03 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.

OR

- 4 a. Calculate the deflections at points C and D and maximum deflection and its location for the beam as shown in Fig.Q4(a) by Machaulay's method. Take value of $EI = 17000 \text{ kN}\cdot\text{m}^2$. (09 Marks)

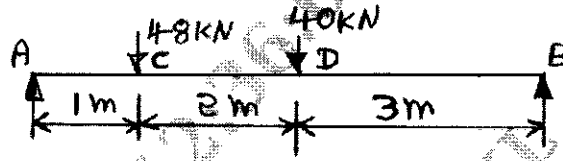


Fig.Q4(a)

- b. Calculate the maximum deflection and slope in the beam loaded as shown in Fig.Q4(b) by conjugate beam method. (07 Marks)

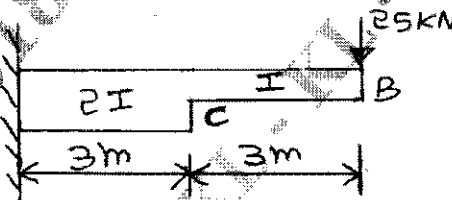


Fig.Q4(b)

Module-3

- 5 a. Derive the expression for strain energy stored in an prismatic element subjected to pure bending moment. (05 Marks)
 b. Explain briefly what is complimentary strain energy. (02 Marks)
 c. Determine the vertical and horizontal deflection point C for the mill bent as shown in Fig.Q5(c) by unit load method. (09 Marks)

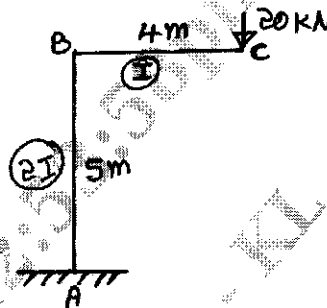


Fig.Q5(c)

OR

- 6 a. State Castigliano's theorems I and II. (03 Marks)
 b. Determine the vertical deflection at point C for the pin jointed plane truss as show in Fig.Q6(b) by strair energy method. Cross section are of each member is 5000mm^2 and $E = 2 \times 10^5 \text{ N/mm}^2$. (07 Marks)

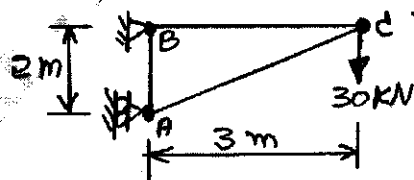


Fig.Q6(b)

- c. Determine the deflection at point C for the beam loaded as shown in Fig.Q6(c) by unit load method. (06 Marks)

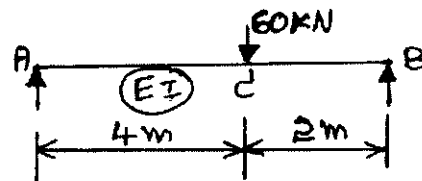


Fig.Q6(C)

Module-4

- 7 a. A three hinged parabolic arch is having a span of 36m. It is subjected to uniformly distributed load of intensity 30kN/m from left support hinge to crown hinge. Determine the normal thrust, radial shear and bending moment at quarter span point located from left support. (08 Marks)
- b. A cable is suspended from two points 'A' and 'B' which are 80m apart. 'A' is positioned 5m below 'B'. The lowest point on the cable is 10m below point 'A'. The cable supports a uniformly distributed load of intensity 20kN/m over the entire span. Calculate reaction at supports and maximum tension in the cable. (08 Marks)

OR

- 8 a. Calculate the support reactions, normal thrust and radial shear at point 'D' for a three hinged parabolic arch as shown in Fig. Q8(a). (08 Marks)

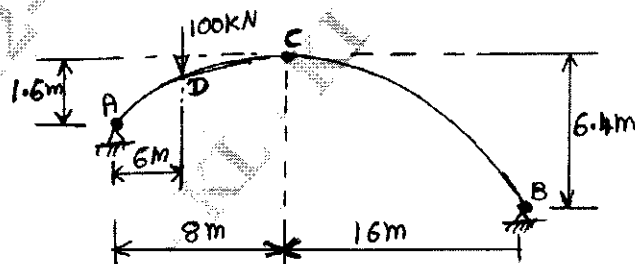


Fig. Q8(a)

- b. A three hinged stiffening girder of suspension bridge of span 120m is subjected to two point loads of 480 kN and 600 kN at distances of 25m and 80m from the left support respectively. The dip of the cable is 12m. Calculate maximum tension in the cable and shear force, bending moment values for the stiffening girder at 40m from the left support. (08 Marks)

Module-5

- 9 a. Determine the shear force at a section located 3m from left support by constructing influence line diagram for the beam with loading as shown in the Fig. Q9(a). (07 Marks)

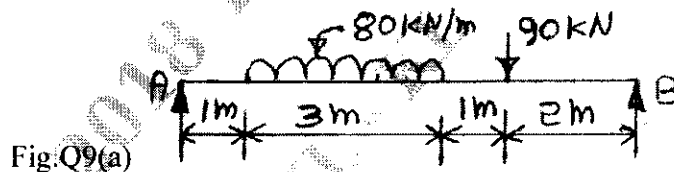


Fig. Q9(a)

- b. A system of wheel loads move from left end to right end as shown in Fig. Q9(b) on a beam simply supported and having a span of 10m. Calculate the maximum bending moment which can occur at a section located 4.0m from the left end. (07 Marks)

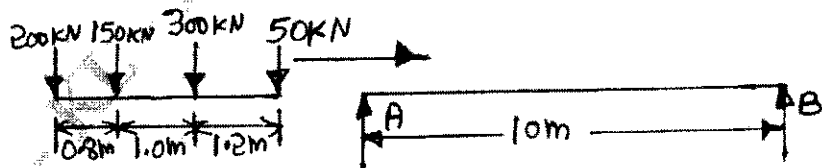


Fig. Q9(b)

- c. Explain briefly what is influence line diagram. (02 Marks)

OR

- 10 a. Determine the influence line diagrams for the forces in the members U_1U_2 , U_2U_3 , L_2L_3 , U_2L_2 and U_2L_3 for the part truss as shown in Fig.10(a). (10 Marks)

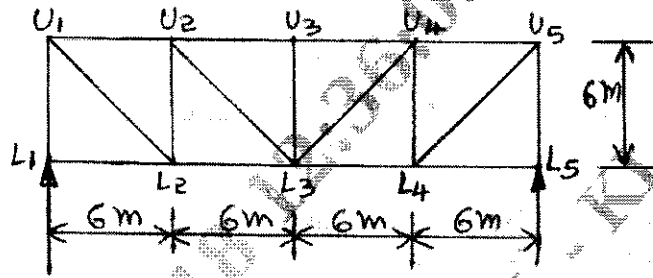


Fig.Q10(a)

- b. A moving load travels from left to right on a girder of span 10m as shown in Fig.Q10(b). Determine the absolute maximum benign moment acting in the girder. (06 Marks)

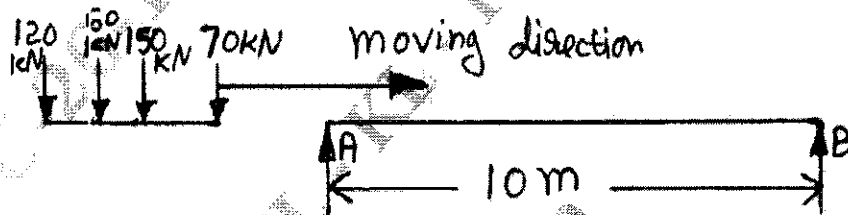
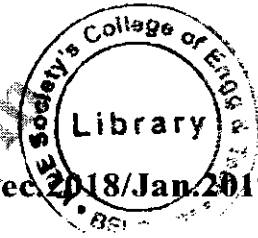


Fig.Q10(b)

CBCS SCHEME

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15CV43

Fourth Semester B.E. Degree Examination, Dec 2018/Jan 2019

Applied Hydraulics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. State and prove the Buckingham's π - Theorem. Why this theorem is considered superior over the Rayleigh's method. (08 Marks)
- b. The discharge through a water is $15 \text{ m}^3/\text{s}$ find the discharge through the model of the weir if the horizontal dimension of the model is $\frac{1}{50}$ the horizontal dimension of the prototype and vertical dimension of the model is $\frac{1}{10}$ the vertical dimension of the prototype. (08 Marks)

OR

- 2 a. Derive an expression for the Reynolds's number Froude number's (08 Marks)
- b. A rectangular pontoon is 5m long 3m wide and 1.20m high. The depth of immersion of the pontoon is 0.80m in sea water. If the centre of gravity is 0.6m above the bottom of the pontoon, determine the meta centric height. The density for sea water is 1025 kg/m^3 . (08 Marks)

Module-2

- 3 a. Derive an expression for the most economical trapezoidal section. (08 Marks)
- b. The discharge of water through a rectangular channel of width 8m is $15 \text{ m}^3/\text{s}$ when the depth of flow of water is 1.2m, calculate
- Specific energy of the flowing water
 - Critical depth and critical velocity
 - Value of minimum specific energy. (08 Marks)

OR

- 4 a. What is specific energy curve? Draw it and derive expressions for critical depth and critical velocity. (08 Marks)
- b. A trapezoidal channel has side slopes of 1 horizontal to 2 vertical and the slopes of the bed is 1 in 1500. The area of the section is 40 m^2 . Find the dimensions of the section. If it is most economical. Determine the discharge of the most economical section if $c = 50$. (08 Marks)

Module-3

- 5 a. Explain the term standing wave. Derive an expression for the depth of standing wave in terms of the u/s Froude number. (08 Marks)
- b. Find the slope of the free water surface in a rectangular channel of width 20m having depth of flow 5m. 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)

OR

- 6 a. Explain Back water curve and Afflux. (04 Marks)
- b. A sluice gate discharge water in to a horizontal rectangular channel with a velocity of 6 m/s and a depth of flow is 0.4m. the width of the channel is 8m. Determine whether a hydraulic jump will occur and if so, find its height and loss of energy per kg of water. Also determine the power lost in the hydraulic jump. (12 Marks)

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. Derive an expression for the impulse momentum equation. (08 Marks)
 b. A Pelton wheel is working with a gross head of 500m. One third of the gross head is lost in friction in the penstock. The rate of flow of water through the nozzle fitted at the end of the penstock is $2.0\text{m}^3/\text{s}$. The angle of deflection of the jet is 165° . Determine the power given by the water to the runner and also hydraulic efficiency of the Pelton wheel.
 Take speed ratio = 0.45 and $C_v = 1.0$. (08 Marks)

OR

- 8 a. Obtain an expression for the work done per second by water on the runner of a pelton wheel. Hence derive an expression for maximum efficiency of the pelton wheel. (08 Marks)
 b. A jet of water of diameter 50mm, having a velocity of 20m/s strikes a curved vane which is moving with a velocity of 10m/s in the direction of the jet. The jet leaves the vane at an angle of 60° to the direction of motion of vane at out let. Determine :
 i) The force exerted by the jet on the vane in the direction of motion
 ii) Work done per second by the jet. (08 Marks)

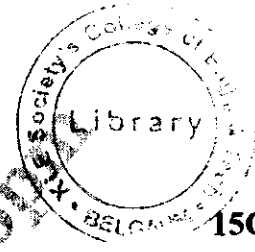
Module-5

- 9 a. By means of a neat sketch, explain the Francis Turbine. (08 Marks)
 b. Find the power required to drive a centrifugal pump which delivers $0.04\text{m}^3/\text{s}$ of water to a height of 20m through a 15cm diameter pipe and 100m long. The overall efficiency of the pump is 70% and coefficient of friction $f = 0.15$ in the formula $h_f = \frac{4fv^2}{2gd}$ (08 Marks)

OR

- 10 a. Define specific speed of a centrifugal pump. Derive an expression for the specific speed. (08 Marks)
 b. The following data is given for a Francis Turbine, Net head $H = 60\text{m}$ speed, $N = 700\text{rpm}$; shaft power = 294.3kW ; $\eta_0 = 84\%$, $\eta_4 = 93\%$ flow ratio = 0.20 ; breadth ratio $n = 0.1$; outer diameter of the runner = 2 \times inner diameter of runner. The thickness of vanes occupy 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine :
 i) Guide blade angle
 ii) Runner vane angles at inlet and outlet
 iii) Diameters of runner at inlet and outlet
 iv) Width of wheel at inlet. (08 Marks)

CBCS SCHEME



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15CV/CT44

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Concrete Technology

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Any missing data may be suitably assumed.
3. IS-10262 mix design code is allowed.*

Module-1

- 1 a. Briefly explain the manufacturing of cement by dry process using flow chart. (08 Marks)
- b. What are Bogue's compounds? Briefly explain their contribution towards gaining of strength of cement. (08 Marks)

OR

- 2 a. List the types of cement and briefly explain the properties and application of any four types of cement. (08 Marks)
- b. What are admixtures, classify them and briefly explain their role in concrete technology? (08 Marks)

Module-2

- 3 a. Define workability and briefly explain the factors influencing workability of concrete. (08 Marks)
- b. What are the effect of segregation and bleeding on the property of hardened concrete? (08 Marks)

OR

- 4 a. Explain the process of hydration of cement, its significance and the chemical reactions involved. (08 Marks)
- b. Enumerate the need of compaction in concreting and list the methods of compaction. (08 Marks)

Module-3

- 5 a. List the factors that affect the strength of hardened concrete and explain briefly any two of them. (08 Marks)
- b. Define:
 - i) Elastic strain in concrete
 - ii) Elastic modulus
 - iii) Creep
 - iv) Shrinkage. (08 Marks)

OR

- 6 a. What is maturity of concrete and briefly explain its significance in the gaining of strength of concrete? (08 Marks)
- b. List the tests that can be conducted on hardened concrete to check its strength and explain any one of them. (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-4

7 Design a concrete Mix for M_{xx} grade of concrete as per IS 10262-2009 with following data:

i) Design stipulations

- Characteristic compressive strength required in field at 28 days
- 20 MPa
- Max size of aggregate (angular) - 20mm
- Degree of workability - 0.9 compaction factor
- Degree of quality control - Good
- Type of exposure - Mild

ii) Test data for materials

- Specific gravity of cement - 3.15
- Specific gravity of coarse aggregates - 2.60
- Specific gravity fine aggregates - 2.60
- Water absorption for coarse aggregate - 0.50%
- Water absorption for fine aggregates - 1.0%
- Surface moisture for coarse aggregates - Nil
- Surface moisture for fine aggregates - 2.0%
- Sieve analysis of coarse aggregates - Confirming to table 2 of IS: 383
- Sieve analysis of fine aggregates - Confirming to zone - II of IS: 383

(16 Marks)

OR

8 What is the significance of concrete mix design and explain the steps involved in it?

(16 Marks)

Module-5

- 9 a. Write short notes on : i) Ferro cement ii) Self compacting concrete. (08 Marks)

b. What is RMC? How its manufactured? Explain briefly. (08 Marks)

OR

- 10 a. What is light weight concrete? State its advantages. (08 Marks)

b. Write note on fibre reinforced concrete. (08 Marks)



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Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Basic Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define : i) Void ratio ii) Porosity iii) Degree of saturation iv) Air content. (08 Marks)
 b. Explain the procedure to determine density of soil by core cutter method and sand replacement method. (08 Marks)

OR

- 2 a. Explain Atterberg's limits. (06 Marks)
 b. The liquid and plastic limits of a given soil sample are 65% and 40% respectively. Compute its consistency index, liquidity index, flow index and toughness index. Given that the water content in the soil sample decreases from 80% to 40% for a ten fold increase in the number of blows required to close the groove in the standard liquid limit apparatus. (10 Marks)

Module-2

- 3 a. Explain with neat sketches, the soil structure. (08 Marks)
 b. Describe the three principal clay minerals. (08 Marks)

OR

- 4 a. What are the objectives of compaction? (04 Marks)
 b. List the factors affecting compaction. (04 Marks)
 c. Following are the observations of compaction test:

Water content %	Weight of wet soil (N)
7.7	16.67
11.5	18.54
14.6	19.92
17.5	19.52
19.5	19.23
21.2	18.83

If the volume of compaction mould is 950 CC and $G = 2.65$, determine the dry unit weight and OMC. (08 Marks)

Module-3

- 5 a. Explain the laboratory method of determination of permeability by constant head method and variable head method. (08 Marks)
 b. The following details refer to a test to determine the permeability of soil.
 Thickness of specimen = 25mm
 Diameter of stand pipe = 10mm
 Initial head = 1000mm
 Final head = 800mm
 Determine the permeability of soil. If the void ratio of sample is 0.75, what is the permeability of same soil at a void ratio of 0.9? (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.

OR

- 6 a. What are the important properties of flow nets? (04 Marks)
- b. The porosity of a certain sample of sand was 50% in the loose state and 34% in the dense state. The specific gravity is 2.70. Estimate the critical hydraulic gradients in loose and dense states. (04 Marks)
- c. A clay strata of thickness 8m is located at a depth of 6m below ground surface. It is overlaid by fine sand. The water table is located at a depth of 2m below the ground surface. For fine sand the submerged unit weight is 10.2 kN/m^3 . The moist unit weight of sand located above the water table is 16 kN/m^3 . For clay layer, $G = 2.76$ and water content = 25%. Compute the effective stress at the middle of clay layer. (08 Marks)

Module-4

- 7 a. Explain Mass-Spring analogy. (08 Marks)
- b. What are the assumptions made in Terzaghi's theory of one-dimensional consolidation? (08 Marks)

OR

- 8 a. Explain compressibility of soil and volume change. (04 Marks)
- b. Differentiate between normally consolidated soil and over-consolidated soil. (04 Marks)
- c. A saturated specimen of clay had undergone consolidation under a pressure of 200 kN/m^2 in an oedometer test. The thickness of the specimen was found to be 21.18mm and its water content 12%. Subsequently, with a further increase in pressure of 100 kN/m^2 , the thickness of specimen at the end of 24 hrs was reduced by 1.18mm. Compute the coefficient of volume compressibility and compression index of soil $G = 2.7$. (08 Marks)

Module-5

- 9 a. Explain Mohr's Coulomb's failure theory and draw the failure envelope for different soils. (08 Marks)
- b. What are the factors affecting the shear strength of soil? (04 Marks)
- c. What are the advantages and disadvantages of direct shear test? (04 Marks)

OR

- 10 a. Explain triaxial compression test and what are the advantages of triaxial test. (08 Marks)
- b. Following results are obtained from a direct shear test on a soil at failure,

Normal load (N)	100	200	300	400
Shear load (N)	90	181	270	362

Size of the box = $6 \text{ cm} \times 6 \text{ cm}$. Determine shear strength parameters. (08 Marks)

* * * * *

Module-3

- 5 a. Define the terms:
- The Zenith and Nadir
 - The celestial poles and equator
 - The sensible horizon
 - The visible horizon
 - The altitude (α)
 - Co-latitude. (06 Marks)
- b. Find the shortest distance between two points A and B given that the latitudes of A and B are $15^{\circ} 0' N$ and $12^{\circ} 6' N$ and their longitudes are $50^{\circ} 12' E$ and $54^{\circ} 0' E$ respectively. Find also the direction of B on the great circle route. Radius of Earth = 6370 km. (10 Marks)

OR

- 6 a. State that properties of a spherical triangle. (05 Marks)
- b. Show that one nautical mile is equal to 1.852 km. (04 Marks)
- c. Calculate the distance in kilometers between two points A and B along the parallel of latitude given that:
- Latitude of A, $28^{\circ} 42' N$; longitude of A = $31^{\circ} 12' W$
Latitude of B, $28^{\circ} 42' N$; longitude of B = $47^{\circ} 24' W$
 - Latitude of A; $12^{\circ} 36' S$; longitude of A = $115^{\circ} 6' W$
Latitude of B; $12^{\circ} 36' S$; longitude of B = $150^{\circ} 24' E$. (07 Marks)

Module-4

- 7 a. Define the terms: i) Camera axis; ii) Picture plane; iii) principal plane; iv) print ; v) Fuducial axis; vi) Film base. (06 Marks)
- b. Three points A, B and C were photographed and their coordinates with respect to the lines joining the collimation marks on the photograph are:

Point	x	y
a	-35.52mm	+21.43mm
b	+8.48mm	-16.38mm
c	+48.26mm	+36.72mm

The focal length of lens is 120.80mm. Determine the azimuths of the lines OB and OC if that of OA is $354^{\circ} 30'$. The axis of camera was level at the time of exposure at the station O. (10 Marks)

OR

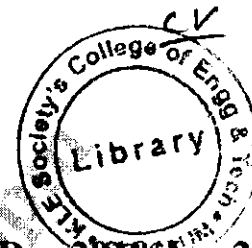
- 8 a. Derive a relation for the scale of a vertical photograph. (06 Marks)
- b. A vertical photograph was taken at an altitude of 1200 metres above the mean sea level. Determine the scale of photograph for terrain lying at elevation of 80 metres and 300 metres, if the focal length of camera is 15cm. (10 Marks)

Module-5

- 9 a. Enumerate three types of measurement of distance with instruments used. (06 Marks)
- b. With sketches explain properties of electromagnetic waves and electromagnetic spectrum. (10 Marks)

OR

- 10 a. Explain the components of GIS. (08 Marks)
- b. Explain the applications of remote sensing in civil engineering. (08 Marks)



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15CV/CT51

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019

Design of RC Structural Elements

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer FIVE full questions, choosing ONE full question from each module.
2. Use of IS456-2000, SP-16 permitted.
3. Assume any missing data suitably.

Module-1

- 1 a. Briefly explain the principles of limit state. (06 Marks)
b. Briefly explain the modes of failure of beam sections with sketches. (06 Marks)
c. What are the causes of cracking in RC members? (04 Marks)

OR

- 2 A simply supported beam has a rectangular section and carries a uniformly distributed load of 20 kN/m over a clear span of 4.5 m. The cross section is 300mm × 550mm and is reinforced with 4 no's of 20 mm diameter bar. Assume cover = 25 mm and bearing = 300 mm. Assuming, M20 grade concrete and Fe415 steel, compute short and long term deflection of the beam. (16 Marks)

Module-2

- 3 a. A Cantilever R.C. beam of span 2 m is rectangular in cross section 230 mm × 380 mm. It is reinforced with 3 – 16 mm diameter bars on tension side. Assume clear cover as 25 mm. M20 grade concrete and Fe415 steel is used. Determine the permissible concentrated load at the free end of Cantilever. (08 Marks)
b. A Doubly reinforced beam section 250 mm wide 500 mm deep to the centre of the tensile reinforcement. It is reinforced with 3 – 16 mm diameter bars as compression reinforcement at an effective cover of 50 mm and 4 bars of 20 mm diameter as tension reinforcement. Determine the moment of resistance of the section. M20 concrete and Fe500 steel is used. (08 Marks)

OR

- 4 a. Determine the minimum effective depth required and the corresponding area of tension reinforcement for a rectangle beam having a width of 200 mm to resist an ultimate moment of 200 kN-m. M20 grade concrete and Fe415 steel is used. (04 Marks)
b. A reinforced concrete beam has a support section with a width of 250 mm and effective depth of 500 mm. The support section is reinforced with 3 bars of 20 mm diameter on the tension side. 2 legged 8 mm diameter stirrups are provided at a spacing of 200 mm centre to centre. Calculate the shear strength of the support section for M20 grade concrete and Fe415 steel. (06 Marks)
c. A singly reinforced slab 120 mm thick is supported by T-beam spaced at 3 m C/C, the effective depth and width of web are 580 mm and 450 mm respectively. Eight HYSD bars of 20 mm diameter have been provided in tension in two layers, with 4 no's in each layer. The effective cover in lower tier is 50 mm. The effective span of simply supported beam is 3.6 m and grade of concrete is M20. Determine the depth of neutral axis and the moment of resistance of T-beams section. (06 Marks)

Module-3

- 5 a. Design the shear reinforcement for an RC beam $300\text{ mm} \times 600\text{ mm}$ effective carrying a uniformly distributed load of 30 kN/m run factored over a span of 6 m supported over 300 mm wide beams. Use M20 grade concrete and Fe415 grade steel. (08 Marks)
- b. Design the reinforcement for tension and compression reinforcement side and its percentage for a doubly reinforced rectangular beam simply supported at both ends. The size of the beam is $300\text{ mm} \times 600\text{ mm}$ effective. Effective cover to compression reinforcement is 50 mm . The ultimate factored total load of 90 kN/m including self weight of beam is acting between the supports of effective span 6.0 m . Grade of concrete and steel are M20 and Fe415. (08 Marks)

OR

- 6 Design one of the intermediate T-beam for a hall measuring $7\text{ m} \times 12\text{ m}$ with beams spaced at 3 m C/C. Depth of slab is 120 mm . Live load on slab is 9.5 kN/m^2 including finishes. Use M20 grade concrete and NYSD bars. (16 Marks)

Module-4

- 7 a. Distinguish between one way and two way slab. (02 Marks)
- b. Design an interior panel of a two-way slab of size $5\text{ m} \times 5\text{ m}$. Live load = 3 kN/m^2 , floor finish = 1 kN/m^2 and bearing = 300 mm . Adopt M20 grade concrete and Fe415 grade steel. Sketch the reinforcement details in plan. (14 Marks)

OR

- 8 The clear dimension of a stair case hall is $2.4\text{ m} \times 4.75\text{ m}$. The floor to floor height is 3.52 m . A two flight dog legged stair is to be provided between the two floors with a rise of 160 mm . Design the stairs and also check for deflection. Sketch the reinforcement details of any one of the flight. (16 Marks)

Module-5

- 9 a. A RCC square column of side 300 mm is reinforced with 4 bars of 16 mm diameter. Determine the allowable service load on the column. M25 grade concrete and Fe500 steel is used. (04 Marks)
- b. A rectangular column of size $300\text{ mm} \times 500\text{ mm}$ is subjected to an axial load of 1200 kN and moment of 30 kN-m acting about an axis bisecting the depth of column. Effective cover = 50 mm . Calculate the necessary reinforcement adopting M20 grade concrete and Fe415 steel. Sketch the reinforcement details. (12 Marks)

OR

- 10 Design a rectangular footing of flat type for a column of size $300\text{ mm} \times 500\text{ mm}$ carrying an axial load of 1200 kN . SBC of soil is 200 kN/m^2 . Adopt M20 concrete and Fe500 steel. Sketch the reinforcement details. (16 Marks)

CBCS SCHEME



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15CV52

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019 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.Q.1 by slope deflection method and draw BMD. (16 Marks)

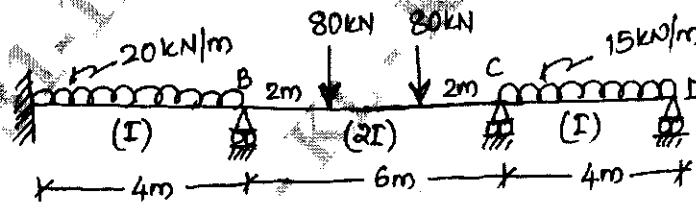


Fig.Q.1

OR

- 2 Analyze the rigid frame shown in Fig.Q.2 by slope deflection method and draw BMD. (16 Marks)

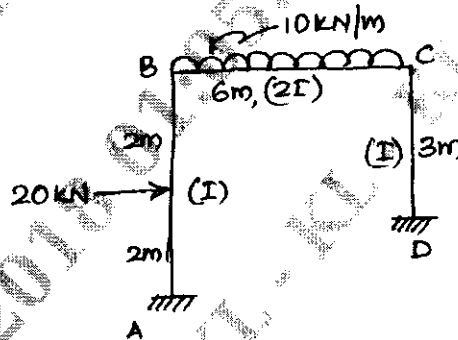


Fig.Q.2

Module-2

- 3 Analyze and draw BMD for the continuous beam shown in Fig.Q.3 by moment distribution method if support 'B' sinks by 30mm and support 'C' sinks by 20mm. Take $EI = 24,000 \text{ kNm}^2$. (16 Marks)

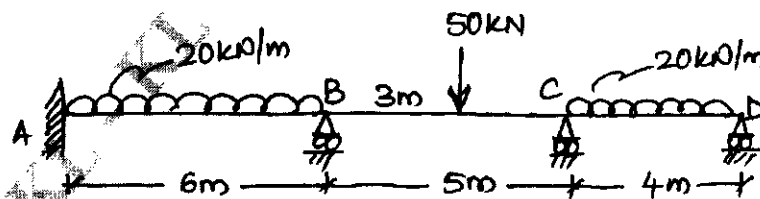


Fig.Q.3

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.

OR

- 4 Analyze the rigid frame shown in Fig.Q.4 by moment distribution method and draw BMD. (16 Marks)

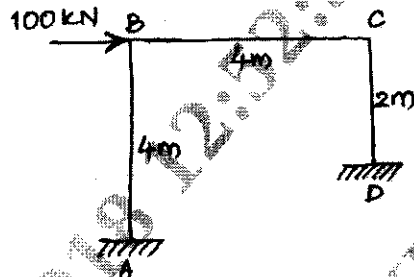


Fig.Q.4

Module-3

- 5 Analyze and draw BMD for the continuous beam shown in Fig.Q.5 by Kani's method, if support 'B' sinks by 10mm and $E = 2 \times 10^5 \text{ N/mm}^2$, $I = 1.2 \times 10^4 \text{ m}^4$. (16 Marks)

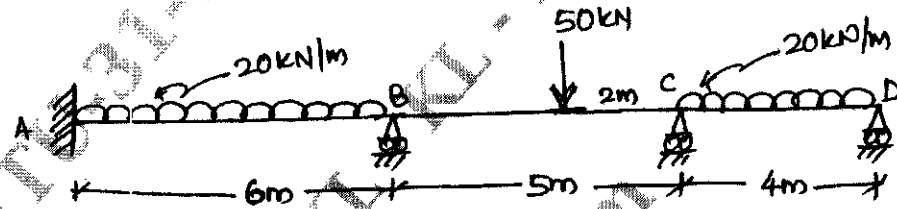


Fig.Q.5

OR

- 6 Analyze the rigid frame shown in Fig.Q.6 by Kani's method and draw BMD. (16 Marks)

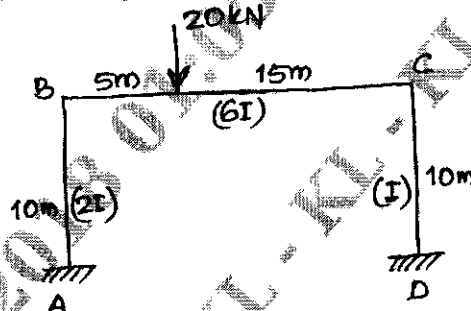


Fig.Q.6

Module-4

- 7 Analyze the continuous beam shown in Fig.Q.7 by matrix flexibility method using system approach and draw BMD. Take moments as redundants. (16 Marks)

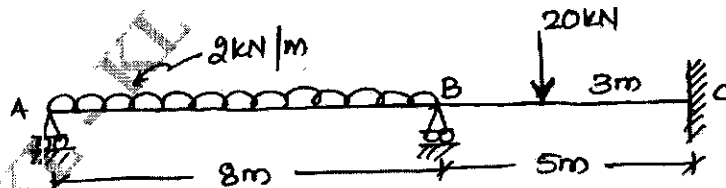


Fig.Q.7



OR

- 8 Analyze the pin-jointed truss shown in Fig.Q.8 by matrix flexibility method of system approach and determine forces in all the members. Take force in member 'OA' as redundant. (16 Marks)

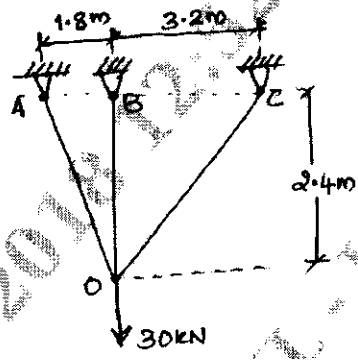


Fig.Q.8

Module-5

- 9 Analyze the rigid frame shown in Fig.Q.9 by matrix stiffness method and draw BMD. (16 Marks)

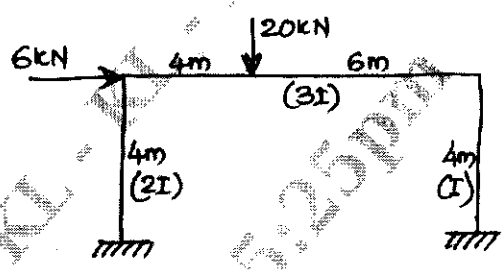


Fig.Q.9

OR

- 10 Analyze the pinjointed frame shown in Fig.Q.10 by matrix stiffness method and find forces in all the members. The numbers in parentheses are the C/S areas of members in sqmm. (Take E = constant). (16 Marks)

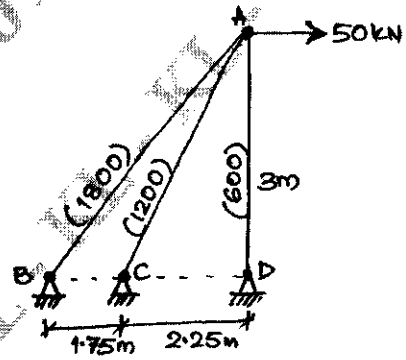


Fig.Q.10

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Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Applied Geotechnical Engineering

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 Stabilization of bore holes? Mention various methods and explain any one method. (06 Marks)
- b. With the help of neat sketch, explain Seismic Refraction method of soil exploration. Using this method, determine the velocity of waves in soil layers and thickness of the top stratum, for the following details

Time (s) :	0.1	0.2	0.3	0.4	0.45	0.50	0.55
Distance (m) :	40	80	120	160	200	240	280

Geophones are placed at a spacing of 40m in a straight line and the time taken for the last wave to be received at each geo - phone is given. (10 Marks)

OR

- 2 a. List and explain types of soil samples. (06 Marks)
- b. Explain the determination of ground water level by Hvorslev's method. Using this method estimate the ground water table level for the following data :
Depth up to which water is boiled out = 15m ; Water rise on first day = 0.80m ;
Water rise on second day = 0.70m ; Water rise on third day = 0.60m. (10 Marks)

Module-2

- 3 a. Explain types of settlements with formulae. (06 Marks)
- b. Define Isobar. Using Boussenesq's equation construct isobar of intensity 0.25 Q (25% isobar), where Q is point load acting on the surface. (10 Marks)

OR

- 4 a. A circular area 6m diameter carries a uniformly distributed load of 10kN/m², determine the vertical stress at a depth of 2m, 4m and 8m. Plot the variation of vertical stress with depth. (06 Marks)
- b. A square footing 1.2m × 1.2m rests on a saturated clay layer 4 deep. $W_L = 30\%$, $\gamma_{sat} = 17.8\text{kN/m}^3$ $W = 28\%$ and $G = 2.68$. Determine the settlement if the footing carries a load of 300kN. (10 Marks)

Module-3

- 5 a. Explain Fellinius method of obtaining centre of critical slip surface in the case of stability analysis of C - ϕ soil. (06 Marks)
- b. A retaining wall of height 10m supports cohesionless soil with the following properties. $G = 2.65$, $e = 0.65$ and $\phi = 30^\circ$, Water table lies at 3m depth. Surface of back fill is horizontal and carries surcharge of intensity 14kN/m². Draw lateral active earth pressure distribution diagram. Determine total active earth pressure and its point of application. (10 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.

- 6 a. Derive equations for the earth pressure coefficients K_a and K_p by considering back fill with horizontal surface. Use Rankine's theory. (06 Marks)
- b. An embankment is to be constructed with a soil having $C = 20\text{kN/m}^2$, $\phi = 10^\circ$ and $\gamma = 19\text{kN/m}^3$. The desired factor of safety with respect to cohesion as well as friction as 1.5. Determine i) Safe height of the desired slope if slope is 2H to 1V. ii) Safe angle of slope if the desired height is 15m. For $\phi = 10^\circ$; Taylor's stability numbers are as follows : (10 Marks)

Stability No :	0.04	0.08
Slope angle (i) :	20	30

Module-4

- 7 a. With the help of sketches, explain effect of water table and eccentric loading on bearing capacity soil. (06 Marks)
- b. A square footing located at a depth of 1.3m below the ground has to carry a load of 800kN. Find the size of footing, if the desirable factor of safety is 3. The soil has the following properties. Void ratio = 0.55 ; degree of saturation = 50% , Specific gravity = 2.67 , Cohesion = 8kPa , Angle of shearing resistance = 30° , $N_c = 37.2$, $N_q = 22.5$ and $N_\gamma = 19.7$. (10 Marks)

OR

- 8 a. Explain Standard Penetration test with suitable corrections. (06 Marks)
- b. A rectangular footing has a size of $1.8\text{m} \times 3\text{m}$ has to transmit the load of a column at a depth of 1.5m. Calculate the safe load which the footing can carry at a factor of safety of 3 against shear failure. Use IS code method. The soil has following properties : $n = 40\%$; $G = 2.67$; $W = 15\%$; $C = 8\text{kN/m}^2$ and $\phi = 32.5^\circ$. (10 Marks)

Module-5

- 9 a. With the help of sketch, explain negative skin friction. (06 Marks)
- b. A 200mm diameter, 8m long piles are used as foundation for a column in a uniform deposit of medium clay having unconfined compressive strength of 100kN/m^2 . The spacing between the piles is 500mm. There are 9 piles in the ground arranged in a square pattern. Calculate the ultimate load capacity of the group. Assume adhesion factor = 0.9 and $N_c = 9$. (10 Marks)

OR

- 10 Write short notes on any four of the following : (16 Marks)
- Efficiency of pile group.
 - Group capacity of piles.
 - Pile load test.
 - Settlement of piles.
 - Under reamed piles.
 - Single loaded pile capacity.



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15CV54

**Fifth Semester B. E. Degree Examination, December 2018
(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. Prepare a working drawing for an isolated rectangular RCC column and footing has the following details:

- Column size: (400 x 600) mm.
- Size of footing: 2m x 3m of uniform thickness 450mm.
- Depth of foundation below GL = 1.5m
- Height of column to be shown above GL = 1.0m
- Thickness of PCC bed in 1:3:6 = 75mm

Details of reinforcement:

- Column: #8 - 16 ϕ as main bars with 2L - 8 ϕ @ 150 c/c lateral ties
- Footing: Longer direction steel - 12 ϕ @ 130 c/c
- Shorter direction steel - 12 ϕ @ 220 c/c

(30 Marks)

OR

Q2. Draw plan and sectional elevation of RCC dog legged staircase for an office building which measures 3m x 5.5m. The vertical distance between the floor is 3.3m (including landing). Thickness of the floor slab is 150mm. Provide steps with tread of 300mm and rise of 150mm. Thickness of waist slab and landing slab is 150mm. Width of stair is 1.5m. Reinforcement details: main steel: 10 ϕ @ 125 c/c spacing and distribution: 8 ϕ @ 250 c/c spacing.

(30 Marks)

Q3. Line diagram of single storey residential building is given in figure Q3. Draw to scale the following:

- a. Plan at sill.
- b. Front elevation.
- c. Section along XX

(50 Marks)

OR

Q4. Line diagram of single storey Hospital building is given in figure Q4. Draw to scale the following:

- a. Plan at sill.
- b. Front elevation.
- c. Section along XX

(50 Marks)

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15CV552

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Railways, Harbours, Tunneling and Airports

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Discuss the significance of road, rail, water and air transport. (06 Marks)
- b. What are the functions and requirements of ballast? (05 Marks)
- c. Illustrate the constituents of right hand turnout in detail. (05 Marks)

OR

- 2 a. Explain the conventional methods of route alignment survey. (08 Marks)
- b. What should be the equilibrium Cant on a M.G curve of 5° for an average speed of 60 kmph? Also find out the maximum permissible speed after allowing the maximum Cant deficiency. (08 Marks)

Module-2

- 3 a. Describe the stabilization of track on poor soil. (08 Marks)
- b. Explain the modern methods of maintenance of railway track. (08 Marks)

OR

- 4 a. Define yards. Explain the types of yards. (08 Marks)
- b. Evaluate the quantity of materials required to construct 1.5km long BG track. Take sleeper Density = $(m + 6)$, Length of Rail = 13m. (08 Marks)

Module-3

- 5 a. List and briefly explain the classification of harbour based on protection needed, and location. (08 Marks)
- b. Define tunnel. Explain the shapes of tunnel with neat sketch. (08 Marks)

OR

- 6 a. Describe the components of harbour with neat sketch. (08 Marks)
- b. Write a note on tunnel ventilation and tunnel lining. (08 Marks)

Module-4

- 7 a. Discuss the characteristics of air transport? (04 Marks)
- b. Enumerate the classification of airports based on ICAO and FAA. (06 Marks)
- c. Mention the objectives of airport planning. (06 Marks)

OR

- 8 a. Sketch the typical airports showing different types of runways. (08 Marks)
- b. Explain the various factors which you would keep in view while selecting a suitable site for an airport. (08 Marks)

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-5

- 9 a. Define orientation of runway. Briefly explain the procedure of plotting Type-II wind Rose diagram. (08 Marks)
- b. Explain the different types of Markings used in airport. (08 Marks)

OR

- 10 a. Describe the elements of taxiway geometric design. (08 Marks)
- b. Calculate the actual length of runway from the following data:
- (i) Airport elevation : R.L 100
 - (ii) Airport Reference Temperature : 28°
 - (iii) Basic Runway length : 600 m
 - (iv) Highest Point along the length : R.L 98.2
 - (v) Lowest point along the length : R.L 95.2
- (08 Marks)

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Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Masonry Structures

Time: 3 hrs.

Max. Marks: 80

**Note: 1. Answer FIVE full questions, choosing one full question from each module.
2. Use of IS1905 – 1987 code is permitted.**

Module-1

- 1 a. Briefly explain the various defects and errors in masonry construction. (08 Marks)
 b. Explain in detail the properties of mortar. (08 Marks)

OR

- 2 a. Explain the qualities of good building stone and brick used in masonry. (08 Marks)
 b. Explain : (i) Effect of workmanship on masonry strength. (08 Marks)
 (ii) Initial rate of absorption.

Module-2

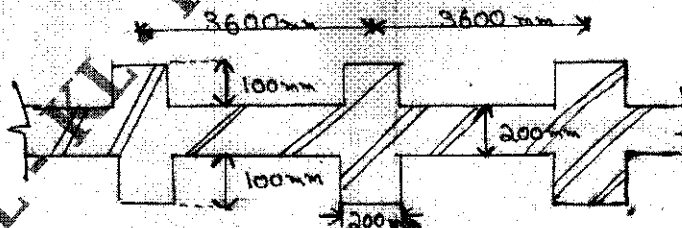
- 3 a. Explain the following types of masonry elements (i) Solid wall (ii) Faced wall (iii) Cavity wall (iv) Panel wall. (08 Marks)
 b. A solid wall of thickness 100 mm is constructed with brick units of 10 N/mm² and M1 type of mortar. Ceiling height of wall is 3 m. Load acts axially. End of the walls are fully restrained at top and bottom. Determine
 (i) Effective height (ii) Effective thickness (iii) Slenderness ratio
 (iv) Eccentricity (v) Stress modification factor (vi) Area reduction factor
 (vii) Shape modification factor (viii) Permissible compressive stress (08 Marks)

OR

- 4 a. Explain the following :
 (i) Area reduction factor.
 (ii) Effective length.
 (iii) Slenderness ratio.
 (iv) Effective height. (08 Marks)
 b. Write a short note on load dispersion and arching action in masonry. (08 Marks)

Module-3

- 5 a. List the steps involved in the design of cavity walls (without eccentricity). (06 Marks)
 b. Design an interior wall of a single storeyed workshop of height 5.4 m supporting a RCC roof. The bottom of the wall rests over a foundation block. Assume roof load equal to 45 kN/m. Refer Fig. Q5 (b). (10 Marks)



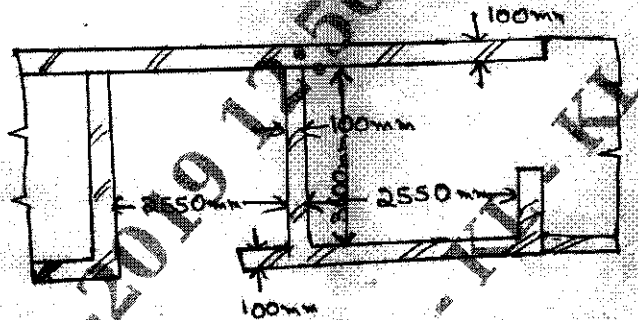
Solid wall with piers
Fig. Q5 (b)

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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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OR

- 6 Design an interior wall of a two storeyed building with RCC slabs of effective span 2.65 m. The wall is 3.6 m long and is stiffened at the ends by 100 mm thick intersecting walls. The ceiling height of each floor is 3 m. Refer Fig. Q6. (16 Marks)



Solid wall supported at the ends by cross walls

Fig. Q6

Module-4

- 7 a. Design an interior wall of a two storeyed wall carrying concrete slabs with a storey height of 3 m. The wall is stiffened by 100 mm thick intersecting walls at 3600 mm c/c. Also the wall has a door opening of size 900×2000 mm at a distance of 200 mm from one of the intersecting walls. Assume loading as follows:
 (i) Roof loading = 15 kN/m
 (ii) Floor loading = 12.5 kN/m (10 Marks)
- b. With neat sketch, explain various stress distribution under eccentric loads. (06 Marks)

OR

- 8 Design an interior cavity wall of a two storeyed building carrying eccentric load due to unequal short spans of roof/ floor of 4 m and 3 m on either side of the wall. The height of each storey is 3 m. Assume intensity of loading as follows:
 (i) From roof = 6 kN/m²
 (ii) From floor = 4 kN/m²
 Assume overall thickness = 250 mm (cavity wall). Each leaf being 100 mm thick. (16 Marks)

Module-5

- 9 a. Design an solid wall under wind loading of a single storey warehouse of 3.5 m height. The loading on the wall consists of vertical load of 25 kN/m from the roof and wind pressure of 860 N/m². The wall is tied with metal anchor at the floor and roof levels. (12 Marks)
- b. Explain the various modes of failures of infilled frames. (04 Marks)
- OR
- 10 a. List the steps involved in the design of compound wall. (08 Marks)
- b. List the steps involved in the design of a shear wall under seismic loading. (08 Marks)



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Fifth Semester B.E. Degree Examination, Dec 2018/Jan.2019 Remote Sensing and GIS

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define Remote Sensing. Explain the process of remote sensing with neat sketch. (08 Marks)
- b. Describe the Electromagnetic spectrum with a neat sketch. (08 Marks)

OR

- 2 a. Explain the energy interactions with earth surface features (soil, water and vegetation) with a neat sketch. (06 Marks)
- b. Define Visual Interpretation. Enumerate different types of elements considered during visual interpretation process. (10 Marks)

Module-2

- 3 a. Explain different types of IRS series satellites used in remote sensing. (08 Marks)
- b. Explain different types of sensors used in remote sensing. (08 Marks)

OR

- 4 a. Explain different types of sensor resolutions in remote sensing. (08 Marks)
- b. Illustrate Radiometric and Geometric corrections in digital image processing. (08 Marks)

Module-3

- 5 a. Define GIS. Describe the key components of GIS software. (08 Marks)
- b. Describe different types of Data types used in GIS data models. (08 Marks)

OR

- 6 a. Explain different types of coordinate systems used in GIS. (08 Marks)
- b. Describe different types of map projections used in GIS. (08 Marks)

Module-4

- 7 a. Explain topological model of vector data overlay concept. (08 Marks)
- b. Explain the creation of shape file in vector data model. (08 Marks)

OR

- 8 a. Describe Raster data GIS models with sketch. (08 Marks)
- b. Explain advantages and disadvantages of Raster data. (08 Marks)

Module-5

- 9 a. Explain the role of Remote sensing in monitor of land use changes. (08 Marks)
- b. Explain the application of Remote Sensing and GIS in water resources management. (08 Marks)

OR

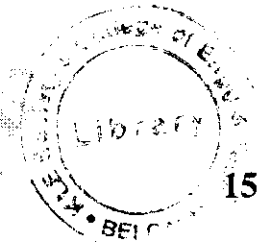
- 10 a. Explain the applications of RS and GIS for natural resources management system. (08 Marks)
- b. Describe the application of RS and GIS in the field of Urban planning. (08 Marks)

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15CV564

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019

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. Outline the purpose of Occupational Safety and Health Act of India. (08 Marks)
b. Explain the history of Safety development. (08 Marks)

OR

- 2 a. Define i) Accident ii) Hazard iii) Risk. (03 Marks)
b. Write a short note on 3E's of safety. (03 Marks)
c. Explain the various methods of Accident Investigation. (10 Marks)

Module-2

- 3 a. Define 'Ergonomics'. Discuss the elements of OSHA's Ergonomic guidelines. (10 Marks)
b. Discuss the hazard preventions and control methods. (06 Marks)

OR

- 4 a. Define i) Human error analysis ii) Fault tree analysis. (08 Marks)
b. Write a brief note on Worksite analysis programme for Ergonomics. (08 Marks)

Module-3

- 5 a. Define Fire and discuss the classification of fire. (08 Marks)
b. Discuss the i) Effect of enclosure ii) Early detecting of fire. (08 Marks)

OR

- 6 a. List and explain the various methods of extinguishing fire. (08 Marks)
b. Discuss the management of electrical safety. (08 Marks)

Module-4

- 7 a. Discuss about the health problems at work place. (08 Marks)
b. Explain the necessary actions to be implemented at work place. (08 Marks)

OR

- 8 a. Explain the different types of personal protective equipment. (08 Marks)
b. Discuss the Environment Management plan for safety and sustainability. (08 Marks)

Module-5

- 9 a. Explain the preventive measures for safety in construction industry. (08 Marks)
b. Discuss the Safety and Health in wastewater treatment plants. (08 Marks)

OR

- 10 a. Discuss the roles and responsibilities of Managers in construction industry. (08 Marks)
b. Discuss the handling of chemicals in laboratories. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019

Highway Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain various characteristics of Road Transport. (05 Marks)
- b. Explain briefly the salient features of third twenty year road development plan. (05 Marks)
- c. There are three alternate proposals of road plans for a district in Karnataka state. Suggest the order of priority for planning road based on the maximum utility approach. Assume utility units of 0.5, 1.0, 2.0 for the three population ranges and utility of 1.0 and 10.0 per 1000 tonnes of agricultural and industrial products served.

Proposal	Road length in km	Number of villages served pollution range			Productivity in 1000 tonnes	
		<2000	2001-5000	>5000	Agriculture	Industrial
A	200	80	40	10	90	12
B	250	75	45	12	105	22
C	300	85	50	18	110	26

(06 Marks)

OR

- 2 a. Explain the role of transportation in social and economic development of the country. (05 Marks)
- b. Explain briefly the following :
(i) Jayakar Committee (ii) Indian Road Congress (IRC) (iii) Central Road Fund (CRF) (05 Marks)
- c. The area of a certain district in India is 13,400 sq.km and there are 12 towns as per 1981 census. Determine the lengths of different categories of roads to be provided in third twenty year road development plan. (06 Marks)

Module-2

- 3 a. What are the basic requirements of an ideal highway alignment? List and explain briefly. (05 Marks)
- b. Briefly explain the role of pavement surface characteristics in highway geometric design. (05 Marks)
- c. Calculate the safe stopping sight distance for design speed of 50 kmph. For (i) Two way traffic on two lane road (ii) Two way traffic on a single lane road. Assume $f = 0.37$ and reaction time, $t = 2.5$ sec. (06 Marks)

OR

- 4 a. Briefly explain how MAP study is helpful in the alignment of new highway. (05 Marks)
- b. Give the details of drawings to be prepared in highway project and discuss briefly. (05 Marks)
- c. The radius of a horizontal circular curve is 100 m. The design speed is 50 kmph and the design co-efficient of lateral friction is 0.15.
(i) Calculate the super elevation required if full lateral friction is assumed to develop
(ii) Calculate the co-efficient of friction needed if no super elevation is provided.
(iii) Calculate the equilibrium super-elevation if the pressure on inner and outer wheels should be equal. (06 Marks)

1 of 2

Module-3

- 5 a. List and explain the desirable properties of subgrade soil. (05 Marks)
 b. List and explain the various design factors to be considered for pavements. (05 Marks)
 c. A load penetration values of CBR tests conducted on a specimen of a soil sample are given below. Determine the CBR value of soil, if 100 divisions of load represents 190 kg and in the calibration chart of proving ring. (06 Marks)

Penetration of plunger, in mm	0.0	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	7.5	10.0	12.5
Load dial readings (Divisions)	0	8	16	23	29	34	37	43	48	57	63	67

OR

- 6 a. Explain the desirable properties of aggregates to be used in pavement construction. (05 Marks)
 b. Explain the significance of ESWL in pavement design. (05 Marks)
 c. Calculate the stresses at interior, edge and corner regions of a cement concrete pavement using Westergaard's stress equation. Use the following data; wheel load, $P = 5100$ kg, Modulus of elasticity, $E = 3 \times 10^5$ kg/cm², Pavement thickness, $h = 18$ cm, Poisson's ratio of concrete, $\mu = 0.15$, Modulus of subgrade reaction, $k = 6$ kg/cm³, Radius of contact area, $a = 15$ cm. (06 Marks)

Module-4

- 7 a. Briefly explain the different types of pavement construction. (08 Marks)
 b. Explain the construction steps for cement concrete pavement slab. (08 Marks)

OR

- 8 a. Explain the construction steps for water bound macadam roads. (08 Marks)
 b. Write a short note on the following :
 (i) Bituminous macadam (ii) Bituminous concrete (iii) Prime coat (iv) Seal coat (08 Marks)

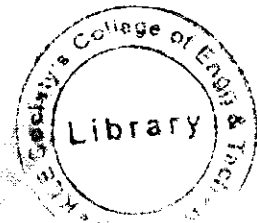
Module-5

- 9 a. What are the requirements of highway drainage system? (05 Marks)
 b. Explain the various road user benefits of highway improvements. (05 Marks)
 c. The maximum quantity of water expected in one of the open longitudinal drain on clayey soil is 0.9 m³/sec. Design the cross-section of trapezoidal drain, assuming the bottom width of the trapezoidal section to be 1 m and cross slope to be 1 vertical to 1.5 horizontal. The allowable velocity of flow in the drain is 1.2 m/sec. (06 Marks)

OR

- 10 a. Briefly explain the types of cross drainage structures. (05 Marks)
 b. Describe the various methods of economic analysis of a highway. (05 Marks)
 c. Compare the annual costs of two types of pavement structures (i) WBM with thin bituminous surface at total cost of Rs.2.2 lakhs per km, life of 5 years, interest at 10%, salvage value of Rs.0.9 lakhs after 5 years; Annual average maintenance cost of Rs. 0.35 lakhs per km and (ii) Bituminous macadam base and bituminous concrete surface, total cost of Rs. 4.2 lakhs per km, life of 15 years, interest at 8%, salvage value of Rs. 2 lakhs at the end of 15 years ; Annual average maintenance cost Rs.0.25 lakhs per km. (06 Marks)

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15CV651

Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Solid Waste Management

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. With a neat schematic diagram, explain the functional elements of solid waste management. (10 Marks)
- b. Estimate the energy content of a solid waste sample in unit energy on dry basis and ash free dry basis, assume ash 5%.

Component	% by mass	% moisture content	Energy (kJ/kg)
Food waste	15	70	4650
Paper	45	06	16750
Card board	10	05	16300
Plastics	10	02	32600
Garden trimming	10	60	6500
Wood	05	20	18600
Tincans	05	03	700

(06 Marks)

OR

- 2 a. With a neat schematic diagram explain
i) Hauled container system
ii) Stationary container system. (10 Marks)
- b. An area consisting of 1000 houses of average 5 person per home is contributing solid waste to a transfer station designed for a week. The waste is carried in 2 types of vehicle i.e., compactor trucks and flat bed trucks whose volume are 15 and 1.15 m³ with their densified of the material is 400 and 50 kg/m³ respectively. Assuming 10 compactor trucks loads and 40 flat bed trucks loads per weeks. Estimate the unit waste generation rate. (06 Marks)

Module-2

- 3 a. Explain the following processing techniques briefly:
i) Mechanical volume reduction
ii) Mechanical size reduction. (10 Marks)
- b. Explain chemical volume reduction. (06 Marks)

OR

- 4 a. Give list of component separation techniques, explain them. (10 Marks)
- b. What are 3T's of incineration process? Explain them. (06 Marks)

Module-3

- 5 a. Explain the following composting methods:
i) Bangalore method
ii) Indore method. (10 Marks)
- b. With a neat sketch, explain the trench method of sanitary land filling. (06 Marks)

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.

OR

- 6 a. Discuss the important affecting the aerobic composting process. (10 Marks)
b. Determine the landfill area required for municipality with a population of 50,000 given that solid waste generation = 360gm/person/day compacted density of landfill = 504 kg/m³. Average depth of compacted solid waste = 3m (06 Marks)

Module-4

- 7 a. Explain briefly the bio medical waste classification and disposal techniques. (10 Marks)
b. Write a note on: i) Hazardous waste; ii) Construction waste. (06 Marks)

OR

- 8 a. Explain the Cell vent and Well vent methods of controlling gas movement in land fills. (08 Marks)
b. Define E-waste. List the sources and disposal methods of E-waste. (08 Marks)

Module-5

- 9 Explain any four types of incinerators. (16 Marks)

OR

- 10 a. Define pyrolysis. With the help of flow chart explain the process of pyrolysis. (08 Marks)
b. Explain the various factors to be considered in selection of a site for sanitary land fill. (08 Marks)

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15CV661

Sixth Semester B.E. Degree Examination, Dec.2018/Jan.2019

Water Resources Management

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain Hydrologic cycle, with neat sketch. (08 Marks)
- b. What is an Aquifer? Explain various types of aquifers with sketches. (08 Marks)

OR

- 2 a. What is Scarcity of water? Give causes and effects of scarcity of water. (08 Marks)
- b. Write a detailed note on Indian water resources. (08 Marks)

Module-2

- 3 a. Explain the need of Water Resources Management. (06 Marks)
- b. Give three approaches of planning. Discuss the advantages of each one. (10 Marks)

OR

- 4 a. List various aspects of planning of water resources. Explain in detail. (08 Marks)
- b. In adaptive integrated policies, which are the questions to be answered by the planners and managers? (08 Marks)

Module-3

- 5 a. Give Integrated Water Resources Management (IWRM) definition as put up by Global Water partnership (GWP). Also give Dublin principles. (08 Marks)
- b. Explain types and forms of private sector involment in IWRM. (08 Marks)

OR

- 6 a. Explain the frame work of IWRM, developed by GWP, consisting of three 'E's. (08 Marks)
- b. Give IWRM tools of implementation. (08 Marks)

Module-4

- 7 a. Write in detail about National Water policies. (08 Marks)
- b. Give a broad roadmap for implementation of water policies. (08 Marks)

OR

- 8 a. Write a note on "the role of community based organization" in WRM. (08 Marks)
- b. Explain Water laws, Policies and Administration in India. (08 Marks)

Module-5

- 9 a. Explain various methods of Rain water harvesting. (08 Marks)
- b. Write in detail about Micro catchment, with neat sketch. (08 Marks)

OR

- 10 a. Give details of farm pond, as a water harvesting structure. (08 Marks)
- b. How percolation tanks help in water harvesting? Give the design considerations for the same. (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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15CV71

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Municipal and Industrial Wastewater Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain the need for Good sanitation. Describe types of sewerage system and their suitability. (10 Marks)
- b. Explain factors affecting wet weather flow and the effects of flow variations on the design of sewerage system. (06 Marks)

OR

- 2 a. Define Sewer Appurtenances and explain with neat sketch construction and working of manhole. (06 Marks)
- b. What do you understand by the term Low – cost treatment? (02 Marks)
- c. Explain the following with sketches : (08 Marks)
 - i) Septic tank
 - ii) Oxidation pond.

Module-2

- 3 a. Explain briefly the dilution method of disposal of sewage. What are the factors which influence the choice of the method to be adopted? (06 Marks)
- b. Design a sewer to serve a population of 36,000, the daily per capita water supply allowance being 135 lt, of which 80%, find its way into the sewer. The slope available for the sewer to be laid is 1 in 625 and the sewer should be designed to carry four times the dry weather flow, when running full. What would be the velocity of flow in the sewer when running full? (10 Marks)

OR

- 4 a. Discuss in details the process Deoxygenation and Reoxygenation with respect to self – purification of Natural water with a neat sketch. (08 Marks)
- b. Write short notes on : (08 Marks)
 - i) Sewage sickness
 - ii) Sewage farming.

Module-3

- 5 a. Write the flow diagram employed for a municipal wastewater treatment plant. Indicate the importance of each unit indicated in the flow diagram. (10 Marks)
- b. Explain the importance of screens and types of screens in the sewage treatment process. (06 Marks)

OR

- 6 a. Determine the size of the High rate Tricking Filters for the following data : (08 Marks)
 - i) Sewage flow = 4.5 MLD
 - ii) Recirculation ratio = 1.5
 - iii) BOD of Raw sewage = 250 mg/L
 - iv) BOD removal in primary tank = 30%.
 - v) Final effluent BOD desired = 30 mg/L.
- b. Explain briefly the different stages of sludge digestion process in a “Digester”. With a neat sketch, explain the constructional details of sludge digestion tank. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-4

- 7 a. Differentiate between Domestic sewage and Industrial waste. (08 Marks)
b. Explain the methods used for Neutralization of Acidic and Alkaline waste. (08 Marks)

OR

- 8 a. Briefly explain the effects of Industrial wastewater on sewage treatment plants. (08 Marks)
b. Explain different methods of Strength Reduction. (08 Marks)

Module-5

- 9 a. With process flow diagram, explain the cotton textile mill wastes origin. (08 Marks)
b. Enumerate the effects of discharging paper and pulp industrial wastes into water bodies or sewers. (08 Marks)

OR

- 10 a. With process flow diagram, explain the origin of wastes from Cane Sugar mill. List its characteristics. (08 Marks)
b. With a flow diagram, explain the units used for treatment of Dairy waste on receiving stream. (08 Marks)

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15CV72

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019

Design of RCC and Steel Structures

Time: 3 hrs.

Max. Marks: 80

- Note:** 1. Answer any TWO full questions, choosing one full question from each module.
 2. Use of IS-456, IS-800 SP (6) and Steel tables are permitted.

Module-1

- 1 Design a slabtype rectangular combined footing for two columns of size 300mm × 450mm and 300mm × 600mm, subjected to axial loads of 650 kN and 900 kN respectively. The columns are spaced at 3.6 m c/c. The width of the footing is restricted to 1.8 m. Use M20 grade concrete and Fe415 grade steel. Assume SBC of soil = 160 kN/m². (40 Marks)

OR

- 2 Design a Cantilever retaining wall to retain an earth embankment with a horizontal top 3.50 m above ground level. The unit weight of back fill is 18 kN/m³. Angle of internal friction $\phi = 30^\circ$. SBC of soil = 180 kN/m². Take coefficient of friction between soil and concrete = 0.55. Adopt M20 grade concrete and Fe415 grade steel. Depth of foundation = 1.0 m. (40 Marks)

Module-2

- 3 Design a roof truss shown in Fig. Q3 with forces in each member of the truss are given in table Q3. The size of RC column supporting the truss is 300mm × 300mm. Use M20 grade concrete for column. Design the truss using bolt of M16, property class 4.6 for connections and also design anchor bolts. (40 Marks)

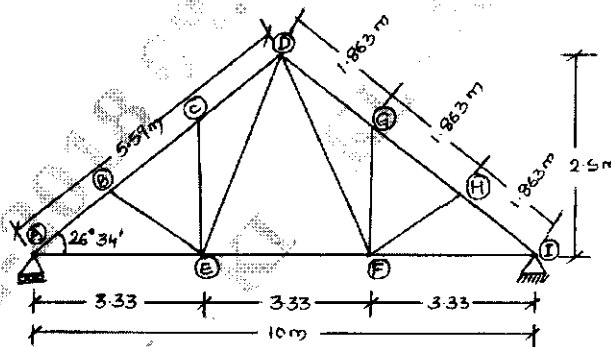


Fig. Q3

Member	Design force in kN	
	Compression	Tension
Top chord member	54.25	-
Bottom chord member	-	48.31
Diagonal member (DF, DE)	14.35	-
Member BE, HF	-	24.50
Member CE, GF	12.40	-

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

- 4 Design a simply supported crane gantry girder for the following data: The crane is electrically operated. Yield stress of steel is 250 N/mm^2 .
- (i) Span of Crane girder = 20 m
 - (ii) Effective span of gantry girder = 7.4 m
 - (iii) Capacity of crane = 220 kN.
 - (iv) Self weight of Crane girder excluding crab = 200 kN.
 - (v) Weight of Crab = 60 kN.
 - (vi) Wheel base distance = 3.4 m
 - (vii) Minimum hook approach = 1.2 m.
 - (viii) Self weight of rail = 300 N/m
 - (ix) Height of rail = 75 mm

Gantry girder is to be supported on RCC column bracket of size $300\text{mm} \times 450\text{mm}$. Size of column $300\text{mm} \times 600\text{mm}$. (40 Marks)



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15CV73

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019

Hydrology and Irrigation Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. With engineering representation, explain hydrologic cycle along with processes involved in it. (06 Marks)
- b. Explain how consistency of rainfall data is checked using double mass curve technique. (05 Marks)
- c. The average annual rainfall of 5 raingauge stations in a basin are 89, 68, 54, 45, 41 and 55 cm. If the error in the estimation of basin rainfall should not exceed 10%. How many additional raingauges should be installed in the basin. (05 Marks)

OR

- 2 a. Define precipitation. List its types and explain with neat sketch how its amount is measured using Symon's raingauge. (08 Marks)
- b. What are the importances of hydrology? With neat sketch explain mass curve of rainfall and rainfall hyetograph. (08 Marks)

Module-2

- 3 a. Explain how evaporation amount is measured using IS class-A pan? List the factors affecting it. (08 Marks)
- b. What is evapotranspiration? Write its measurement using Lysimeter method, with sketch. (05 Marks)
- c. List the factors affecting evapotranspiration. Write Blaney-Criddle equation used to estimate ET. (03 Marks)

OR

- 4 a. Define infiltration. With neat sketch, explain double ring infiltrometer. (06 Marks)
- b. Write a Horton's infiltration equation used to estimate infiltration rate. (02 Marks)
- c. For a storm of 3 hr duration the rainfall rates are as follows:

Time Period (minutes)	30	30	30	30	30	30
Rainfall rate (cm/hr)	1.4	3.4	4.8	3.2	2.0	1.2

If the surface run off is 3.4 cm determine the ϕ -index and W-index assume initial ϕ -index is more than 1.4 cm/hr. (08 Marks)

Module-3

- 5 a. What is runoff? List and explain factors affecting it. (08 Marks)
- b. Define hydrograph. With sketch explain component parts of hydrograph. (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.

OR

- 6 a. The hourly ordinates of a two hour unit hydrograph are given below. Derive a 6-hours unit hydrograph for the same catchment. (08 Marks)

Time (hours)	00	01	02	03	04	05	06	07
Discharge (Cumecs)	00	1.0	2.7	5.0	8.0	9.8	9.0	7.5

Time (hours)	08	09	10	11	12	13	14	15
Discharge (Cumecs)	6.3	5.0	4.0	2.9	2.1	1.3	0.5	00

- b. Find out the ordinates of a storm hydrograph resulting from a 3 hour storm with rainfall of 3, 4.5 and 1.5 cm during subsequent 3 hour intervals. The ordinates of unit hydrograph are given in the table below.

Hours	00	03	06	09	12	15	18
OVH (cumecs)	00	90	200	350	450	350	260

Hours	21	24	03	06	09	12
OVH (cumecs)	190	130	80	45	20	00

- Assume an initial loss of 5 mm infiltration index of 5 mm / hr and base flow of 20 cumecs. (08 Marks)

Module-4

- 7 a. Define Irrigation. List and explain benefits and ill effects of irrigation. (08 Marks)
b. What are Duty, delta and base period? Explain factors affecting Duty of water. (08 Marks)

OR

- 8 a. What is Irrigation efficiency? Define different efficiencies of Irrigation water. (05 Marks)
b. What are flow Irrigation and Lift Irrigations. Explain types of flow irrigations. (08 Marks)
c. (i) Give relationship between Duty, delta and base period.
(ii) Write a short note on frequency of Irrigation. (03 Marks)

Module-5

- 9 a. What is canal? List its types and explain with neat sketch its classification based on Alignment. (08 Marks)
b. Explain different storage zones of reservoir with neat sketch. (08 Marks)

OR

- 10 a. The Channel section is to be designed for the following data:

Discharge, $Q = 5$ cumecs

Lacey's silt factor, $f = 1$

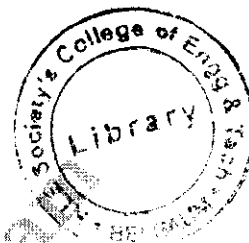
Side slope = $1\frac{1}{2} H$ to $1 V$

Also determine the bed slope of the channel. (08 Marks)

- b. Explain hydrological investigations of reservoir planning. List the points to be considered for selection of site for a reservoir. (08 Marks)

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15CV741

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019

Design of Bridges

Time: 3 hrs.

Max. Marks: 80

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS-456, IRC-5, IRC-6, IRC-21, IS1343, pigeaud's curves and relevant charts allowed.*

Module-1

- 1 a. How are the bridges classified, briefly explain. (10 Marks)
b. List the various loads to be considered in the design of bridges. (06 Marks)

OR

- 2 Briefly explain the following terms: (16 Marks)
i) Linear waterway
ii) Economic span
iii) Afflux
iv) Scour Depth.

Module-2

- 3 Design a deck slab for the following details: (16 Marks)
Carriage way = Two lane (7.5m wide)
Foot paths = 1m on either side
Clear span = 6m
Wearing coat = 80mm
Width of bearing = 400mm
Materials : M25 grade concrete and Fe415 grade HYSD bars
Loading : IRC class AA tracked vehicle.

OR

- 4 Design a SKEW slab culvert to suit the following data: (16 Marks)
Clear span = 6m
Width of bearing = 370mm
Width of carriage way = 7.5m
Overall depth of slab = 540mm
Wearing coat = 80mm
Skew angle = 30°
Loading : IRC class AA tracked vehicle
Materials : M20 grade concrete and Fe415 HYSD bars.

Module-3

- 5 Design the 'Deck slab only' for the T-beam bridge for the following data: (16 Marks)
Effective span = 16m; Live Load – IRC class AA tracked; Materials – M25 grade concrete and Fe415 steel; spacing of the cross girders 4m c/c ; width of carriage way = 7.5m ; thickness of wearing coat = 80mm ; Kerbs on either side = 600mm wide × 300mm deep ; width of main girder = 300mm ; width of cross girder = 300mm ; spacing of main girders = 2.5m c/c ; sketch reinforcement details.

1 of 2

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

- 6 Design T-beam bridge "cross girder" for the data given in Q5 and sketch the reinforcement details. (16 Marks)

Module-4

- 7 Design a Reinforced concrete box culvert having a clear vent way 3m by 3m. The super imposed dead load on the culvert is 12.8 kN/m^2 . The Live Load is estimated as 50 kN/m^2 . Density of soil at site is 18 kN/m^3 . Angle of repose = 30° . Adopt M20 grade concrete and Fe415 steel. Sketch the details of reinforcement. (16 Marks)

OR

- 8 Design a suitable reinforced concrete pipe culvert to suit following data:

Discharge through pipe culvert = $1.57 \text{ m}^3/\text{s}$

Velocity of flow through pipe = 2 m/s

Width of road = 7.5 m

Top width of embankment = $1.5:1$

Bed level of stream = 100.00 m

Top of embankment = 103.00 m

Loading : IRC class AA Wheeled vehicle.

(16 Marks)

Module-5

- 9 Verify the stability of the abutment shown in Fig.Q.9. The other salient details are given below:

Material = Concrete

Density of soil = 18 kN/m^3

Coefficient of friction = 0.6

Angle of repose of soil = $\phi = 30^\circ$

Live Load on bridge = IRC class AA tracked

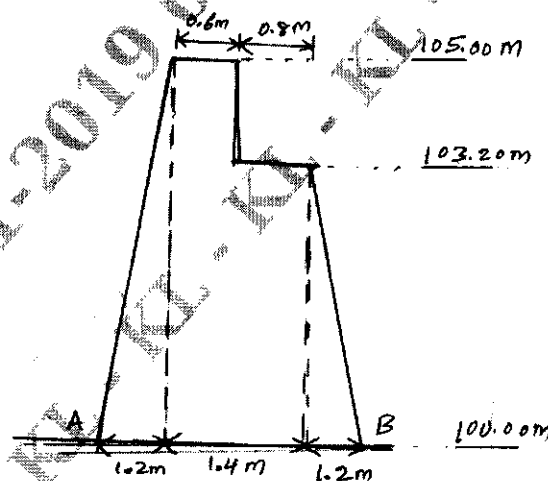
Span of bridge = 15 m

Angle of friction between the soil and concrete = 18°

The bridge deck consists of three longitudinal girders of 1.4 m depth with a deck slab of 200 mm depth.

(16 Marks)

Fig.Q.9



OR

- 10 Write short notes on:

- Bridge bearings
- Hinges
- Expansion Joints

(16 Marks)

2 of 2

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Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019

Ground Water and Hydraulics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain the vertical distribution of ground water with a neat sketch. (06 Marks)
- b. Define the terms : i) Juvenile water ii) vadose water iii) connate water iv) meteoric water. (06 Marks)
- c. Write a note on the importance of ground water. (04 Marks)

OR

- 2 a. What is an aquifer? Explain the different types of aquifers with neat sketches. (12 Marks)
- b. Define the terms : i) aquifuge ii) aquiclude with example. (04 Marks)

Module-2

- 3 a. Explain Darcy's Law and discuss the validity and limitations. (06 Marks)
- b. Explain storage coefficient with a neat diagram and derive an expression for storage coefficient of an confined aquifer. (10 Marks)

OR

- 4 a. What is permeability? Explain the determination of permeability by constant head permeameter. (08 Marks)
- b. An artesian aquifer of 20m thick has a porosity of 20% and bulk modulus of compression 10^8 N/m^2 . Estimate the storage coefficient of the aquifer. What fraction of this is attributable to the expansibility of the water? Take elasticity of water $K_w = 2.13 \times 10^9 \text{ N/m}^2$. (08 Marks)

Module-3

- 5 a. Derive an equation for discharge for the case of steady radial flow into an unconfined aquifer using Dupuit's theory. List the assumptions and limitations. (12 Marks)
- b. A tube well of 300mm diameter penetrates fully a confined aquifer. The length of the strainer is 25m. Calculate the yield from the well under a drawdown of 4m. The coefficient of permeability of aquifer is 50m/day. Assume radius of circle of influence $R = 200\text{m}$. (04 Marks)

OR

- 6 a. Explain Thei's method to determine aquifer constants S and T for unsteady radial flow towards well. (10 Marks)
- b. A well is located in a 25m confined aquifer of permeability 30m/day and storage coefficient 0.005. If the well is being pumped at the rate of 1750 liters per minute, calculate the drawdown at a distance of 100m from the well after 20hrs of pumping. Take $W(u) = 3.35$. (06 Marks)

Module-4

- 7 a. List the various surface and subsurface methods of ground water exploration. (04 Marks)
b. Describe in detail, the exploration of groundwater by electrical resistivity method. (12 Marks)

OR

- 8 a. Enumerate the groundwater exploration by seismic refraction method. (10 Marks)
b. Briefly explain any two methods of logging. (06 Marks)

Module-5

- 9 a. Explain in brief the advantages and disadvantages of open wells and tube wells. (06 Marks)
b. What are the factors considered for the selection of pumps for shallow and deep wells? (04 Marks)
c. Design an open well in fine sand to give a discharge of 0.003 cumec when worked under a depression head of 2.5m Take fine sand value $= 0.5 \text{m}^3/\text{hr}/\text{m}^2$. (06 Marks)

OR

- 10 a. With the help of a neat sketch, explain the working of a submersible pump. (10 Marks)
b. What is importance of artificial recharge? Explain various methods of ground water recharge. (06 Marks)

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15CV744

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019

Structural Dynamics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- Differentiate between : i) Forced vibrations and free vibrations
ii) Random excitation and harmonic excitation
iii) Oscillation and vibration (06 Marks)
 - A body of 10kg is supported on spring of stiffness 300N/m and a dash-pot is connected to it, which produces a resistance of 0.04N at a velocity of 0.02m/s. In what ratio will be the amplitude of vibration reduces after 5 cycle? (10 Marks)

OR

- Derive an expression for motion $x(t)$ of an under damped Single Degree of Freedom system (SDOF) subjected to free vibration. (10 Marks)
 - A diver weighing 90kg stands at the end of a cantilever diving board of span 1m. The diver oscillates at a frequency of 2Hz. What is the flexural rigidity of the diving board? (06 Marks)

Module-2

- What is magnification factor? Explain its dependence on frequency ratio and damping ratio with a qualitative graph relating to all the above three quantities. (08 Marks)
 - Source of vibration with frequency 300Hz is to be isolated from an equipment of mass 15kg. Determine the stiffness of spring if 50% of vibration is to be isolated, damping is negligible. (08 Marks)

OR

- Derive an expression for the force transmitted to the foundation in a damped Single Degree of Freedom (SDOF) system due to harmonic force, $F(t) = F_0 \sin \omega t$. (08 Marks)
 - A machine weighing 600N is supported by springs of stiffness $K = 20 \text{ N/mm}$ and dampers of damping coefficient, $C = 0.01 \text{ N-s/mm}$. A harmonic force of amplitude 20N is applied. Compute the resonant amplitude. (08 Marks)

Module-3

- Determine the natural frequencies and mode shapes for structure as shown in Fig Q5. Draw the mode shapes. Given $I = 5 \times 10^5 \text{ mm}^4$, $E = 2.5 \times 10^4 \text{ N/mm}^2$, $m_1 = 1360 \text{ kg}$, $m_2 = 660 \text{ kg}$.

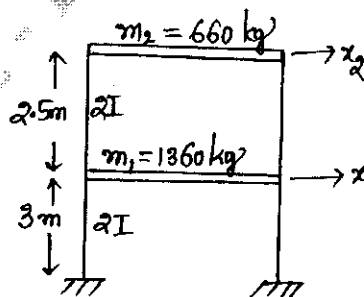


Fig Q5

(16 Marks)

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

- 6 Compute the natural frequencies and mode shapes for the shear frame shown in the Fig Q6. Given $EI = 23.83 \times 10^6 \text{ Nm}^2$ for all columns.

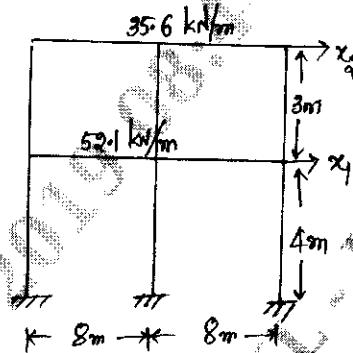


Fig Q6

(16 Marks)

Module-4

- 7 Determine natural frequencies and steady state response of the multi degree freedom system frame at $t = 0.1 \text{ sec}$ for the Fig Q7.

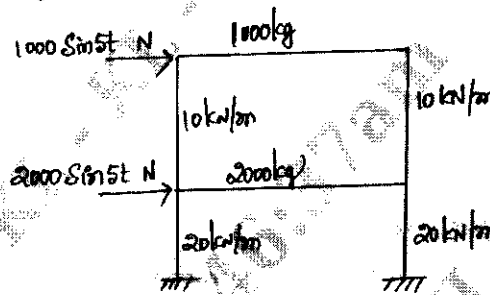


Fig Q7

(16 Marks)

OR

- 8 For a three storeyed shear building subjected to harmonic loading (Fig Q8), compute the response, given the results of the free vibration analysis. Neglect axial deformities in all structural elements. Given: Stiffness of floor : $K_1 = K_2 = 160 \times 10^6 \text{ N/m}$; $K_3 = 240 \times 10^6 \text{ N/m}$. Mass of the floor : $M_1 = M_2 = M_3 = 20 \times 10^3 \text{ kg}$ (or Ns^2/m). The natural frequencies are $w_1 = 43.87 \text{ rad/s}$, $w_2 = 120.15 \text{ rad/s}$, $w_3 = 167 \text{ rad/s}$.

The mode shapes are as follows: $\phi_1 = \begin{bmatrix} 1 \\ 0.76 \\ 0.34 \end{bmatrix}$ $\phi_2 = \begin{bmatrix} 1 \\ -0.8 \\ -1.16 \end{bmatrix}$ $\phi_3 = \begin{bmatrix} 1.0 \\ -2.43 \\ 2.51 \end{bmatrix}$.

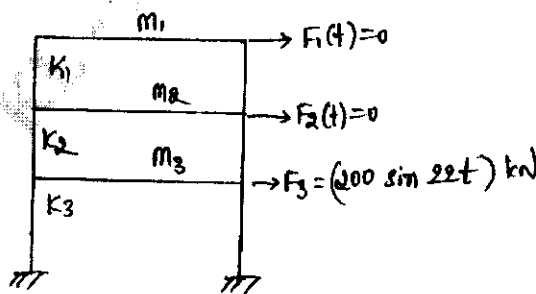
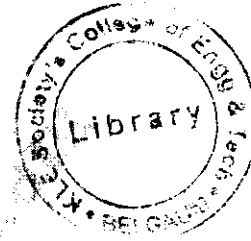


Fig Q8

(16 Marks)



15CV744

Module-5

- 9 Develop stiffness matrix and mass matrix for a simply supported beam of length L , mass density ρ , cross section area A , flexural rigidity EI . (16 Marks)

OR

- 10 Compute the lowest natural frequency of simply supported beam of span 2m and mass per unit length 500N/m, $EI = 833.33 \times 10^9 \text{ Nmm}^2$. Consider the beam as a single element as indicated in Fig 10.

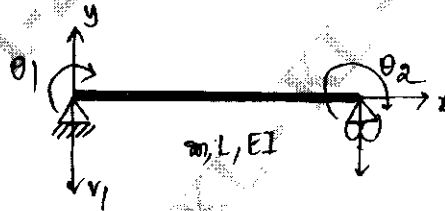


Fig Q10

(16 Marks)

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15CV751

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019 Urban Transportation and Planning

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 urbanization? State the causes of urbanization. (08 Marks)
b. Explain the problems in the urban transportation in the present scenario. (08 Marks)

OR

- 2 a. Explain the classification of transit system with example. (08 Marks)
b. Write a note on the following : (08 Marks)
(i) BRTS
(ii) Metro trains

Module-2

- 3 a. Define external cordon line. What factors should be given due weightage in the selection of external cordon line. (06 Marks)
b. What is zoning? Discuss the points to be kept in mind while doing zoning. (10 Marks)

OR

- 4 a. What are the methods of origin and destination study? Explain home interview method in detail. (08 Marks)
b. What is sampling? Discuss various types of samplings. (08 Marks)

Module-3

- 5 a. Explain in detail the factors governing trip generation and attraction rates. (06 Marks)
b. The following data shows average household size and total trips made per day for a particular zone of study area. Develop the trip production equation and also compute co-efficient of correlation. (10 Marks)

Average Household size	Total trips/day
2	4
3	6
4	7
5	8
6	10

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.

OR

- 6 a. Enlist the different methods of trip distribution. Explain in detail average growth factor method. (06 Marks)
- b. Estimate the future trip distribution by Furness method (up-to two iteration) from the following data: (10 Marks)

O/D	1	2	3	4	Future trips
1	-	50	60	30	280
2	40	-	70	20	390
3	20	60	-	40	300
4	50	70	30	-	220
Future trips	200	500	340	150	

Module-4

- 7 a. Write a short note on opportunity models. (06 Marks)
- b. The total trips produced in and attracted to the three zones A, B and C of a survey area in the design year area tabulated as

Zone	Trips Produced	Trips attracted
A	2000	3500
B	3500	4800
C	4800	2000

It is known that the trips between two zones are inversely proportional to the second power of the travel time between zones, which is 25 minutes. If the trip interchange between zones B and C is 300. Calculate the trip interchange between zones A and B, A and C, B and A, C and B. (10 Marks)

OR

- 8 a. Define modal split and explain in brief the factors affecting modal split. (10 Marks)
- b. Draw the flow diagram for modal split carried out between trip generation and trip distribution. (06 Marks)

Module-5

- 9 a. List the various assignment techniques and explain any two methods. (10 Marks)
- b. Explain the application of the traffic assignment. (06 Marks)

OR

- 10 a. Discuss the points for the selection of land - use transport model. (06 Marks)
- b. Write a flow chart of fundamental structure of Lowry model and explain the principal components of the model. (10 Marks)

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15CV753

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019

Rehabilitation and Retrofitting of Structures

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain the following terms:
i) Repair
ii) Rehabilitation
iii) Strengthening
iv) Retrofitting (08 Marks)
- b. What are the causes of distress and deterioration of concrete? (08 Marks)

OR

- 2 a. How do you carry out physical inspection of distressed concrete structures? (08 Marks)
- b. What is durability of concrete? How do the following affect the durability of concrete:
i) Carbonation
ii) Alkali aggregate reaction (08 Marks)

Module-2

- 3 a. List the steps involved in evaluation of structures and explain the different aspect of detailed investigation. (10 Marks)
- b. What are the non destructive test conducted to assess the existing strength of concrete structures? Explain any one. (06 Marks)

OR

- 4 a. Give the classification of tests and different tests that comes under each category to assess existing distress of structures. (12 Marks)
- b. What are the different situations that call for investigation of structures? (04 Marks)

Module-3

- 5 a. Explain the durability factors for humid environment with freezing and frost action. (04 Marks)
- b. Explain in detail regarding mechanism of temperature variation in concrete and their remedial measures. (08 Marks)
- c. Explain different types of cracks. (04 Marks)

OR

- 6 a. Explain the importance of concrete cover in RCC structures. (05 Marks)
- b. What are the factors to be considered by the designer at the construction site? (05 Marks)
- c. What preventive measure will ensure protection against corrosion in New Structures? (06 Marks)

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 maintenance. Explain the importance of maintenance. (08 Marks)
b. Discuss the rehabilitation techniques that are adopted for structural elements. (08 Marks)

OR

- 8 a. Explain in detail restoration of column by method of Jacketing. (10 Marks)
b. When do you Retrofit Structures? (06 Marks)

Module-5

- 9 a. What are the Ideal properties of Repair material? (06 Marks)
b. Explain the following: (10 Marks)
i) Epoxy injection
ii) Repair mortars

OR

- 10 a. Explain the procedure for Repairing Cracks in masonry structures. (06 Marks)
b. Classify and explain the use of different Techniques for Repair. (10 Marks)



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Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Advanced Concrete Technology

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. Name the Bogue's compounds. Explain their role in strength development. (08 Marks)
b. Explain the importance of transition zone in concrete. (06 Marks)
c. How do Bingham's parameters help to ascertain rheology of concrete? (06 Marks)
- 2 a. What are mineral admixtures? Explain the effect of flyash on hardened state of concrete. (06 Marks)
b. Explain the method of 'Marsh Cone test' for optimum dosage of super plasticizer. (08 Marks)
c. Explain the role of : i) Accelerators and ii) Retarders. (06 Marks)
- 3 a. List the salient features of the revised IS 10262 – 2009 for concrete mix design. (08 Marks)
b. What are the basic consideration for Mix proportioning of concrete? (06 Marks)
c. Explain the properties affect in the mix design of concrete. (06 Marks)
- 4 a. What is Carbonation of concrete? How does it influence the corrosion of steel? (08 Marks)
b. Discuss in brief Alkali – aggregate reaction and what precautions are necessary to minimize. (06 Marks)
c. What are the factors influencing sulphate attack on concrete? (06 Marks)

PART – B

- 5 a. What is RMC? Explain briefly methods of concreting and advantages of RMC. (08 Marks)
b. What is high volume of flyash concrete? Mention its applications. (06 Marks)
c. Enumerate the need for self-compacting concrete and mention its applications. (06 Marks)
- 6 a. What are the factors affecting the properties of fibre reinforced concrete (FRC)? (06 Marks)
b. What are the different types of fibres used in concrete and mention its applications. (08 Marks)
c. What is Ferrocement? List the various applications of ferro cement. (06 Marks)
- 7 a. Explain the Light Weight concrete and High density concrete. (10 Marks)
b. Discuss in brief the properties of high performance concrete in fresh and hardened state. (10 Marks)
- 8 a. Why Non – destructive Testing is required? Explain the the Ultrasonic pulse velocity method. (10 Marks)
b. What are the factors affecting the strength of test specimen under test? Explain the effect of H/D ratio on strength. (10 Marks)

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10CV82

Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019

Design and Drawing of Steel Structures

Time: 4 hrs.

Max. Marks:100

**Note: 1. Answer any ONE full question, each from PART-A and PART-B.
2. Use of IS-800, SP(6)-1 and steel tables is permitted.**

PART - A

1. a. An ISMB 350 is connected to the flange of column ISHB 400 using 20 mm diameter black bolts of Grade 5.6. Two angles ISA 110 × 110 × 8 mm were used for framed connection. The length of angle is 260 mm. Four bolts were used to connect the angles with the column. Also another set of four bolts were used to connect angles with the web of the beam. Draw to a suitable scale.
 - i) Front view and
 - ii) Side view with all details. (15 Marks)
- b. A stiffened seated connection has the following details. An ISMB500@869 N/m is connected to the web of column ISHB300@630 N/m using welds. The clip angle ISA 100 × 100 × 6 mm of length 120 mm was used. The size of weld was 5 mm. The seat plate of size 200 × 90 × 18 mm stiffening plate of thickness 12 mm and length 180 mm was used. The width of stiffener plate was equal to the width of seat plate and reduced to 50 mm at the bottom. Use 12 mm fillet weld. Draw to a suitable scale.
 - i) Front view and
 - ii) Side view (15 Marks)
2. a. A column section ISHB250@547N/m is supported over another column section ISHB300 @724 N/m. The bearing plate thickness 50 mm. Use splice plate of thickness 6 mm. Use 8 numbers of 20 mm bolt on one side of the joint for each flange. Draw to a suitable scale.
 - i) Front view and
 - ii) Side view (15 Marks)
- b. A gusseted base for ISHB400@822 N/m with flange plate of 300 × 12 mm one on each flange to be detailed with the data.
 - i) Base plate 720 × 720 × 16 mm
 - ii) Gusset plate 16 mm thick and 360 mm depth
 - iii) Gusset angles 2ISA 150 × 115 × 15 mm
 Gusset plate and the flange plate connected by 10 bolts on one side of columns. Provide 12 bolts for connecting gusset plate to gusset angle. Diameter of bolts 20 mm. Draw to a suitable scale.
 - i) Sectional elevation
 - ii) Side view (15 Marks)

PART - B

3. Design a welded plate girder to carry a superimposed load of 50 kN/m and two concentrated loads of 200 kN each at one third span points. The effective span of the plate girder is 20 m. Assume that the girder is laterally supported throughout its length. (40 Marks)
Draw to a suitable scale.
 - i) Half sectional elevation
 - ii) C/section at midspan and at support. (30 Marks)

1 of 2

4 Design a simply supported Gantry girder to carry a superimposed load for the following data:

Span of the girder = 20 m

Span of the gantry girder = 7 m

Capacity of the crane = 220 kN

Self weight of crane excluding the crab = 200 kN

Weight of the crab = 60 kN

Wheel base distance = 3.4 m

Minimum hook approach = 1.1 m

Self weight of rail = 0.3 kN/m

Height of rail = 75 mm

(40 Marks)

Draw to a suitable scale:

i) C/section of the gantry girder

ii) Plan details

(30 Marks)

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10CV833

Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Pavement Design

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. With the help of sketches mention the various layers of flexible and rigid pavements. Write the functions of each layer. (10 Marks)
- b. Distinguish between highway pavement and airfield pavement. (10 Marks)
- 2 a. State assumptions and limitations of Boussinesq's theory. (06 Marks)
- b. Find the vertical stress distribution in a homogeneous pavement upto a depth of 60cms. Due to a bullock cart with wheel load 600kg on a vertical plane.
 - i) Along the line of action of load.
 - ii) 5cm away from the line of action of load. (14 Marks)
- 3 a. Explain the ESWL concept with neat figure. (08 Marks)
- b. Find the ESWL by graphical method for a dual wheel load assembly with 2000kg on each wheel and tyre pressure of 6.5kg/cm² if the centre to centre spacing between the wheels is 25cm. Consider the pavement thickness of 25cm and 45cm. (Use plain graph paper). (12 Marks)
- 4 a. Design the pavement section by triaxial leasus method using the following data:
 Wheel load = 41kN
 E-value of subgrade soil = 10N/mm²
 E-value of base course material = 40 N/mm²
 E-value of wearing course = 100 N/mm² which is 7.5cm thick
 Traffic coefficient = 1.5
 Rainfall coefficient = 0.9
 Radius of contact area = 150mm
 Design deflection = 2.5mm
 Sketch the pavement section. (10 Marks)
- b. Explain the design of flexible pavement by revised CBR method as per IRC quick lines. (10 Marks)

PART – B

- 5 a. Explain the following:
 - i) Types and objectives of joints in cement concrete pavement.
 - ii) Critical combination of stress in a CC pavement. (10 Marks)
- b. A cement concrete pavement has a thickness of 20cms, has 2 lanes of slab width a 3.35m coefficient of friction between slab and subgrade = 1.5. Weight of slab = 480 kg/m². Allowable working stress in steel = 1400 kg/cm². Maximum permissible bond stress,
 - i) Plain bars, 17.5 kg/cm².
 - ii) Deformed bars, 24 kg/cm². Design a tie – bar system. (10 Marks)

- 6 a. Explain different types of stresses due to wheel loads. (10 Marks)
b. Using the data given below, calculate the wheel load stresses at i) Interior ii) Edge and iii) Corner regions of a cement concrete pavement using Westergaard's stress equation. Also determine the probable location where the crack is likely to develop due to corner loading. Wheel load $P = 5100\text{kg}$, $E_c = 3.0 \times 10^5 \text{ kg/cm}^2$, Pavement thickness, $h = 18\text{cms}$, Poisson's ratio of concrete $= \mu = 0.15$, $K = 6.0 \text{ kg/cm}^3$ and radius of contact area, $a = 15\text{cm}$. (10 Marks)
- 7 a. Explain Benkelman Beam deflection method. (10 Marks)
b. What are the requirements of airport pavement? (10 Marks)
- 8 a. Explain failures in flexible pavements. (10 Marks)
b. Write short notes on: i) Mud pumping ii) Structural cracks. (10 Marks)

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10CV835

Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Industrial Waste Water Treatment

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer FIVE full questions, selecting at least TWO full questions from each part.**
2. Draw neat labeled diagram wherever necessary
3. Suitable data can be assumed.

PART - A

- 1 a. Write the effect of industrial waste water on municipal sewage treatment plants. (05 Marks)
b. Define stream sampling and explain in brief the factors to be considered during sampling. (05 Marks)
c. Briefly explain effluent and stream standards and legislation to control water pollution. (10 Marks)
- 2 a. Explain self purification of streams with oxygen sag curve. (10 Marks)
b. A waste water effluent of 570 l/s with a BOD = 55 mg/l, DO = 2.5 mg/l and temperature of 25°C enters a river where the flow is 30m³/sec and BOD = 4 mg/l, DO = 8.4 mg/l and temperature of 17°C. Deoxygenation constant for the waste is 0.10 per day at 20°C. The velocity of water in the river downstream is 0.15 m/s and depth of flow is 1.2m. Determine the following after mixing of waste water. i) Combined discharge; ii) BOD of mix; iii) D.O of mix and iv) Temperature of mix. (10 Marks)
- 3 a. Write short notes on: i) Strength reduction; ii) Neutralization. (10 Marks)
b. Equalization and proportioning is of much importance in industrial waste water. Justify with proper procedure. (10 Marks)
- 4 a. Write short notes on: i) Reverse osmosis; ii) Dialysis. (10 Marks)
b. Explain the methods for treatment and disposal of sludge solids. (10 Marks)

PART - B

- 5 a. Write the advantages of combined treatment of industrial waste water with domestic waste. (05 Marks)
b. Explain the stages of Tanning process. (05 Marks)
c. Write the procedure with suitable example for discharge of partially treated and completely treated wastes into streams. (10 Marks)
- 6 a. Describe the characteristics and treatment of waste water from a sugar industry. (10 Marks)
b. With a flow diagram explain treatment of cotton textile mill wastes. (10 Marks)
- 7 a. Explain the treatment methods to treat waste water generated from steel industry with a flow diagram and add a note on its waste water characterization. (10 Marks)
b. Write short notes on:
i) Reusing and recycling of waste water.
ii) Characteristics of Indian Tannery Industrial Waste Water. (10 Marks)
- 8 a. With a flow diagram, explain the treatment of combined antibiotics and chemical wastes. (10 Marks)
b. Write the characteristics of combined effluent of a pulp and paper mill and add its effects of wastes on sewers. (10 Marks)

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**Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Urban Transport Planning**

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 scope of Urban Transport Planning. (05 Marks)
- b. Discuss the interdependence of the land use and traffic. (07 Marks)
- c. With a help of flow chart, explain system approach to Urban planning. (08 Marks)
- 2 a. Explain the various stages involved in transport planning. (10 Marks)
- b. The following information was obtained from a transportation survey of a town, develop a linear regression model for estimating the trips from each zone. If the population in a particular zone increases to 60,000 predict the expected trip generation from that zone. (10 Marks)

Zone	1	2	3	4	5	6	7	8
X	52	56	62	66	44	60	40	50
Y	24	22	34	30	24	30	18	26

- 3 a. Define a 'Zone'. Mention the different factors considered in dividing the whole area into zones. (10 Marks)
- b. With a neat sketch, explain the road side interview survey method. (10 Marks)
- 4 a. Explain the factors governing the trip generation and attraction. (10 Marks)
- b. Explain the category analysis with the assumptions. Mention the advantages and disadvantages of this method. (10 Marks)

PART - B

- 5 a. Obtain the future trip table by using : i) Uniform Rate method ii) Average growth factor method. (10 Marks)

O \ D	1	2	3
1	50	40	60
2	40	20	30
3	60	30	20

The future trips generated in zone 1, 2, 3 are expected to be 300, 180, 320.

- b. The number of trips produced in and attracted to the three zones 1, 2, and 3 are tabulated as follows :

Zone	1	2	3
Trips produced (Pi)	14	33	28
Trips Attracted (Aj)	33	28	14

As a result of calibration the friction factors to be associated with the impedance values between the various zones have been found to be as follows :

Impedance units	1	2	3	4	5	6	7	8
Friction factors	82	52	50	41	39	26	20	13

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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.

The impedance values between the various zones can be taken from the following matrix.

O \ D	1	2	3
1	8	1	4
2	3	6	5
3	2	7	4

- Distribute the trips between the various zones. (At least two iterations) (10 Marks)
- 6 a. Explain the factors affecting the Model split. (10 Marks)
 b. With a help of flow diagram, explain the modal split carried out between trip generation and trip distribution. (10 Marks)
- 7 a. Briefly explain the important considerations in selecting a land use transport models. (10 Marks)
 b. With a flow chart, explain the structure of Lowry model. (10 Marks)
- 8 Write short notes on the following :
- a. Moore's algorithm. (05 Marks)
 b. Diversion curve. (05 Marks)
 c. Recent developments in model split analysis. (05 Marks)
 d. Difficulties in transport planning for small and medium cities. (05 Marks)

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Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Environmental Impact Assessment

Time: 3 hrs.

Max. Marks:100

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

PART - A

- 1 a. Define Environmental Impact Assessment (EIA) and Environmental Impact Statement (EIS). With the help of neat flow chart, explain the relationship between EIA, EIS and FONSI. (14 Marks)
b. Write a short note on need for EIA studies. (06 Marks)
- 2 a. With the help of flow chart, explain the step – by – step procedure for conducting EIA. (14 Marks)
b. Explain the limitations of EIA. (06 Marks)
- 3 Explain any four EIA methodologies in detail. (20 Marks)
- 4 a. Explain various steps involved in prediction and assessment of Impacts on Air Environment. (10 Marks)
b. Explain various steps involved in prediction and assessment of Impacts on Water Environment. (10 Marks)

PART - B

- 5 a. Explain EIA guidelines for developmental projects. (10 Marks)
b. Write a short note on Rapid and Comprehensive EIA. (10 Marks)
- 6 a. Write a short note on Public participation along with merits and demerits. (10 Marks)
b. Explain various practical considerations in public participation of EIA process. (10 Marks)
- 7 a. Explain salient features of project activity environmental parameter activity relationships. (10 Marks)
b. Explain various environmental impacts due to thermal power project. (10 Marks)
- 8 a. Explain the EIA for water resource project. (10 Marks)
b. Explain various impacts due to nuclear power plant project. (10 Marks)
