KLE.Dr.M.S.SHESHGIRI
COLLEGE OF ENGINEERING & TECHNOLOGY
BELAGAVI-08
LIBRARY AND INFORMATION CENTER
QUESTION PAPERS
3rd,4th 5th,6th 7th & 8th SEMESTER
CIVIL
JUNE/JULY-2017

CBCS Scheme

USN | | | | | | | | | | |

15MAT31

Third Semester B.E. Degree Examination, June/July 2017
Engineering Mathematics - III

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Obtain the Fourier series expansion of

$$f(x) = \begin{cases} \pi x & 0 \le x \le 1 \\ \pi(2-x) & 1 \le x \le 2 \end{cases}$$ **(08 Marks)**

and deduce that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots\ldots=\frac{\pi^2}{8}$.

b. Obtain the constant term and first sine and cosine terms in the Fourier expansion of y from the following table. **(08 Marks)**

x	0	1	2	3	4	5
y	9	18	24	28	26	20

OR

2 a. Expand $f(x) = |x|$ as a Fourier series in $-\pi \le x \le \pi$ and deduce that **(06 Marks)**

$$\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots\ldots=\frac{\pi^2}{8}.$$

b. Obtain the half range cosine series for the function $f(x) = x \sin x$ in $0 < x < \pi$. **(05 Marks)**

c. The following table gives variations of periodic current over a period T. Show that there is a direct current part of 0.75 amp in the variable current and obtain the amplitude of first harmonic. **(05 Marks)**

t(sec)	0	$\frac{T}{6}$	$\frac{T}{3}$	$\frac{T}{2}$	$\frac{2T}{3}$	$\frac{5T}{6}$
A (amp)	1.98	1.3	1.05	1.3	-0.88	-0.25

Module-2

3 a. Find the Fourier Transform of

$$f(x) = \begin{cases} 1-x^2 & |x| \le 1 \\ 0 & |x| > 1 \end{cases}$$ **(06 Marks)**

Hence evaluate $\int_0^\infty \frac{x\cos x - \sin x}{x^3} \cos \frac{x}{2}\, dx$.

b. Find the Fourier cosine transform of

$$f(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ 2-x & \text{for } 1 < x < 2 \\ 0 & \text{for } x > 2 \end{cases}$$ **(05 Marks)**

c. Find the inverse Z – transform of

$$\frac{3z^2+2z}{(5z-1)(5z-2)}.$$ **(05 Marks)**

OR

4 a. Find the Fourier sine transform of $\frac{e^{-ax}}{x}$, $a > 0$. **(06 Marks)**

b. Find the Z – transform of i) $\cosh n\theta$ ii) n^2. **(05 Marks)**

c. Solve the difference equation $y_{n+2} + 4y_{n+1} + 3y_n = 3^n$ with $y_0 = 0$, $y_1 = 1$. **(05 Marks)**

Module-3

5 a. Find the coefficient of correlation and two regression lines for the following data : **(06 Marks)**

x	1	2	3	4	5	6	7	8	9	10
y	10	12	16	28	25	36	41	49	40	50

b. Fit a curve of the form $y = ae^{bx}$ for the following data : **(05 Marks)**

x	5	6	7	8	9	10
y	133	55	23	7	2	2

c. Use Newton – Raphson method to find a real root of the equation $x \sin x + \cos x = 0$ near $x = \pi$. **(05 Marks)**

OR

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

b. Fit a second degree parabola to the following data : **(05 Marks)**

x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

c. Use the regula – falsi method to obtain a root of the equation $2x - \log_{10}x = 7$ which lies between 3.5 and 4. Carryout 2 iterations. **(05 Marks)**

Module-4

7 a. The population of a town is given by the table **(06 Marks)**

Year	1951	1961	1971	1981	1991
Population in thousands	19.96	39.65	58.81	77.21	94.61

Using Newton's forward and backward interpolation formula, calculate the increase in the population from the year 1955 to 1985.

b. Use Lagrange's interpolation formula to find y at x = 10, given **(05 Marks)**

x	5	6	9	11
y	12	13	14	16

c. Given the values

x	2	4	5	6	8	10
y	10	96	196	350	868	1746

Construct the interpolating polynomial using Newton's divided difference interpolation formula. **(05 Marks)**

OR

8 a. From the following table, estimate the number of students who obtained marks between 40 and 45. **(06 Marks)**

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

b. Apply Lagrange's formula inversely to obtain the root of the equation f(x) = 0, given f(30) = -30 , f(34) = -13 , f(38) = 3 , f(42) = 18. **(05 Marks)**

c. Use Simpson's $\frac{1}{3}$ rule to find $\int_0^{0.6} e^{-x^2} dy$ by taking 7 ordinates. **(05 Marks)**

Module-5

9 a. Find the work done in moving a particle in the force field $\vec{F} = 3x^2 i + (2xz - y)j + z k$ along the curve defined by $x^2 = 4y$, $3x^3 = 8z$ from x = 0 to x = 2. **(06 Marks)**

b. Verify Stoke's theorem for $\vec{F} = (x^2 + y^2)i - 2xy j$ around the rectangle $x = \pm a$, $y = 0$, $y = b$. **(05 Marks)**

c. Solve the Euler's equation for the functional $\int_{x_0}^{x_1} (1 + x^2 y')y' dx$. **(05 Marks)**

OR

10 a. Verify Green's theorem for $\int_e (xy + y^2)dx + x^2 dy$, where e is bounded by y = x and $y = x^2$. **(06 Marks)**

b. Evaluate the surface integral $\iint_s \vec{F}$. Nds where $\vec{F} = 4xi - 2y^2 j + z^2 k$ and s is the surface bounding the region $x^2 + y^2 = 4$, z = 0 and z = 3. **(05 Marks)**

c. Show that the shortest distance between any two points in a plane is a straight line. **(05 Marks)**

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15MATDIP31

Third Semester B.E. Degree Examination, June/July 2017
Additional Mathematics - I

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Express $\frac{3+4i}{3-4i}$ in the form x + iy. **(06 Marks)**

b. Express $\sqrt{3}+i$ in the polar form and hence find their modulus and amplitudes. **(05 Marks)**

c. Find the sine of the angle between $\vec{a} = 2i - 2j + k$ and $\vec{b} = i - 2j + 2k$. **(05 Marks)**

OR

2 a. Simplify **(06 Marks)**

$$\frac{(\cos 3\theta + i\sin 3\theta)^4(\cos 4\theta + i\sin 4\theta)^5}{(\cos 4\theta + i\sin 4\theta)^3 + (\cos 5\theta + i\sin 5\theta)^{-4}}$$

b. If $\vec{a} = i + 2j - 3k$ and $\vec{b} = 3i - j + 2k$, then show that $(\vec{a} + \vec{b})$ and $(\vec{a} - \vec{b})$ are orthogonal. **(05 Marks)**

c. Find the value of λ, so that the vectors $\vec{a} = 2i - 3j + k$, $\vec{b} = i + 2j - 3k$ and $\vec{c} = j + \lambda k$ are co-planar. **(05 Marks)**

Module-2

3 a. If $y = \cos(m \log x)$ then prove that $x^2y_{n+2} + (2n+1)xy_{n+1} + (m^2 + n^2)y_n = 0$. **(06 Marks)**

b. With usual notation prove that

$$\tan\phi = \frac{rd\theta}{dr}.$$ **(05 Marks)**

c. If $u = \log_e\left(\frac{x^4 + y^4}{x + y}\right)$, show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 3$. **(05 Marks)**

OR

4 a. Find the Pedal equation of $r = a[1 - \cos\theta]$. **(06 Marks)**

b. Expand $\log_e(1+x)$ in ascending powers of x as far as the term containing x^4. **(05 Marks)**

c. Find the total derivative of $Z = xy^2 + x^2y$, where $x = at^2$ $y = 2at$. **(05 Marks)**

Module-3

5 a. Evaluate $\int_0^{\pi/6} \sin^6 3x\,dx$ using Reduction formula. **(06 Marks)**

b. Evaluate $\int_0^1 x^6\sqrt{1-x^2}\,dx$ – using Reduction formula. **(05 Marks)**

c. Evaluate $\int_1^2\int_0^{2-y} xydxdy$. **(05 Marks)**

OR

6 a. Evaluate $\int_0^{\pi/2} \sin^3 x \cos^7 x \, dx$. **(06 Marks)**

b. Evaluate $\int_0^{\pi} x \cos^6 x \, dx$. **(05 Marks)**

c. Evaluate $\int_0^3 \int_0^2 \int_0^1 (x + y + z) \, dz \, dx \, dy$. **(05 Marks)**

Module-4

7 a. A particle moves along the curve $\vec{r} = (1-t^3)\hat{i} + (1+t^2)\hat{j} + (2t - 5)\hat{k}$. Determine the velocity and acceleration. **(06 Marks)**

b. Find the directional derivative of $\phi = xy^2 + yz^3$ at the point (2,-1, 1) in the direction of the vector $i + 2j + 2k$. **(05 Marks)**

c. Find the constant a, b, c. Such that the vector $\vec{F} = (x + y + az)\,\hat{i} + (x + cy + 2z)\,\hat{k} + (bx + 2y - z)\,\hat{j}$ is irrotational. **(05 Marks)**

OR

8 a. Find the angle between the tangents to the curve $\vec{r} = t^2\,\hat{i} + 2t\hat{j} - t^3\hat{k}$ at the points $t = \pm 1$. **(06 Marks)**

b. Find the divergence and curl of the vector $\vec{F} = (xyz + y^2z)\,\hat{i} + (3x^2 + y^2z)\,\hat{j} + (xz^2 - y^2z)\,\hat{k}$. **(05 Marks)**

c. If $\vec{F} = (ax + 3y + 4z)\,\hat{i} + (x - 2y + 3z)\,\hat{j} + (3x + 2y - z)\,\hat{k}$ is solenoidal, find a. **(05 Marks)**

Module-5

9 a. Solve $\frac{dy}{dx} = \frac{y}{x - \sqrt{xy}}$. **(06 Marks)**

b. Solve $\frac{dy}{dx} + y \cot x = \sin x$. **(05 Marks)**

c. Solve $\frac{dy}{dx} = \frac{x + 2y - 1}{x + 2y + 1}$. **(05 Marks)**

OR

10 a. Solve $(x^2 - y^2)\,dx = 2xy\,dy$. **(06 Marks)**

b. Solve $x\frac{dy}{dx} + y = x^3 y^6$. **(05 Marks)**

c. $(1 + xy)\,ydx + (1 - xy)\,xdy = 0$. **(05 Marks)**

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CBCS Scheme

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15CV/CT32

Third Semester B.E. Degree Examination, June/July 2017
Strength of Materials

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define : (i) Poisson's ratio (ii) Volumetric strain (iii) Temperature stresses **(06 Marks)**

b. A steel bar of 20 mm diameter is subjected to tensile load test. Determine stress, strain, Young's modulus, % elongation from the following data:
Gauge length – 200 mm, Extension at a load of 100 kN – 0.147 mm, Total elongation 50 mm. Also determine the % decrease in cross sectional area of the specimen if the diameter of the rod at failure is 16 mm. **(10 Marks)**

OR

2 a. Derive the relationship between Young's modulus and shear modulus with usual notation. **(06 Marks)**

b. A steel tube 45 mm external diameter and 3 mm thick encloses centrally a solid copper bar 30 mm diameter. The bar and the tube are rigidly connected together at their ends at a temperature of 30°C. Find the stresses developed in each material when heated to 180°C. Take $E_S = 200\,GPa$, $\alpha_S = 10.8\times10^{-6}/°C$; $E_C = 110\,GPa$, $\alpha_C = 17\times10^{-6}/°C$ **(10 Marks)**

Module-2

3 a. Derive Lami's equation for thick cylinders. **(06 Marks)**

b. The state of stress at a point in a strained material is as shown in the Fig. Q3 (b)
Determine (i) Principal stresses and principal planes (ii) Max shear stress and its plane
(iii) Sketch the stress diagram showing stresses and planes. **(10 Marks)**

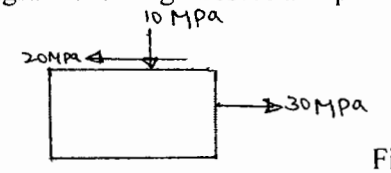

Fig. Q3(b)

OR

4 a. Derive expressions for normal stress and tangential stress for a member subject to uniaxial loading. **(06 Marks)**

b. A shell 3.25 m long, 1 m diameter is subjected to internal fluid pressure of 1 MPa. If the thickness of the shell is 10 mm. Find Hoop stress, longitudinal stress, max shear stress and change in diameter and length. Take $E = 2\times10^5$ MPa, $\frac{1}{m} = 0.3$. **(10 Marks)**

Module-3

5 a. Derive the relationship between load intensity, shear force and bending moment. **(06 Marks)**

b. A simply supported beam is subject to a point load of 15 kN together with udl of 15 kN/m applied as shown in Fig. Q5 (b). Draw SFD and BMD. Find also point of zero shear and its corresponding BM. **(10 Marks)**

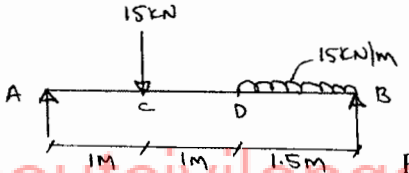

Fig. Q5 (b)

OR

6 a. Show that max BM for a simply supported beam of length l carrying udl of intensity W/unit length is $\frac{Wl^2}{8}$. **(06 Marks)**

b. Draw SFD and BMD for the load diagram, shown in Fig. Q6 (b). Mark the values at salient points. **(10 Marks)**

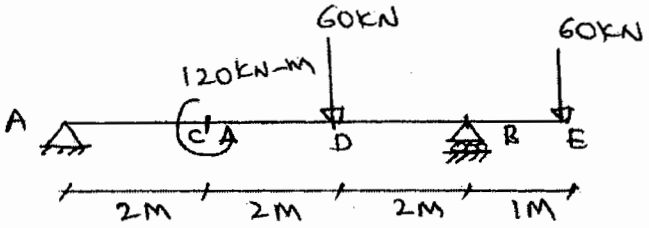

Fig. Q6 (b)

Module-4

7 a. Derive the bending equation, $\frac{M}{I}=\frac{f}{y}=\frac{E}{R}$ with usual notation. **(06 Marks)**

b. A hallow tube of 6 m length with external diameter 60 mm and thickness 10 mm is subject to minimum crippling load. Find Euler's critical load for this column : (i) When both ends are fixed. (ii) When one end fixed other end hinged. Assume E = 200 GPa. **(10 Marks)**

OR

8 a. Derive expression for crippling load for a long column when both ends are hinged. **(06 Marks)**

b. A circular pipe of external diameter 70 mm and thickness 8 mm is used as a simply supported beam over an effective span of 2.5 m. Find the max concentrated load that can be applied at the centre of the span if permissible stress in the tube is 150 N/mm^2. **(10 Marks)**

Module-5

9 a. Derive the torque equation $\frac{T}{I_P}=\frac{f_S}{R}=\frac{C_\theta}{l}$ with usual notation. **(06 Marks)**

b. State the theories of failures. Explain briefly any two of the theories. **(10 Marks)**

OR

10 a. State the assumption made in the theory of pure torsion. **(06 Marks)**

b. A hallow shaft has to transmit 600 kW power at 80 rpm. The maximum torque developed may exceed the mean torque by 40%. Design a suitable section if the working stress is 90 MPa. Take diameter ratio as 0.8. What will be the angular twist measured over a length of 2 m if C = 84 GPa? **(10 Marks)**

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15CV33

Third Semester B.E. Degree Examination, June/July 2017
Fluid Mechanics

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define the following with symbols and units:
i) Mass density ii) Specific weight **(04 Marks)**

b. Derive expression for Newton's law of viscosity and state. **(06 Marks)**

c. A cylindrical shaft of 90 mm dia rotates about a vertical axis inside a fixed cylindrical tube of length 50 cm and 95 mm internal dia. If the space between the tube and the shaft is filled by a lubricant of dynamic viscosity 8.0 poise. Determine the power required to overcome viscous resistance, when the shaft is rotated at a speed of 240 rpm. **(06 Marks)**

OR

2 a. Explain the working of a Bourdan's pressure gauge with a diagram. **(04 Marks)**

b. State and prove Pascal's law. **(06 Marks)**

c. Fig.Q2(c) shows a differential manometer connecting two points A and B. Pipe A contains carbon tetrachloride of specific gravity 1.594 under a pressure of 1.05 kgf/cm^2 and pipe B contains oil of specific gravity 0.8 under a pressure of 1.75 kgf/cm^2. If the manometer liquid is mercury, find the difference 'x' between the mercury levels.

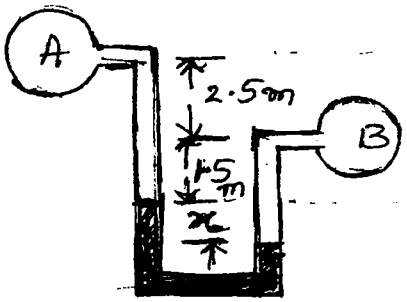

Fig.Q2(c) **(06 Marks)**

Module-2

3 a. Define: i) Total pressure, ii) Centre of pressure. **(04 Marks)**

b. Derive an expression for the depth of centre of pressure from the free surface of liquid of an inclined plane surface submerged in the liquid. **(06 Marks)**

c. A rectangular plane surface 1 m wide and 3 m 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 centre of pressure when the upper edge of the plate is 2 m below the free surface. **(06 Marks)**

OR

4 a. Define: i) Uniform and non-uniform flow, ii) steady and unsteady flow. **(04 Marks)**

b. Derive the three dimensional continuity equation in the Cartesian coordinates. **(06 Marks)**

c. The stream function for a two dimensional flow is $\Psi = 2x^2 - 2y^2$. Find:
i) Resultant velocity at point (1, 3).
ii) Velocity potential function. **(06 Marks)**

Module-3

5 a. Define momentum equation and give its applications. **(03 Marks)**

b. State the Bernoulli's theorem. Derive the Bernoulli's equation starting from Euler's equation of motion along a stream line. **(06 Marks)**

c. A 45° reducing bend is connected in a pipeline, the diameters at the inlet and outlet are 600 mm and 300 mm respectively. Find the force exerted by the water on the bend if the intensity of pressure at inlet to bend is 88.29 kN/m^2 and rate of flow of water is 0.6 m^3/sec. **(07 Marks)**

OR

6 a. Define: i) Forced vortex, ii) Free vortex. Give one example each. **(04 Marks)**

b. Derive an expression for the discharge through a venturimeter. **(06 Marks)**

c. The water is flowing through a tapering pipe of length 50 cm, having dia 40 cm at the upper end and 20 cm at the lower end at the rate of 60 ℓps. The pipe has a slope of 1 in 40. Find the pressure at the lower end, if the pressure at the higher end is 24.525 N/cm^2. **(06 Marks)**

Module-4

7 a. Define the hydraulic coefficients (C_c, C_d, C_v) of an orifice and obtain the relation between them. **(05 Marks)**

b. Derive the expression for discharge through a small orifice of area 'a' under a head 'h' measured above the centre of the orifice. **(05 Marks)**

c. Water discharges freely at a rate of 98 ℓps through a 120 mm dia vertical sharp edged orifice under a constant head of 10 m of water. A point on the jet measured from the venacontracta has coordinates (+4.5m, –0.54m). Find hydraulic coefficients. **(06 Marks)**

OR

8 a. Explain ventilation of weirs. **(04 Marks)**

b. Derive the expression for discharge through a triangular notch. **(06 Marks)**

c. Find the discharge through a trapezoidal notch which is 1m wide at the top and 0.40 m at the bottom and is 30 cm in height. The head of water on the notch is 20 cm. given C_d for rectangular portion = 0.62 and C_d for triangular portion = 0.60. **(06 Marks)**

Module-5

9 a. Explain: i) Pipes in parallel, ii) Pipes in series. **(04 Marks)**

b. Derive Darcy Weisbach expression for the loss of head due to friction in pipes. **(06 Marks)**

c. A pipe 50 mm diameter is 6 m long and the velocity of flow of water in the pipe is 2.4 m/sec. What loss of head and the corresponding power would be saved if the central 2 m length of pipe was replaced by 75 mm diameter pipe, the change of section being sudden? Take 4f = 0.04 for pipes of both diameters. **(06 Marks)**

OR

10 a. Explain the terms hydraulic gradient and total energy lines. **(04 Marks)**

b. Derive the expression for pressure rise due to sudden closure of valve when the pipe material is elastic. **(05 Marks)**

c. For a pipe network shown in Fig.Q10(c), determine the flow in each pipe. The value of n may be assumed as 2.0.

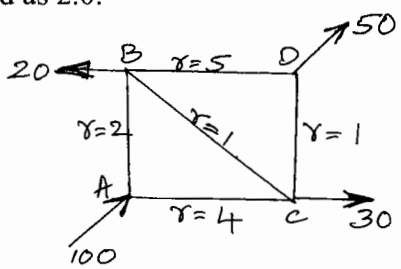

Fig.Q10(c) **(07 Marks)**

CBCS Scheme

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15CV/CT35

Third Semester B.E. Degree Examination, June/July 2017
Engineering Geology

Time: 3 hrs. Max. Marks: 80

Note: 1. ***Answer FIVE full questions, choosing one full question from each module.***
2. ***Write neat figures wherever necessary.***

Module-1

1 a. Enumerate importance and applications of Geology in Civil Engineering practices. **(06 Marks)**
b. Write a note on cleavage and fracture properties in minerals. **(05 Marks)**
c. Write the physical properties, composition and uses of Quartz and Calcite. **(05 Marks)**

OR

2 a. Describe the Internal structure and Composition of the Earth. **(06 Marks)**
b. Define a Mineral. Describe hardness property in minerals. **(05 Marks)**
c. Distinguish between Rock forming and Ore forming minerals with examples. **(05 Marks)**

Module-2

3 a. What are Igneous rocks? Describe different types of igneous rocks. **(06 Marks)**
b. Explain Rock as a construction material. **(05 Marks)**
c. Define a Fault. Describe different parts of fault, with neat figure. **(05 Marks)**

OR

4 a. What is Metamorphism? Give a note on types of metamorphism. **(06 Marks)**
b. Write a short note on Granite and Sandstone, giving their mineralogical composition and uses. **(05 Marks)**
c. What are Joints? Comment on their Engineering Importance. **(05 Marks)**

Module-3

5 a. Explain Rock Weathering and its types with examples. **(06 Marks)**
b. What is an Earthquake? Give its causes and effects. **(06 Marks)**
c. Write a note on Floods and their control. **(04 Marks)**

OR

6 a. Comment on Geomorphological aspects in selection of sites for dams and reservoirs. **(06 Marks)**
b. What are Landslides? Give a note on their control. **(05 Marks)**
c. Describe different drainage patterns. **(05 Marks)**

Module-4

7 a. What is an Aquifer? Give a note on its types with examples. **(06 Marks)**
b. Explain Electrical Resistivity method for Ground water Exploration. **(06 Marks)**
c. Write a note on Hydrological cycle. **(04 Marks)**

OR

8	a.	Write a note on occurrence of Ground water in different terrains.	**(06 Marks)**
	b.	Describe artificial recharge of Ground water.	**(05 Marks)**
	c.	Explain Sea water intrusion and its remedies.	**(05 Marks)**

Module-5

9	a.	What are Topographic and Contour maps?	**(06 Marks)**
	b.	Explain concept and applications of Remote sensing.	**(05 Marks)**
	c.	Comment on Impact of mining and quarrying on environment.	**(05 Marks)**

OR

10	a.	Write a note on Global Positioning System (GPS).	**(06 Marks)**
	b.	What is LANDSAT Imagery? Write its uses.	**(05 Marks)**
	c.	Write a note on the Impact of reservoirs on Environment.	**(05 Marks)**

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CBCS Scheme

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15CV36

Third Semester B.E. Degree Examination, June/July 2017
Building Materials and Construction

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What are the requirements for a good quality building stone? Hence define : backing, corbel and coping of stones. **(06 Marks)**

b. Briefly explain the advantages of cement concrete blocks. **(04 Marks)**

c. List the different tests conducted on bricks. Explain briefly any two of them. **(06 Marks)**

OR

2 a. What are the requirements of good mortar? List the typical proportions used for cement mortar in construction industry. **(04 Marks)**

b. Briefly explain the following tests on fine aggregates :
i) bulking ii) specific gravity test. **(06 Marks)**

c. Differentiate natural and manufactured coarse aggregate. Briefly explain use and procedure of impact and abrasion test on coarse aggregates. **(06 Marks)**

Module-2

3 a. What do you understand by "bearing capacity" of soil. Define : ultimate bearing capacity and safe bearing capacity of soil. **(04 Marks)**

b. Sketch and explain following types of foundations :
i)Isolated footing ii) combined footing iii) strap beam footing. **(06 Marks)**

c. With a neat sketch, explain the features of English bond and Flemish bond with respect to brick masonry. List their merits and demerits. **(06 Marks)**

OR

4 a. Define : i) Bevelled closer ii) Mitred closer iii) King closer and iv) Queen closer. **(04 Marks)**

b. Explain different classification of stone masonry with neat sketches, wherever necessary. **(06 Marks)**

c. Compare and contrast brick work to stone work. **(06 Marks)**

Module-3

5 a. Define lintel. What are the different types of lintels used? **(04 Marks)**

b. With a neat sketch, explain the components of a segmental arch. **(06 Marks)**

c. Write short notes on : Cement flooring and Mosaic flooring. **(06 Marks)**

OR

6 a. What are the factors to be considered while selecting a roof covering? **(04 Marks)**

b. Enumerate the advantages and disadvantages of flat roofs over a pitched roof. **(06 Marks)**

c. With neat sketches, write an explanatory note on different types of roof trusses. **(06 Marks)**

Module-4

7 a. List the guide lines to be followed while locating doors and windows. **(04 Marks)**

b. Draw a neat sketch showing all the components of following types of door :
i) Fully paneled door ii) revolving door. **(06 Marks)**

c. With neat sketches, differentiate :
i) fixed window and pivoted window
ii) corner window and bay window. **(06 Marks)**

OR

8 a. Define a stair. With a neat sketch explain the following terms : i) Thread and Riser ii) Flight and landing. **(04 Marks)**

b. Plan a doglegged stair for a building in which vertical distance between the floors is 3.6m. The stair hall measures 3m × 5m (internal dimensions). **(06 Marks)**

c. Write explanatory note on : shoring and underpinning formwork. **(06 Marks)**

Module-5

9 a. What are the objectives of plastering? Explain the requirement of a good plaster. **(04 Marks)**

b. Explain the method of applying : Stucco plastering and Lathe plastering. **(06 Marks)**

c. Discuss the defects in plastering. **(06 Marks)**

OR

10 a. What are the causes of dampness in building? Hence what do you understand by damp proof course. **(06 Marks)**

b. Mention the objectives of painting and point out the characteristics of an ideal paint. **(06 Marks)**

c. Explain the method of varnishing wood works. **(04 Marks)**

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15MAT41

Fourth Semester B.E. Degree Examination, June/July 2017
Engineering Mathematics–IV

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Find by Taylor's series method the value of y at x = 0.1 from $\frac{dy}{dx} = x^2y - 1$, $y(0) = 1$ (upto 4th degree term). **(05 Marks)**

b. The following table gives the solution of $5xy' + y^2 - 2 = 0$. Find the value of y at x = 4.5 using Milne's predictor and corrector formulae. **(05 Marks)**

x	4	4.1	4.2	4.3	4.4
y	1	1.0049	1.0097	1.0143	1.0187

c. Using Euler's modified method. Obtain a solution of the equation $\frac{dy}{dx} = x + |\sqrt{y}|$, with initial conditions y = 1 at x = 0, for the range $0 \le x \le 0.4$ in steps of 0.2. **(06 Marks)**

OR

2 a. Using modified Euler's method find y(20.2) and y(20.4) given that $\frac{dy}{dx} = \log_{10}\left(\frac{x}{y}\right)$ with y(20) = 5 taking h = 0.2. **(05 Marks)**

b. Given $\frac{dy}{dx} = x^2(1 + y)$ and y(1) = 1, y(1.1) = 1.233, y(1.2) =1.548, y(1.3) = 1.979. Evaluate y(1.4) by Adams-Bashforth method. **(05 Marks)**

c. Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at x = 0.2 by taking h = 0.2 **(06 Marks)**

Module-2

3 a. Obtain the solution of the equation $2\frac{d^2y}{dx^2} = ux + \frac{dy}{dx}$ by computing the value of the dependent variable corresponding to the value 1.4 of the independent variable by applying Milne's method using the following data: **(05 Marks)**

x	1	1.1	1.2	1.3
y	2	2.2156	2.4649	2.7514
y'	2	2.3178	2.6725	3.0657

b. Express $f(x) = 3x^3 - x^2 + 5x - 2$ in terms of Legendre polynomials. **(05 Marks)**

c. Obtain the series solution of Bessel's differential equation $x^2y'' + xy' + (x^2 + n^2)y = 0$ **(06 Marks)**

OR

4 a. By Runge-Kutta method solve $\frac{d^2y}{dx^2} = x\left(\frac{dy}{dx}\right)^2 - y^2$ for x = 0.2. Correct to four decimal places using the initial conditions y = 1 and $y' = 0$ at x = 0, h = 0.2. **(05 Marks)**

b. Prove that $J_{+\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}}\sin x$ **(05 Marks)**

c. Prove the Rodrigues formula,

$$\rho_n(x) = \frac{1}{2^n n!}\frac{d^n(x^2-1)^n}{dx^n}$$ **(06 Marks)**

Module-3

5 a. State and prove Cauchy's-Riemann equation in polar form. **(05 Marks)**

b. Discuss the transformation $W = e^z$. **(05 Marks)**

c. Evaluate $\int_C \left\{\frac{\sin(\pi z^2)+\cos(\pi z^2)}{(z-1)^2(z-2)}\right\}dz$

using Cauchy's residue theorem where 'C' is the circle $|z| = 3$ **(06 Marks)**

OR

6 a. Find the analytic function whose real part is, $\frac{\sin 2x}{\cosh 2y - \cos 2x}$. **(05 Marks)**

b. State and prove Cauchy's integral formula. **(05 Marks)**

c. Find the bilinear transformation which maps $z = \infty$, i, 0 into $\omega = -1, -i, 1$. Also find the fixed points of the transformation. **(06 Marks)**

Module-4

7 a. Find the mean and standard deviation of Poisson distribution. **(05 Marks)**

b. In a test on 2000 electric bulbs, it was found that the life of a particular make was normally distributed with an average life of 2040 hours and S.D of 60 hours. Estimate the number of bulbs likely to burn for,

(i) more than 2150 hours.
(ii) less than 1950 hours
(iii) more than 1920 hours and less than 2160 hours.

[A(1.833) = 0.4664, A(1.5) = 0.4332, A(2) = 0.4772] **(05 Marks)**

c. The joint probability distribution of two random variables x and y is as follows:

x/y	-4	2	7
1	1/8	1/4	1/8
5	1/4	1/8	1/8

Determine:

(i) Marginal distribution of x and y.
(ii) Covariance of x and y
(iii) Correlaiton of x and y. **(06 Marks)**

OR

8 a. The probability that a pen manufactured by a factory be defective is $\frac{1}{10}$. If 12 such pens are manufactured what is the probability that, (i) Exactly 2 are defective (ii) at least 2 are defective (iii) none of them are defective. **(05 Marks)**

b. Derive the expressions for mean and variance of binomial distribution. **(05 Marks)**

c. A random variable X take the values -3, -2, -1, 0, 1, 2, 3 such that $P(x = 0) = P(x < 0)$ and $P(x = -3) = P(x = -2) = P(x = -1) = P(x = 1) = P(x = 2) = P(x = 3)$. Find the probability distribution. **(06 Marks)**

Module-5

9 a. In 324 throws of a six faced 'die' an odd number turned up 181 times. Is it reasonable to think that the 'die' is an unbiased one? **(05 Marks)**

b. Two horses A and B were tested according to the time (in seconds) to run a particular race with the following results:

Horse A:	28	30	32	33	33	29	34
Horse B:	29	30	30	24	27	29	

Test whether you can discriminate between the two horses.($t_{0.05}$=2.2 and $t_{0.02}$=2.72 for 11 d.f) **(05 Marks)**

c. Find the unique fixed probability vector for the regular stochastic matrix, $A = \begin{bmatrix} 0 & 1 & 0 \\ 1/6 & 1/2 & 1/3 \\ 0 & 2/3 & 1/3 \end{bmatrix}$ **(06 Marks)**

OR

10 a. Define the terms: (i) Null hypothesis (ii) Type–I and Type–II error (iii) Confidence limits. **(05 Marks)**

b. Prove that the Markov chain whose t.p.m $P = \begin{bmatrix} 0 & 2/3 & 1/3 \\ 1/2 & 0 & 1/2 \\ 1/2 & 1/2 & 0 \end{bmatrix}$ is irreducible. Find the corresponding stationary probability vector. **(05 Marks)**

c. Three boys A, B, C are throwing ball to each other. A always throws the ball to B and B always throws the ball to C. C is just as likely to throw the ball to B as to A. If C was the first person to throw the ball find the probabilities that after three throws (i) A has the ball. (ii) B has the ball. (iii) C has the ball. **(06 Marks)**

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15MATDIP41

Fourth Semester B.E. Degree Examination, June/July 2017
Additional Mathematics – II

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Find the rank of the matrix :

$$\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$$ by elementary row transformations. **(06 Marks)**

b. Solve the following system of equations by Gauss elimination method :

$2x + y + 4z = 12$

$4x + 11y - z = 33$

$8x - 3y + 2z = 20$. **(05 Marks)**

c. Find all the eigen values and eigen vector corresponding to largest eigen value of the matrix :

$$\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}.$$ **(05 Marks)**

OR

2 a. Solve the following system of equations by Gauss elimination method :

$x + y + z = 9$

$2x + y - z = 0$

$2x + 5y + 7z = 52$. **(06 Marks)**

b. Reduce the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$ into its echelon form and hence find its rank. **(05 Marks)**

c. Find the inverse of the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ using Cayley – Hamilton theorem. **(05 Marks)**

Module-2

3 a. Solve $(D^2 - 4D + 13)y = \cos 2x$ by the method of undetermined coefficients. **(06 Marks)**

b. Solve $(D^2 + 2D + 1)y = x^2 + 2x$. **(05 Marks)**

c. Solve $(D^2 - 6D + 25)y = \sin x$. **(05 Marks)**

OR

4 a. Solve $(D^2 + 1)y = \tan x$ by the method of variation of parameters. **(06 Marks)**

b. Solve $(D^3 + 8)y = x^4 + 2x + 1$. **(05 Marks)**

c. Solve $(D^2 + 2D + 5)y = e^{-x} \cos 2x$. **(05 Marks)**

Module-3

5 a. Find the Laplace transforms of :

i) $e^{-t}\cos^2 3t$ ii) $\frac{\cos 2t - \cos 3t}{t}$. **(06 Marks)**

b. Find:

i) $L\left[t^{-5/2} + t^{5/2}\right]$ ii) $L[\sin 5t \cdot \cos 2t]$. **(05 Marks)**

c. Find the Laplace transform of the function : $f(t) = E\sin\left(\frac{\pi t}{\omega}\right)$, $0 < t < \omega$, given that $f(t+\omega) = f(t)$. **(05 Marks)**

OR

6 a. Find :

i) $L[t^2 \sin t]$ ii) $L\left[\frac{\sin 2t}{t}\right]$. **(06 Marks)**

b. Evaluate : $\int_0^\infty \frac{\cos 6t - \cos 4t}{t}\,dt$ using Laplace transform. **(05 Marks)**

c. Express $f(t) = \begin{cases} \sin 2t, & 0 < t < \pi \\ 0, & t > \pi \end{cases}$, in terms of unit step function and hence find $L[f(t)]$. **(05 Marks)**

Module-4

7 a. Solve the initial value problem $\frac{d^2y}{dx^2} + \frac{5dy}{dx} + 6y = 5e^{2x}$, $y(0) = 2$, $y'(0) = 1$ using Laplace transforms. **(06 Marks)**

b. Find the inverse Laplace transforms : i) $\frac{3(s^2-1)^2}{2s^2}$ ii) $\frac{s+1}{s^2+6s+9}$. **(05 Marks)**

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

OR

8 a. Solve the initial value problem :

$\frac{d^2y}{dt^2} + \frac{4dy}{dt} + 3y = e^{-t}$ with $y(0) = 1 = y'(0)$ using Laplace transforms. **(06 Marks)**

b. Find the inverse Laplace transform : i) $\frac{1}{s\sqrt{5}} + \frac{3}{s^2\sqrt{5}} - \frac{8}{\sqrt{5}}$ ii) $\frac{3s+1}{(s-1)(s^2+1)}$. **(05 Marks)**

c. Find the inverse Laplace transform : $\frac{2s-1}{s^2+4s+29}$. **(05 Marks)**

Module-5

9 a. State and prove Baye's theorem. **(06 Marks)**

b. A can hit a target 3 times in 5 shots, B 2 times in 5 shots and C 3 times in 4 shots. They fire a volley. What is the probability that i) two shots hit ii) atleast two shots hit? **(05 Marks)**

c. Find P(A), P(B) and $P(A \cap \overline{B})$, if A and B are events with $P(A \cup B) = \frac{7}{8}$, $P(A \cap B) = \frac{1}{4}$ and $P(\overline{A}) = \frac{5}{8}$. **(05 Marks)**

OR

10 a. Prove that P(A∪B) = P(A) + (B) – P(A∩B), for any two events A and B. **(06 Marks)**

b. Show that the events $\overline{A}$ and $\overline{B}$ are independent, if A and B are independent events. **(05 Marks)**

c. Three machines A, B and C produce respectively 60%, 30%, 10% of the total number of items of a factory. The percentage of defective output of these machines are respectively 2%, 3% and 4%. An item is selected at random and is found defective. Find the probability that the item was produced by machine C. **(05 Marks)**

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15CV42

Fourth Semester B.E. Degree Examination, June/July 2017
Analysis of Determinate Structure

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Briefly explain different forms of structures. **(03 Marks)**

b. State the assumptions made in the analysis of truss. **(04 Marks)**

c. Find the forces in the numbered members of the loaded truss shown Fig.Q1(c) using method of sections.

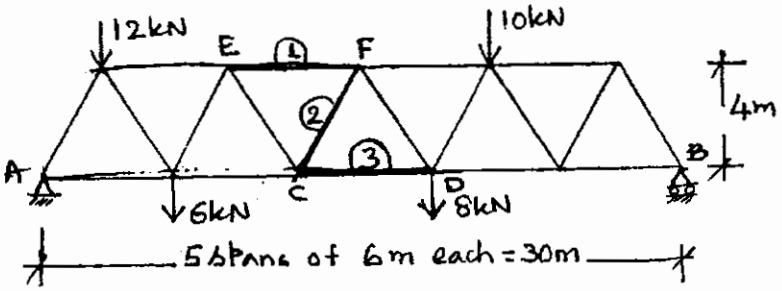

Fig.Q1(c) **(09 Marks)**

OR

2 a. Explain statically determinate and indeterminate structures with examples. **(04 Marks)**

b. Analyze the loaded truss shown in Fig.Q2(b) by method of joints and tabulate the results neatly.

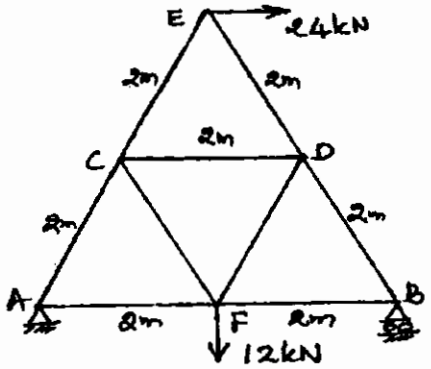

Fig.Q2(b) **(12 Marks)**

Module-2

3 a. Derive the differential equation of deflected curve for the beam. **(04 Marks)**

b. Determine the maximum deflection at the free end of a cantilever beam subjected point load W at free end of span 'L' with constant EI. Use Macaulay's method. **(06 Marks)**

c. Using conjugate beam method, find the deflection at end of a cantilever beam of span 'L' subjected udl of ω/mt run over entire span. EI constant. **(06 Marks)**

OR

4 a. State first and second moment area theorems. **(04 Marks)**

b. Find the ratio of deflection at C and D for the simply supported beam shown in Fig.Q4(b). Take E = 200 GPa, I = 6×10^{7} mm^4. Use Macaulay's method.

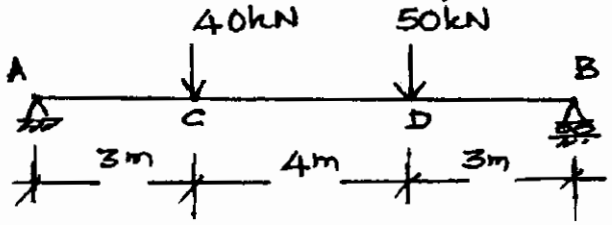

Fig.Q4(b) and Fig.Q4(c) **(05 Marks)**

c. Find the maximum deflection for the simply supported beam loaded as shown in Fig.Q4(c). Use moment-area method. **(07 Marks)**

Module-3

5 a. Derive the expression for the strain energy stored in a beam due to flexure. **(04 Marks)**

b. Find the horizontal and vertical deflection at the free end 'c' of a bent frame loaded as shown in Fig.Q5(b). Using unit load approach. Take EI = 15000 kN-m^2.

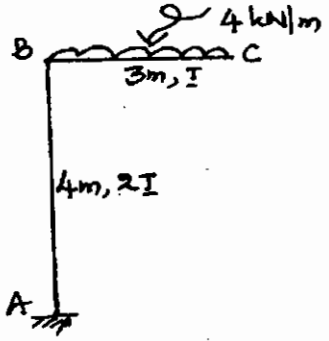

Fig.Q5(b) **(12 Marks)**

OR

6 a. For the truss shown in Fig.Q6(a), determine the vertical deflection at C by strain energy method. Take E = 210 GPa and A = 5×10^{4} mm^2.

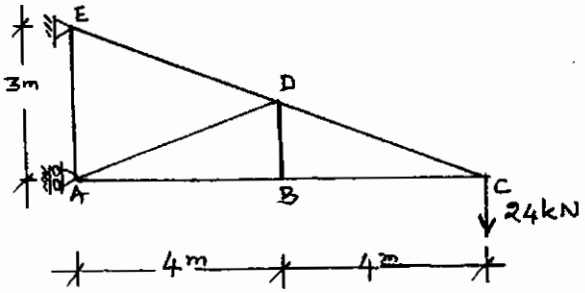

Fig.Q6(a) **(09 Marks)**

b. A cantilever beam is loaded as shown in Fig.Q6(b). Compute the deflection at point C by unit load approach. Take E = 200 GPa, I = 8×10^{7} mm^4.

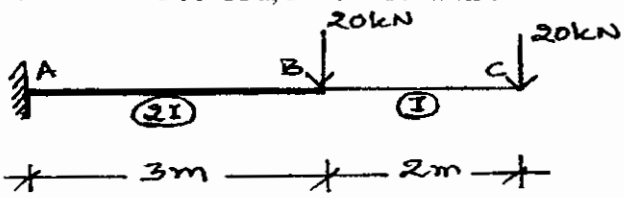

Fig.Q6(b) **(07 Marks)**

Module-4

7 a. A three hinged parabolic arch of span 30 m, rise 5m is subjected to uniformly distributed load of 20 kN/m for left half of the span. Determine support reactions at the springing levels. Also determine normal thrust, radial shear and bending moment at a section 8 m from left support. **(09 Marks)**

b. A suspension cable of span 100 m and slip 10 m carries a udl of 8 kN m of horizontal span over the entire span. Find the maximum and minimum tension in the cable and where they occur in the cable. Find the length of cable. **(07 Marks)**

OR

8 a. A flexible suspension cable of weight 12 kN/m hangs between two vertical walls 60 mt apart, left being at a point 10 m below the right point. A point load of 200 kN is attached to cable in such a manner that the point of attachment of load is 20 m horizontally from left end wall and 5 m below the left hand support. Find the maximum and minimum tension in the cable. **(08 Marks)**

b. A parabolic arch of span 24 m with a central rise of 4 m is subjected to a point load of 30 kN at 6 m from left support and a udl of 15 kN/m over the right half of the span. Sketch BMD, also find normal thrust and radial shear at 10 m from right support. **(08 Marks)**

Module-5

9 a. What are the uses of influence line diagram? **(03 Marks)**

b. A simply supported beam of span 8m in traversed by a udl of 10 m long with intensity 20 kN/m. Draw the influence line diagram for:

i) Reaction at left support
ii) S.F at 3 mt from left support
iii) BM at 3 mt from left support.

Find the maximum values of above quantities. **(13 Marks)**

OR

10 a. A beam has a span of 20 m. Draw influence line for BM and SF at a section 8m from the left support and determine the maximum BM and SF for this section due to two point loads 80 kN and 40 kN at a fixed distance of 2m apart rolling from left to right with 80 kN load leading. **(06 Marks)**

b. Draw influence line for shear force and bending moment at a section 5 m from left support of a simply supported beam, 25 m long. Hence calculate the maximum SF and BM at this section due to uniformly distributed rolling load of 8m long with intensity 5 kN/m. **(10 Marks)**

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15CV43

Fourth Semester B.E. Degree Examination, June/July 2017
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. What is meant by dimensionally homogeneous equation? Explain with an example. **(04 Marks)**

b. Define i) Center of buoyancy ii) Metacenter. How these are used to identify the equilibrium condition of floating bodies? **(06 Marks)**

c. In a 1:30 model of spillway, the velocity and discharge are 1.5m/s and $2m^3/s$. Find the corresponding velocity and discharge in prototype. **(06 Marks)**

OR

2 a. Using Buckingham π-theorem, derive the following relationship

$$R = \rho V^2 D^2 . \phi\left[\frac{\mu}{\rho VD}, \frac{H}{D}\right]$$

Where R = Resistance, ρ = density, V = Velocity of flow, D = diameter, μ = Viscosity, H = hight. **(07 Marks)**

b. Define :

i) Geometric similarity ii) Kinematic similarity and iii) Dynamic similarity. **(06 Marks)**

c. A body of cross-sectional area $2m^2$ and depth 5m has specific gravity 0.8. Determine the depth of immersion of the body. **(03 Marks)**

Module-2

3 a. Derive Chezy's equation for discharge through uniform flow in open channel. **(08 Marks)**

b. A 3m wide rectangular channel carries $2.4m^3/s$ discharge at a depth of 0.7m. Determine:

i) Specific energy at 0.7m depth
ii) Critical depth
iii) Alternate depth to 0.7. **(08 Marks)**

OR

4 a. For the most economical trapezoidal section show that half of top width is equal to side slope length. **(08 Marks)**

b. A rectangular channel 6m wide and 1m depth of water has a bed slope of 1 in 900 and is having n = 0.012. Determine the discharge. What will be the dimensions of the channel for maximum discharge with amount of lining being kept constant? Also compute percentage increase in discharge. **(08 Marks)**

Module-3

5 a. Derive the relationship between conjugate depths in case of hydraulic jump on a horizontal floor. **(08 Marks)**

b. A rectangular channel with bottom width 4m and bed slope 0.0008 has a discharge of $1.5m^3/s$. In a GVF in this channel the depth at a certain section is 0.3m. If n = 0.016, determine the type of profile. **(08 Marks)**

OR

6 a. Explain the classification of surface profiles in an open channel with neat sketches. **(10 Marks)**

b. A rectangular channel 8m wide discharges water with a depth of 0.4m and 6m/s velocity. Find the formation of hydraulic jump and if so, determine jump height and energy loss in meters. **(06 Marks)**

Module-4

7 a. Show that the maximum efficiency of jet striking at the center of a symmetrical single curved vane is $\left(\frac{16}{27}\right)$. vane is semicircular. **(08 Marks)**

b. A Pelton wheel turbine has to be designed for the following :
Data: Power = 6000kW, Net head = 300m, Speed = 550rpm, Jet ratio = 1/10, Overall efficiency = 85%, C_v = 0.98, Speed ratio is 0.46. Determine diameter of runner and jet, discharge and number of jets required. **(08 Marks)**

OR

8 a. Draw a neat sketch of a layout of hydroelectric power plant and explain the functions of each component. Also define different heads. **(08 Marks)**

b. A jet of water moving at 30m/s impinges on a series of curved vanes moving with a velocity of 15m/s. The jet makes an angle of 30° to the direction of motion of vane when entering and leaves at an angle of 120° to the direction of motion of vanes. Draw the velocity triangles at inlet and outlet and find :
i) The vane angle at inlet and outlet
ii) Workdone per N of water
iii) Hydraulic efficiency. **(08 Marks)**

Module-5

9 a. Define :
i) Unit head ii) Unit discharge iii) Unit power. **(03 Marks)**

b. Derive the expression for minimum starting speed of a centrifugal pump. **(06 Marks)**

c. A Kaplan turbine runner is to be designed to develop 7350kW power under a head of 5.5m with $\eta_0 = 85\%$. Boss diameter = $\frac{1}{3}$ diameter of runner, speed ratio = 2.1, Flow ratio = 0.7. Determine :
i) Diameter of runner and boss, ii) Speed. **(07 Marks)**

OR

10 a. Define draft tube. Explain its function. Draw the neat sketches of types of draft tubes. **(06 Marks)**

b. Define: i) Manometric head ii) Static head iii) Suction head iv) Delivery head. **(04 Marks)**

c. A centrifugal pump runs at 1000rpm and delvers water against a head of 15m. The impeller diameter and width at the outlet are 0.3m and 0.05m respectively. The vanes are curved back at 30° $\eta_{man} = 92\%$. Find discharge. **(06 Marks)**

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15CV/CT44

Fourth Semester B.E. Degree Examination, June/July 2017
Concrete Technology

Time: 3 hrs. Max. Marks: 80

Note: 1. ***Answer FIVE full questions, choosing one full question from each module.***
2. Use of IS – 10262 – 2009 is permitted.

Module-1

1 a. Write the chemical composition of cement. Write the flow chart for dry process. **(08 Marks)**
b. Explain the importance of size, shape and texture of aggregate. **(08 Marks)**

OR

2 a. Explain the role of Admixtures in Concrete Technology. **(08 Marks)**
b. Name any four types of cement. State the properties and applications of any two types of cement. **(08 Marks)**

Module-2

3 a. Define Workability. Explain the factors influencing workability of concrete. **(08 Marks)**
b. Write note on Segregation and Bleeding. **(08 Marks)**

OR

4 a. Why curing is needed to concrete? Explain curing methods. **(08 Marks)**
b. Why compaction is required to concrete? Explain Compaction methods by vibration. **(08 Marks)**

Module-3

5 a. Explain the factors influencing the strength of concrete. **(08 Marks)**
b. Write note on : i) Creep ii) Shrinkage of concrete. **(08 Marks)**

OR

6 a. Explain Maturing concept of concrete. **(08 Marks)**
b. The strength of a sample of fully matured concrete is found to be 40MPa. Find the strength of identical concrete at the age of 7 days when cured at an average temperature during day time at 20^0C and night time at 10^0C. Take A = 32 , B = 54.Use % strength of concrete at maturity = $A + B \log_{10}\left(\frac{\text{maturity}}{1000}\right)$. **(08 Marks)**

Module-4

7 Design a concrete mix for M_{20} grade of concrete with the following design stipulation as per IS 10262 – 2009 guide lines.
a. Grade designation: M20.
b. Type of cement : Ultra Tech PPC.
c. Maximum size of Aggregate [MSA] : 20mm
d. Minimum cement content : 320 kg/m^3.
e. Maximum W/C ratio : 0.55.
f. Workability : 50 – 75mm (slump)

g. Exposure condition : Mild
h. Degree of supervision : Good.
i. Type of Aggregate : Crushed angular aggregate.
j. Max. cement content : 450 kg/m^3.
k. Chemical Admixture : Not recommended.
l. Specific gravity of cement : 3.05.
m. Specific gravity of Coarse Aggregate : 2.68.
n. Specific gravity of Fine Aggregate : 2.66.
o. Water absorption of Coarse Aggregate : 0.85%.
p. Water absorption of Fine Aggregate : 1.15%.
q. Free (surface) moisture of Coarse Aggregate : NIL.
r. Free moisture of Fine Aggregate : NIL.
s. Sieve Analysis of Coarse Aggregate : Conforming to table 2 of IS : 383.
t. Sieve Analysis of Fine Aggregate : Conforming to zone – II of IS : 383. **(16 Marks)**

OR

8 What is meant by concrete mix design? Write the steps involved in the method of mix design (IS -10262 - 2009). **(16 Marks)**

Module-5

9 a. Explain the materials used for self – compacting concrete. **(08 Marks)**
b. State the advantages and disadvantages of RMC. **(08 Marks)**

OR

10 a. Explain the fiber types used in Fiber Reinforced Concrete. **(08 Marks)**
b. State the advantages of Light Weight Concrete. **(08 Marks)**

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CBCS Scheme

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15CV45

Fourth Semester B.E. Degree Examination, June/July 2017

Basic Geotechnical Engineering

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. With the help of phase diagram of sol, define the terms:
i) Void ratio ii) Water content
iii) Degree of saturation iv) Unit weight of soil **(08 Marks)**

b. Following results were obtained from liquid limit test on a clay sample, whose plastic limit is 13% and natural water content is 18%. Determine the following:
i) Liquid limit ii) Flow index iii) Consistency index

Number of blows	5	16	23	42
Water content %	32	27.8	25.5	23.3

(08 Marks)

OR

2 a. Sketch a typical grain-size curve for (i) Well graded soil, (ii) Uniformly graded soil. Calculate uniformity coefficient and coefficient of curvature from the curve. **(04 Marks)**

b. Explain the salient features of I.S. plasticity chart for classification of fine grained soils. **(06 Marks)**

c. A partially saturated sample from a borrow pit has a natural water content of 14% and bulk unit weight of 19 kN/m^3. The specific gravity of solids is 2.70. Determine the void ratio, and degree of saturation. What will be the unit weight of the sample on saturation? **(06 Marks)**

Module-2

3 a. Distinguish between:
i) Primary and secondary valence bonds
ii) Dispersed and flocculent structures
iii) Structure of Kaolinite and Montmorillonite
iv) Isomorphism substitution and base exchange capacity **(10 Marks)**

b. Differentiate between standard and modified proctor tests. **(06 Marks)**

OR

4 a. Explain the factors affecting the degree of compaction. **(04 Marks)**

b. List the differences between compaction and consolidation. **(04 Marks)**

c. In a standard proctor test. Following results were obtained:

Mass of compacted soil in grams	1700	1890	2003	1960
Water content %	7.7	11.5	14.6	19.7

i) Draw the compaction curve showing OMC and maximum dry density.
ii) Determine the void ratio and degree of saturation.
Given, volume of mould = 950 cc and G = 2.65. **(08 Marks)**

Module-3

5 a. Define Darcy's law. Derive an expression to relate discharge velocity and seepage velocity. **(06 Marks)**

b. Explain the following terms:
i) Total stress ii) Neutral stress
iii) Effective stress iv) Quick sand condition **(06 Marks)**

c. An earthen dam is built on a impervious foundation with a horizontal filter under the downstream slope. The horizontal and vertical permeability of the soil material in the dam are respectively 4×10^{-5} m/sec and 1×10^{-5} m/sec. Full reservoir level is 20m above downstream filter. Flow net consists of 4 flow channels and 15 equipotential drops. Estimate the seepage loss per meter length of the dam. **(04 Marks)**

OR

6 a. List the properties and use of flow nets. **(04 Marks)**

b. In a falling head permeameter test, the initial head is 300 m it drops by 1 cm in 3 minutes. How much longer should the test to be continued, if the head is to drop to 180 m? **(04 Marks)**

c. Explain with neat sketch the method of locating the phreatic line in a homogenous earth dam with horizontal filter. **(08 Marks)**

Module-4

7 a. Explain mass-spring analogy of consolidation of soils. **(08 Marks)**

b. In a consolidation test, the void ratio of soil sample decreases from 1.20 to 1.10 when the pressure increases from 160 to 320 kN/m^2. Determine the coefficient of consolidation, if the coefficient of permeability is 8×10^{-7} mm/sec. **(08 Marks)**

OR

8 a. Explain under consolidated, normally consolidated and over consolidated soil. **(06 Marks)**

b. How preconsolidation pressure is determined by Casagrande's method? **(06 Marks)**

c. A soil sample 2 cm thickness take 20 minutes to reach 20% consolidation. Find the time for a clay layer 6 cm thick to reach 40% consolidation. Assume double drainage in both cases. **(04 Marks)**

Module-5

9 a. Briefly explain Mohr-Coulomb's shear strength theory. **(06 Marks)**

b. In a direct shear test on sand, sample failed at a shear strength of 70 kN/m^2 when normal stress was 100 kN/m^2. Determine angle of internal friction. Draw Mohr circle at failure. Mark major and minor principal planes. What are the values of major and minor principal stresses? **(10 Marks)**

OR

10 a. Mention the advantages and disadvantages of direct shear test. **(04 Marks)**

b. Classify shear tests based on drainage conditions. **(03 Marks)**

c. A soil has unconfined compression strength of 120 kN/m^2. In triaxial compression test, specimen of same soil (under similar conditions) when subjected to cell pressure of 40 kN/m^2, failed at an additional stress of 160 kN/m^2. Determine:
i) Shear strength parameters
ii) Angle made by failure plane with axial stress direction in case of triaxial test. **(09 Marks)**

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15CV46

Fourth Semester B.E. Degree Examination, June/July 2017
Advanced Surveying

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Explain the following along with a neat sketch : **(08 Marks)**
i) Forward tangent ii) Point of curve iii) Deflection angle iv) Apex distance.

b. Two tangents intersect at a chainage of 1190m, the deflection angle 36^0. Compute all the data necessary to set out a curve of radius 300m by deflection angle method. The peg interval is 30m. Tabulate the results. **(08 Marks)**

OR

2 a. A reverse curve is to be set out to connect two parallel railway line 30m apart. The distance between the tangent points is 150m. Both the arcs have the same radius. The curve is set out by method of ordinates from long chord taking a peg interval of 10m. Calculate the necessary data for setting the curve. **(08 Marks)**

b. List the requirements of a transition curve (any four). **(04 Marks)**

c. With a neat sketch, list any four vertical curves. **(04 Marks)**

Module-2

3 a. Mention the points to be considered in the selection of triangular station. **(06 Marks)**

b. Triangulation station B was used in measuring angles and the instrument was necessary to shift to a satellite station S due south of main station B at a distance of 12.2m from it. The line BS bisects the exterior angle A, B, C and the angles ASB and BSC were observed to be 30^0 20' 30" and 29^0 45' 6". When the station B was observed angles CAB and ACB were observed to be 59^0 18' 26" and 60^0 26' 12". The side AC computed to be 4248.5m from the adjacent triangle. Determine the correct value of the angle ABC. **(10 Marks)**

OR

4 a. Explain the three kinds of errors. **(03 Marks)**

b. The observed values of P, Q and R at a station the angles being subjected to the condition that P + Q = R.
P = 30^0 12' 28.2" ; Q = 35^0 48^0 12.6" ; R = 66^0 0' 44.4" **(08 Marks)**
Find the most probable value of P, Q and R.

c. Explain the probability curve. **(05 Marks)**

Module-3

5 a. Define the following terms :
i) Zenith and Nadir ii) Prime vertical iii) Hour angle. **(03 Marks)**

b. Mention the properties of a spherical triangle. **(05 Marks)**

c. Find the shortest distance between two points A & B, given
A latitude – 18^0 24' N longitude 36^0 18 E
B latitude – 68^0 32' N longitude 126^0 34 E. **(08 Marks)**

OR

6 a. Define the following : i) Vertical circle ii) Azimuth iii) Altitude. **(03 Marks)**

b. Explain Ecliptic and Solstices. **(05 Marks)**

c. Find the shortest distance between two places A & B given that the longitudes of A and B are 15^0 0' N and 12^0 6' N and longitudes are 50^0 12' E and 54^0 0' E respectively. **(08 Marks)**

Module-4

7 a. Define the following terminologies :
i) Exposure station ii) Picture plane iii) Perspective centre. **(03 Marks)**

b. Mention the general features of Photographic images. **(07 Marks)**

c. Find the number of photographers (size 250 × 250mm) required to cover over a area of 20km × 16km of the longitudinal overlap is 60% and the side overlap is 30% scale the photograph is 1cm = 150m. **(06 Marks)**

OR

8 a. Derive an expression for relief displacement on a vertical photograph. **(05 Marks)**

b. Explain the procedure for aerial survey. **(05 Marks)**

c. A vertical photograph was taken at a altitude of 1200 meters above mean sea level. Determine the scale of the photograph for a terrain lying at elevations of 80 meters and 300 meters if the focal length of the camera is 15cm. **(06 Marks)**

Module-5

9 a. Mention the advantages of total station and also discuss the working principles of the same. **(08 Marks)**

b. Define Remote sensing. Explain the stages of idealized remote sensing system. **(08 Marks)**

OR

10 a. What is GIS? Enumerate on GIS applications in civil engineering. **(08 Marks)**

b. Explain the basic principles of GPS and its application in surveying. **(08 Marks)**

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10AL51

Fifth Semester B.E. Degree Examination, June/July 2017
Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define Management with list and explain the functions of Management. **(10 Marks)**
b. "Manager plays a vital role in an organization". Justify this statement with reference to Interpersonal, Decision and Informational roles. **(10 Marks)**

2 a. State and explain importance of planning process. **(10 Marks)**
b. Elucidate on steps in Decision making with probable difficulties faced by Manager. **(10 Marks)**

3 a. What are Committees? Explain the principles of committees. **(10 Marks)**
b. Explain techniques of selection in detail. **(10 Marks)**

4 a. Define Motivation. Mention characteristics and anticipated results of motivation. **(10 Marks)**
b. Describe essentials of Sound control system. **(10 Marks)**

PART – B

5 a. Briefly describe Entrepreneurship and list out types of Entrepreneurs. **(10 Marks)**
b. Enumerate on barriers faced by Women Entrepreneurs. **(10 Marks)**

6 a. Describe Small Scale industry, Ancillary industry and Tiny industry. **(10 Marks)**
b. Explain the impact of Liberalization , Privatization and Globalization on small scale industry. **(10 Marks)**

7 a. Describe Single Window concept. **(05 Marks)**
b. Enumerate on functions of SISI. **(05 Marks)**
c. Explain the role of KSFC in setting up industries. **(05 Marks)**
d. Write on objectives of NSIC. **(05 Marks)**

8 a. Explain the process of product identification and project selection. **(10 Marks)**
b. Discuss on essentials of project appraisal. **(10 Marks)**

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10CV52

Fifth Semester B.E. Degree Examination, June/July 2017
Design of RC Structural Elements

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Use of IS – 456 – 2000 and SP – 16 is permitted.

PART – A

1 a. Explain the philosophy and principles of limit state method of RCC design. **(06 Marks)**

b. Explain the following :
i) Characteristic loads
ii) Characteristics strength
iii) Partial safety factor for loads
iv) Partial safety factor for materials. **(08 Marks)**

c. Explain different types of steel used in RCC. **(06 Marks)**

2 a. What is a stress block? Derive from fundamentals the expression for area of stress block $0.36\ f_{ck}\ x_u$ and depth of centre of compressive force from the extreme fibre in compression $0.42\ x_u$. **(08 Marks)**

b. A RC beam 200mm wide by 500mm deep effective is reinforced with 3 nos of 16mm dia bars. Find the moment of resistance of the beam. Effective span is 5.0m. If the effective cover is 40mm, find the safe working load as well as superimposed load. Use M25 grade concrete and Fe 415 steel. **(12 Marks)**

3 a. Explain the importance of side face reinforcement. Give the specification for the same. **(06 Marks)**

b. Enlist various reasons that cause cracking in RCC. **(04 Marks)**

c. A simply supported rectangular beam of 12m span has an effective depth of 800mm. The area of reinforcement required to support the loads is designed as 1.6 percent. Check the deflection control of the beam by empirical method if i) Fe 415 grade HYSD bars are used ii) Fe 500 grade bars are used. **(10 Marks)**

4 Design a singly reinforced concrete beam of clear span 5m to support a design working live load of 10 kN/m. Adopt M20 grade concrete and Fe 415 HYSD bars. Also show the detailing of reinforcements. **(20 Marks)**

PART – B

5 Design RC slab rectangular panel discontinuous and restrained all-round, has an effective spans of 3.5m × 5.0m. Live load is 2 kN/m^2 and floor finish is 0.6 kN/m^2. Use M20 grade concrete and Fe-415 grade steel. All corners are held down. **(20 Marks)**

6 a. A column of size 300 mm × 400 mm is subjected to an axial factored load of 1200 kN and a factored moment of 250 kN-m. Design the column using M25 concrete and Fe 415 steel. Provide 40mm cover. Use of SP–16 is allowed. **(10 Marks)**

b. Design short column (rectangular) subjected to an axial load of 3000 kN. Take effective length = 3.0m. Use M20 grade concrete Fe 415 grate steel. Check for minimum eccentricity in the direction. **(10 Marks)**

7 A rectangular column of size 350mm × 550mm carries a live load of 1800 kN. The safe bearing capacity of soil is 200kN/m^2. Using M25 concrete and Fe 415 steel. Design a rectangular footing to support the column. Sketch the details of reinforcement. **(20 Marks)**

8 The main stair of an office building has to be located in a stair case room measuring 2.5m × 5.6m. The vertical distance between the floors is 3.75m. Live load on stairs 5 kN/m^2. Design the flight slab using M20 and Fe 415 if flight slab and landing slab span in the same direction. **(20 Marks)**

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10CV53

Fifth Semester B.E. Degree Examination, June/July 2017
Structural Analysis – II

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Assume any missing data suitably.***

PART – A

1 a. What is an influence line? Explain its advantages in structural analysis. **(06 Marks)**

b. A moving u.d.l of 20kN/m and 8m long cross over a simply supported girder of span 20m. Determine :
- i) Maximum +ve shear force –ve shear force and B.M at 6m from left support
- ii) Absolute maximum SF and BM anywhere on the girder
- iii) Intensity of u.d.l throughout the span. **(14 Marks)**

2 Analyse the frame shown in Fig Q2 by slope deflection method. Draw BMD and elastic curve. **(20 Marks)**

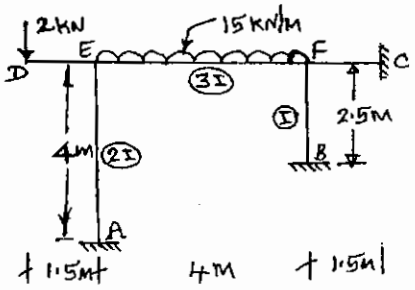

Fig Q2

3 Analyse the continuous beam shown in Fig Q3 by moment distribution method. Sketch the BMD, SFD and Elastic curve, EI constant. **(20 Marks)**

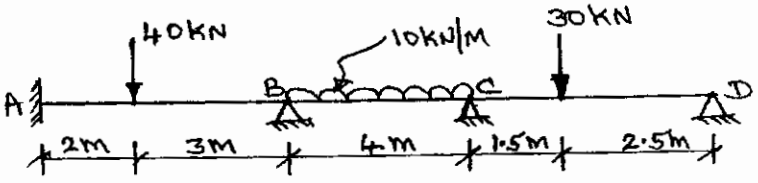

Fig Q3

4 Analyse the frame shown in Fig Q4 by moment distribution method. Draw BMD, EI is constant. **(20 Marks)**

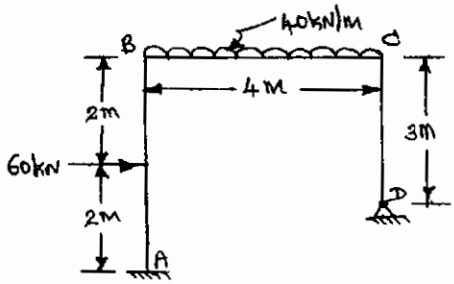

Fig Q4

PART – B

5 Analyse the frame by Kani's method. Take advantages of the symmetry and draw BMD. **(20 Marks)**

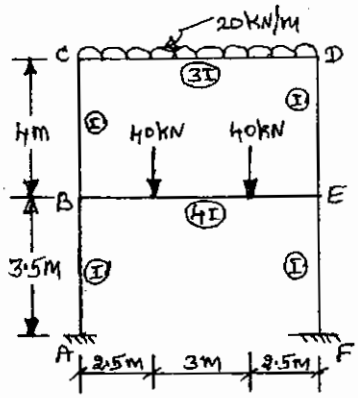

Fig Q5

6 Analyse the frame shown in Fig Q 6 by flexibility matrix method. Draw BMD and Elastic curve. **(20 Marks)**

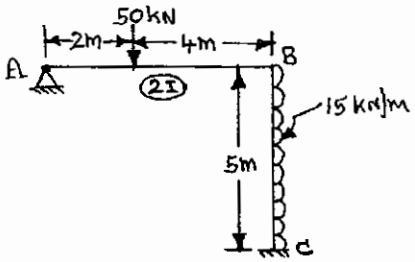

Fig Q6

7 Determine the displacement at 'B' of a pin jointed plane frame shown in Fig Q7. Also calculate the forces in the members AB and BC due to the given loading, by stiffness matrix method. Take $E = 2 \times 10^5$ N/mm^2. **(20 Marks)**

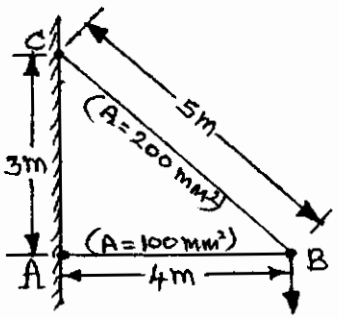

Fig Q7

8 a. Explain : i) Degree of freedom ii) Free vibration
iii) Natural frequency iv) Forced vibration. **(08 Marks)**

b. Determine the natural angular frequency cyclic frequency and periodic of oscillation for a spring mass system with mass 10kg and stiffness 1000 N/m. If the system is given an initial displacement of 0.1m and an initial velocity of 0.2m/sec obtain the equation of motion. Also find displacement, velocity and acceleration after 0.2 sec. **(12 Marks)**

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10CV54

Fifth Semester B.E. Degree Examination, June/July 2017
Geotechnical Engineering – I

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Missing data, if any, may be suitably assumed.

PART – A

1 a. Define following : i) void ratio ii) water content iii) degree of saturation. **(06 Marks)**

b. Starting from 3-phase diagram, with usual notations prove that : $\gamma_b = \frac{(G + s_r e)}{(1+e)}\gamma_w$. **(06 Marks)**

c. For a given sandy soil, e_{max} = 0.82 and e_{min}= 0.42. Let G = 2.66, in the field, the soil is compacted to a moist unit weight of 16.87 kN/m^3 at a moisture content of 9%. Determine void ratio, porosity, degree of saturation and relative density. **(08 Marks)**

2 a. What are index properties? List various index properties. **(06 Marks)**

b. With the help of particle size distribution curves, explain well graded, poorly graded, fine gained and coarse grained soils. **(08 Marks)**

c. A pycnometer test for the determination of water content of a soil sample, having G = 2.70, yielded the following data : weight of moist soil mass = 230.75g
Weight of pycnometer + soil + water = 3092.85g
Weight of pycnometer full of water = 2965.2g
Calculate the water content of the soil. **(06 Marks)**

3 a. Draw a neat sketch of plasticity chart proposed by Casagrande. Using the above chart and the following data classify the soils as per IS 1498 – 1970. **(10 Marks)**

Soil	W_L	W_p	% passing 75 μ IS sieve	% gravel	%sand	C_u	C_c
A	400	45	100	0	0	–	–
B	40	20	70	10	20	–	–
C	40	20	20	20	60	7	2
D	Non plastic	Non plastic	10	10	80	5.0	1.0

b. With the help of neat sketches explain the principle clay minerals Kaolinite, Montmorillonite and Illite. **(10 Marks)**

4 a. What is permeability of soil? Briefly explain the factors affecting permeability. **(06 Marks)**

b. Explain the suitability of variable head permeameter test and also derive the expression used to find the coefficient of permeability. **(06 Marks)**

c. For a field pumping test a well was sunk through a horizontal stratum of sand 14.5m thick underlayed by a clayey stratum. Two observation wells were sunk at horizontal distances of 16m and 34m respectively from the pumping well. The initial position of water table was 2.2m below ground level. At a steady state of pumping rate is 925 lit/min, the draw downs in the observation wells were found to be 2.45m and 1.20m respectively. Show the arrangement in a diagram and determine the co-efficient of permeability. **(08 Marks)**

PART – B

5 a. List the factors affecting shear strength of soils. **(04 Marks)**

b. Explain Mohr-coulomb theory of shear strength. **(06 Marks)**

c. Compute the shear strength of soil along a horizontal plane at a depth of 5m in a deposit of sand having the following particulars.
Angle of internal friction, $\phi = 36°$
Dry unit weight, $\gamma_d = 17\ kN/m^3$
Specific gravity, $G = 2.7$
Assume the ground water table is at a depth of 2.4m from the ground level. Also determine change in shear strength if water table rises upto ground level. **(10 Marks)**

6 a. What do you understand by field control of compaction? Explain proctor needle method. **(08 Marks)**

b. Following are the observations of a compaction test :

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

If the volume of compaction mould is 950CC, assume G = 2.65
i) Draw the compaction curve
ii) Report the maximum dry unit weight and optimum moisture content
iii) Draw 100% saturation line. **(12 Marks)**

7 a. Explain spring analogy of consolidation of soils. **(06 Marks)**

b. Explain normally consolidated, under consolidated and over consolidated soils. **(06 Marks)**

c. In a consolidation test void ratio decreased from 0.70 to 0.60, when the pressure changed from 50 kN/m^2 to 100 kN/m2. Determine :
i) Compression index
ii) Coefficient of compressibility
iii) Coefficient of volume change. **(08 Marks)**

8 a. Write the advantages and disadvantages of direct shear test. **(04 Marks)**

b. Briefly explain different drainage conditions in triaxial test in laboratory and how these simulates field problems. **(06 Marks)**

c. In a drained triaxial compression test, a saturated sand sample failed at a deviator stress of 360 kN/m^2 under a cell pressure of 100 kN/m^2. Find the effective shear parameters of sand if another identical sample is tested under a cell pressure of 200 kN/m^2. Determine the deviator stress at which the specimen fails. **(10 Marks)**

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10CV55

Fifth Semester B.E. Degree Examination, June/July 2017
Hydrology and Irrigation Engineering

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. ***Missing data may suitably be assumed.***

PART – A

1 a. Define Precipitation. Explain various forms of precipitation. **(06 Marks)**
b. Explain with neat sketch Syphon's rain gauge station. **(07 Marks)**
c. The average annual rainfall in cm at four existing raingauge stations in a basin are 105, 79, 70 and 66. If the average depth of rainfall over the basin is to be estimated within 10% error, determine the additional number of gauges required. **(07 Marks)**

2 a. Define Evaporation. With neat sketch, explain measurement of evaporation using IS class A pan. **(06 Marks)**
b. What are the various methods of measurement of rate of infiltration? Also explain determination of constants in Horton's equation. **(06 Marks)**
c. The rate of rainfall for successive 30 minutes period of a 4 hour storm are as follows : 3.5, 6.5, 8.5, 7.8, 6.4, 4.0, 4.0, 6.0 cm/hr. Taking the value of ϕ index as 4.5 cm/hr. Compute the following : i) Rainfall total ii) Total rainfall excess and iii) W – index. **(08 Marks)**

3 a. Define a Hydrograph. Explain various components of flood hydrograph. **(06 Marks)**
b. Explain step by step derivation of unit hydrograph. **(06 Marks)**
c. Given the ordinates of 4 hr. unit hydrograph, derive the ordinates of 12 hr unit hydrograph for same catchment. **(08 Marks)**

Time (hrs)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinate of 4 hr unit hydrograph	0	20	80	130	150	130	90	52	27	15	5	0

4 a. Define Flood routing. What are the uses of flood routing? **(06 Marks)**
b. Differentiate between : i) Hydraulic routing and hydrologic routing ii) Channel routing and reservoir routing iii) Prism storage and Wedge storage. **(06 Marks)**
c. Derive Muskingum routing equation and expressions for routing co-efficients C_0, C_1 and C_2. **(08 Marks)**

PART – B

5 a. Differentiate between : i) Agriculture and Irrigation ii) Sewage irrigation and supplemental irrigation iii) Explain Well irrigation method. **(08 Marks)**
b. Explain Environmental impacts of irrigation. **(06 Marks)**
c. Explain advantages and disadvantages of irrigation. **(06 Marks)**

6 a. Explain classification of soils. **(06 Marks)**
b. What is Frequency of irrigation? How depth of water stored in root zone is derived? **(06 Marks)**

c. After how many days will you supply water to (clay loam) in order to ensure efficient irrigation of given crop, if
i) Field capacity of soil = 27% ii) Permanent wilting point = 14% iii) Density of soil = 1.5 gm/cc iv) Effective depth of root zone = 75cm v) Daily consumptive use of water for given crop = 11mm. **(08 Marks)**

7 a. Define Duty, Delta and Base period. Establish a relationship between them. **(06 Marks)**
b. What is Consumptive use of water? What are the factors affecting consumptive use of water? **(08 Marks)**
c. The base period, intensity of irrigation and duty of various crops under canal system are given in table below. Find the reservoir capacity, if the canal losses are 20% and reservoir losses are 12%. **(06 Marks)**

Crop	Base period in days	Duty at field (ha/cumecs) D	Area under crop (ha)
Wheat	120	1800	4800
Sugarcane	360	800	5600
Cotton	200	1400	2400
Rice	120	900	3200
Vegetables	120	700	1400

8 a. What are the Canals? Explain classification of canals. **(06 Marks)**
b. Explain Lacey's regime theory. **(08 Marks)**
c. Design an irrigation channel to carry a discharge of 14 cumecs. Assume

$N = 0.0225$, $m = 1$ $\frac{B}{D} = 5.7$ **(06 Marks)**

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10CV56

Fifth Semester B.E. Degree Examination, June/July 2017
Transportation Engineering – I

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Assume Missing data suitably***
3. ***Use of tables and charts extracted from IRC 37-2001 and IRC 58-2002 is permitted.***

PART – A

1 a. Explain the role of transportation for the development of rural areas in India. **(06 Marks)**

b. What are the significant recommendations of Jayakar committee? How they are implemented? **(08 Marks)**

c. What are the various characteristics of road transport? **(06 Marks)**

2 a. What are the methods of classification of roads? Mention their respective classification of road. **(06 Marks)**

b. What are the different studies made in planning surveys? What are the typical drawing are prepared in the form of plans by analyzing the planning survey datas? **(06 Marks)**

c. The area of a certain district in India is 13400Sq Km and there are 12 towns as per 1981 census. Determine the lengths of different categories of roads to be provided in this district by the year 2001. **(08 Marks)**

3 a. What is the necessity of re-alignment? What are the different types of improvement made by re-alignment of highway? **(06 Marks)**

b. Draw the typical cross section of following roads with full details :
i) Cross section of two lane city road in built up area
ii) Cross section of divided highway in urban area. **(06 Marks)**

c. The speeds of overtaking and over taken vehicles are 70 and 40kmph respectively on a two way traffic road the average acceleration during overtaking may be assumed as 0.99 m/sec^2.
i) Calculate safe overtaking sight distance
ii) What is the minimum length of overtaking zone?
iii) Draw a neat sketch of the overtaking zone and show the positions of the sign post. **(08 Marks)**

4 a. What are the objects of providing transition curves on the horizontal alignment highways? How its length is calculated by the method of rate of change of centrifugal acceleration? **(08 Marks)**

b. Find the total width of a pavement on horizontal curve for a new national highway to be aligned along a holling terrain with a minimum ruling radius. Assume necessary data. **(06 Marks)**

c. A vertical summit curve is formed at the intersection of two gradients +3.0 and -5.0 percent. Design the length of summits curve to provide a stopping sight distance for a design of 80kmph. Assume other data. **(06 Marks)**

PART – B

5 a. Explain how the C.BR value of the given soil is found in the laboratory. **(08 Marks)**

b. A plate load test was conducted on a soaked subgrade during monsoon season using a plate diameter of 30cm. The test values are given below. Determine the modulus of subgrade reaction for the standard plate. **(06 Marks)**

Mean settlement values in mm	0.0	0.24	0.52	0.76	1.02	1.23	1.53	1.76
Load values in kg	0.0	460	900	1180	1360	1480	1590	1640

c. What are the tests conducted to judge the desirable properties and suitability of the following highway materials i) Road aggregates ii) Bitumen binder. **(06 Marks)**

6 a. Explain E.S.WL. How it is determined for a dual wheel load assembly by graphical method? **(06 Marks)**

b. Calculate the stresses at interior, edge and corner region of a cement concrete pavement using Westergaard's stress equations and also determine the probable location where the crack is likely to develop due to corner loading.
Wheel load P = 5100kg
Modulus of elasticity of cement concrete E = 3.0×10^5 kg/cm^2.
Pavement thickness h = 18cm
Poisson's ratio of concrete $\mu = 0.15$
Modulus of subgrade reaction K = 6.0kg/cm^3
Radius of contact area a = 15cm **(08 Marks)**

c. Design the flexible pavement for construction of new highway with the following data :
Number of commercial vehicles as per
Period of construction = 3 years
Initial traffic = 3500CV per day
Annual traffic growth rate = 6.5%
Category of road N.H 2 lane single carriage way.
Design life 15 years
VDF = 40, LDF = 75%
Use the following pavement design catalogue for 10% CBR ; sketch the pavement structure

Cumulative traffic (msa)	Total pavement thickness (mm)	Pavement		Composition
		Bituminous surfacing		Granular base and sub base (mm)
		BC (mm)	DBM (mm)	
10	540	40	50	Base 250 sub base 200
20	565	40	75	
30	580	40	90	
50	600	40	110	
100	630	50	130	
150	650	50	150	

(06 Marks)

7 a. What are the steps followed for the construction of new highway on cutting. **(06 Marks)**

b. What are the importances of highways drainage? **(06 Marks)**

c. The maximum quantity of water expected in one of the open longitudinal drainage on clayey soil is 0.9m^3/sec design the cross section and longitudinal slope of trapezoidal drain assuming the bottom width of the section to be 1.0m and cross slope to the 1.0 vertical to 1.5 horizontal. The allowable velocity of flow in the drain is 1.2m/sec and mannings roughness coefficient is 0.02. **(08 Marks)**

8 a. What are the benefits to the road users and to other in the region due to improvement of the highway? **(08 Marks)**

b. Calculate the annual cost of a stretch of highway from to following particulars :

Item	Total cost in Lakhs Rs	Estimated life years	Rat of interest %
Land	35.0	100	6
Earthwork	40.0	40	8
Bridges culverts Drainage	50.0	60	8
Pavement	100.0	15	10
Traffic signs and road appetencies	15.0	5	10

The average cost of maintenance of the road is Rs 1.5 lakhs per year. **(06 Marks)**

c. What are the factors to the considered for evaluation of vehicle operation cost? **(06 Marks)**

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10CV61

Sixth Semester B.E. Degree Examination, June/July 2017
Environmental Engineering - I

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 need for protected water supply system for a city or town. **(04 Marks)**

b. What is rate of demand? Explain any six factors affecting the rate of demand. **(08 Marks)**

c. What is Population forecasting? List any six methods of population forecasting. Explain the graphical method in detail, with a sketch. **(08 Marks)**

2 a. Define design period and explain any four factors governing the design period. **(06 Marks)**

b. Forecast the population of a city by 2030 whose sensus record is as follows using i) Geometrical increase method and ii) Incremental increase method. **(14 Marks)**

Year :	1970	1980	1990	2000
Population in thousands	160	169	180	195

3 a. Explain the following sources of water with respect to quantity and quality : i) Open well ii) River. **(06 Marks)**

b. What are Intake structures? List the different types of intakes and explain any one, with a neat sketch. **(08 Marks)**

c. Define Optimum dosage of co-agulant and explain the Jar test in detail. **(06 Marks)**

4 a. Give the permissible limit and effects of following impurities in drinking water : i) Fluorides ii) Chlorides iii) Nitrites iv) Iron. **(08 Marks)**

b. Give the four objectives of water analysis. **(04 Marks)**

c. What is Aeration of water? What are its objectives? List the different types of aerators. **(08 Marks)**

PART – B

5 a. Explain with a neat sketch the working of a horizontal type pressure filter. **(06 Marks)**

b. Compare Slow Sand Filter (SSF) with Rapid Sand Filter (RSF) for the following parameters i) Rate of filteration ii) Method of cleaning iii) Maximum size of each unit iv) Bacterial removal efficiency v) Filter media sand. **(10 Marks)**

c. Explain i) Uniformity co-efficient (UC) ii) Air binding. **(04 Marks)**

6 a. Give any three i) Mechanism of disinfection and ii) Requirements of good disinfectant. **(06 Marks)**

b. Explain i) Pre chlorination and Plain chlorination ii) Super chlorination and Dechlorination. **(04 Marks)**

c. What is Softening of water? Explain in detail lime – soda method of softening with advantages and disadvantages. **(10 Marks)**

7 a. How do you arrive the capacity required for a service reservoir? Explain. **(04 Marks)**

b. What is Defluoridation? Explain any two methods of defluoridation. **(08 Marks)**

c. List the different methods of layout of distribution system. Explain any one method with its merits and demerits. **(08 Marks)**

8 a. What are Pipe appurtenances? List them. **(04 Marks)**

b. With a neat sketch, explain i) Post type fire hydrant ii) Reflux valve. **(10 Marks)**

c. Explain the use of following chemicals in water treatment : i) Activated carbon ii) Copper sulphate iii) Bleaching powder iv) Alum v) Zeolites vi) Sodium hypo chlorite. **(06 Marks)**

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10CV62

Sixth Semester B.E. Degree Examination, June/July 2017
Design and Drawing of RC Structures

Time: 4 hrs. Max. Marks:100

Note: *1. Answer any TWO full questions from Part-A, ONE from Part-B.*
2. Use of IS 456 – 2000 and SP – 16 is permitted.

PART – A

1 A rectangular beam of cross section 300 × 450mm is supported on 5 columns which are equally spaced at a c/c distance of 3.3m. The columns are 300 × 300mm in section. The reinforcement in beam consists of 4 bars of 16mm dia (+ve reinforcement) at midspan and 4 bars of 16mmdia at all supports (–ve reinforcement). 2 bars of +ve reinforcement have been curtailed near each support. Anchor bars consists of 2 – 16mm dia. Stirrups are of 8mm dia. 2 legged vertical at 200 c/c. Draw longitudinal section and important cross sections. Grade of concrete M20 and steel Fe 415 grade. **(20 Marks)**

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

Size of stair case room	= 2200 × 4600mm
Width of flight	= 1050mm
Width of landing	= 1050 mm
Number of treads in each flight	= 10
Thread	= 250mm and
Rise	= 150mm
Wall thickness	= 230mm all-round
Waist slab thickness	= 150mm
Main steel	= 120mm HYSD bars @ 100 c/c and

Distribution steel for each flight 8mm = @ 200 c/c
First flight starts from ground floor level (GFL) and foundation is 750mm below GFL :
Second flight rests on wall. Draw to a suitable scale

a. Plan
b. Section along first flight
c. Section along second flight. **(20 Marks)**

3 A square column of size 300mm × 300mm is provided with square isolated footing of size 3m × 3m.

Details of column	: height of column 3m above GL
Longitudinal steel	: 8 no.'s of 12mm dia
Transverse steel	: 8mm dia lies at 200 c/c

(One square tie connecting corner bars + another diamond tie connecting inner bars).

Details of footing	: depth of footing 1.2m below GL
Depth of footing at column face	: 520mm
Depth of footing at the edge	: 230mm
Reinforcement	: a mesh of 12mm dia HYSD bars at 150mm c/c

Provide suitable cover to steel reinforcement
Draw to a suitable scale :

a. Plan
b. Sectional details
c. Prepare bar bending schedule. **(20 Marks)**

PART – B

4 Design a cantilever retaining wall to retain earth embankment 4.75m height above ground level. The density of earth 18kN/m^3 and its angle of repose - 30°. The embankment is horizontal at the top. SBC of the soil may be taken as 200 kN/m^2 available at 1.25m below ground level the coefficient of friction between soil and concrete is 0.5. Adopt M20 grade of concrete and Fe 415 steel. **(40 Marks)**

Draw to a suitable scale :

a. Cross sectional elevation
b. Longitudinal section showing stem reinforcement and curtailment–for a length of 2m.
c. Section showing heel and toe reinforcement. **(20 Marks)**

5 Design an RCC combined footing for two columns 3.2m apart.
Column A– 300mm × 300mm = P_A = 825 kN
Column B– 300mm × 300mm = P_B = 930 kN
Safe bearing capacity of soil may be taken as 175 kN/m^2. The boundary line is at a distance of 0.8m from the centre line of column A. Use M20 grade concrete and Fe 415 grade steel. **(40 Marks)**

Draw to a suitable scale :

a. Sectional elevation
b. Plan of bottom reinforcement
c. Cross-sections at salient points. **(20 Marks)**

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10CV63

Sixth Semester B.E. Degree Examination, June/July 2017

Transportation Engineering – II

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Missing data, if any, may be suitably assumed.***

PART – A

1 a. Mention the different gauges that are used in Indian railways. Discuss the factors affecting adoption of a particular gauge. **(06 Marks)**

b. With neat sketches, explain coning of wheels and tilting of rails. **(06 Marks)**

c. What is meant by wear of rails? How do you classify the wear? Discuss the various causes of wear. **(08 Marks)**

2 a. List the different fixtures used in railway track and give the dimensional sketch of fish plate. **(06 Marks)**

b. Determine the quantity of materials required to construct a 800 m long BG railway track, assuming a sleeper density of (n + 5). **(06 Marks)**

c. Calculate the maximum permissible train load that a B.G. locomotive can haul with 3 pairs of driving wheels with axle load of 22 kN each on a straight level track at a speed of 80 kmph. Calculate the reduction in speed, if the train has to run on a rising gradient of 1 in 200. What would be the further reduction in speed if the train has to negotiate a 4° curve on the rising gradient? Assume coefficient of friction as 0.2. **(08 Marks)**

3 a. Define: i) Super elevation ii) Negative cant
iii) Cant deficiency iv) Grade compensation on curves **(06 Marks)**

b. An 8° curve branches off from 4° main curve in B.G. layout. If the speed on branch line is 28 kmph, find the speed on main line. Cant deficiency is 7.61 cm. **(06 Marks)**

c. Calculate the maximum permissible speed on a curve of highspeed B.G. track having the following particulars:
Degree of curve = 1°
Amount of super elevation = 8 cm
Length of transition curve = 130 m
Max. speed of the section likely to be sanctioned = 153 kmph. **(08 Marks)**

4 a. Calculate the elements of a BG turnout, if feel divergence is 11.43 cm. Number of crossing is 16 and angle of switch is 1°8′0″. Straight arm distance = 0.9 m. **(06 Marks)**

b. With a neat sketch show the details of acute angle crossing. Indicate: i) actual, ii) theoretical rose of crossing. **(06 Marks)**

c. What is signaling? What are the objectives of signaling? List the types of signals. **(08 Marks)**

PART – B

5 a. Write a note on aircraft characteristics. **(08 Marks)**

b. Define wind rose diagram. With a neat sketch, explain the method of locating the best orientation of runway. **(06 Marks)**

c. Write a note on airport classification. **(06 Marks)**

6 a. A taxiway is to be designed for operating a Boeing aircraft, which has the following characteristics. Determine the turning radius of the taxiway.
Wheel base W = 17.70 m
Tread of main gear = 6.62 m
Width of taxiway, T = 22.5 m
Turn-off speed = 40 kmph
Coefficient of friction = 0.3 **(06 Marks)**

b. Explain the various types of airport markings. **(06 Marks)**

c. An airport is planned at an elevation of 380 m above MSL. The monthly mean of maximum and average daily temperatures for the hottest month at the site are 40°C and 28°C respectively. The effective gradient is 0.18 percent. Determine the length of runway required at the proposed site if the basic runway length is 1900 m. **(08 Marks)**

7 a. Write short notes on:
i) Tunnel lining
ii) Tunnel drainage **(08 Marks)**

b. Explain various shapes of tunnel with neat sketches. **(06 Marks)**

c. With a neat sketch, explain the needle beam method of tunneling in soft soils. **(06 Marks)**

8 a. Explain the functions of :
i) Wharfs and quays
ii) Wet and dry docks **(08 Marks)**

b. Draw a neat sketch of artificial harbor, explain the various components. **(06 Marks)**

c. Define breakwater. Explain any one type of breakwater. **(06 Marks)**

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10CV64

Sixth Semester B.E. Degree Examination, June/July 2017
Geotechnical Engineering - II

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What are the objectives of Soil Exploration? **(06 Marks)**

b. List the methods of dewatering techniques used in the field. Explain any one method, with a neat sketch. **(06 Marks)**

c. A sampling tube has inner diameter of 70mm and cutting edge diameter of 68mm. Its outside diameter are 72 mm and 74 mm respectively. Determine area ratio, inside clearance, outside clearance of the sampler. This tube is pushed at the bottom of the borehole to a distance of 550mm with length of sample recorded being 530mm. Find the recovery ratio. **(08 Marks)**

2 a. List the assumptions and limitations of Boussinesq's theory of stress in soils. **(08 Marks)**

b. Explain the construction and use of Newmark's chart. **(08 Marks)**

c. A water tank is supported by a ring foundation having outer diameter of 10m and inner diameter of 7.5m. The ring foundation transmit uniform load intensity of 160kN/m^2. Compute the vertical stress induced at a depth of 4m below the centre of ring foundation using Westergaurd's analysis. Take $\mu = 0$. **(04 Marks)**

3 a. What are Flow nets? Explain with a neat sketch. List their characteristics. **(08 Marks)**

b. Explain Graphical method of determining phreatic line in homogeneous earthen dam with horizontal drainage filter. **(08 Marks)**

c. For the earthern dam of homogeneous section with horizontal filter, the coefficients of permeability in x & y directions are 8×10^{-7} cm/sec and 3.6×10^{-7} cm/sec respectively. The flow nets constructed gave number of flow channels to be 4 with potential drops 18. Determine the discharge through the dam in m^3/day if the head during seepage was 14m. **(04 Marks)**

4 a. With a neat sketch, explain different types of earth pressures. **(06 Marks)**

b. Differentiate between Rankine's and Coloumb's theory. **(04 Marks)**

c. A retaining wall of 8m height retains sandy material. The properties of sand are e = 0.6 , Q = 30^0 and G = 2.65. The water table is at a depth of 2.5m from the ground surface. Draw the earth pressure diagram and determine the magnitude and point of application of the total active earth pressure. **(10 Marks)**

PART – B

5 a. With neat sketches, explain types of slope failures and its causes. **(08 Marks)**

b. Explain Friction circle method of stability analysis to slopes. **(08 Marks)**

c. An embankment is inclined at an angle of 35^0 and its height is 15m. The angle of shearing resistance is 15^0 and cohesion intercept is 40kN/m^2. The unit weight of soil is 18kN/m^3. Find the factor of safety with respect to cohesion. Consider Taylor's stability number as 0.06. **(04 Marks)**

6 a. With a neat sketch, explain the effect of eccentric loading on footing. **(04 Marks)**

b. With a neat sketch, explain plate load test. **(06 Marks)**

c. Determine the safe bearing capacity of square footing of 2.1m width placed at a depth of 1.5m in a soil with a moist unit weight of $17kN/m^3$, C = $15kN/m^2$ and Q = 30^0. Take $N_c = 11.8$, $N_q = 3.9$ and $N_r = 1.7$. What is the change in bearing capacity if the water table raises to 0.5m above the base of the footing? Assume F = 3. **(10 Marks)**

7 a. Explain the terms Immediate settlement, Consolidation settlement , Secondary settlement and Differential settlement. **(08 Marks)**

b. Estimate the immediate settlement of a footing of size (2 × 3)m resting at a depth of 2m in sandy soil whose compression modulus is $10N/mm^2$ and the footing is expected to transmit a unit pressure of $160 kN/m^2$. Assume $\mu = 0.28$ and $I_f = 1.06$. **(04 Marks)**

c. A square footing (1.2m × 1.2m) rests on a saturated clay layer of 4m deep. The soil properties are W_L = 30% , r_{sat} = $17.8kN/m^3$, W = 28% and G = 2.68. Determine the primary consolidation settlement if the footing carries a load of 300kN. **(08 Marks)**

8 a. Explain the factors influencing the choice of foundation. **(06 Marks)**

b. Discuss the proportioning of isolation footing. **(06 Marks)**

c. Write a note on classification of pile foundation. **(08 Marks)**

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10CV65

Sixth Semester B.E. Degree Examination, June/July 2017
Hydraulic Structures and Irrigation Design Drawing

Time: 4 hrs. Max. Marks:100

Note: *1. Answer any TWO questions from Part-A and ONE full question from Part-B.*
2. Missing data, if any, may be suitably assumed.

PART - A

1 a. What is reservoir sedimentation? Explain with neat sketch. Also discuss various methods of reservoir sediment control. **(07 Marks)**

b. Briefly explain the procedure for determining the storage capacity and yield of a reservoir using mass curve. **(08 Marks)**

2 a. Explain the various modes of failure of gravity dam and mention their remedies. **(07 Marks)**

b. Design the practical profile of a gravity dam of stone masonry given the following data :

R.L. of base of dam	= 1450m
R.L. of F.R.L.	= 1480.5m
Specific gravity of the masonry	= 2.4
Safe compressive stress for masonry	= 1200 kN/m^2
Height of waves	= 1m.

(08 Marks)

3 a. Explain the method of plotting phreatic line for an earth dam with horizontal filter at downstream. **(07 Marks)**

b. For a homogeneous earth dam 52m high, and 2m free, board a flow net was constructed and following results were obtained.
Number of potential drops = 25
Number of flow channels = 04
The dam has a horizontal filter of 40m length at its d/s end. Calculate the discharge per meter length of the dam if the coefficient of permeability of the dam is 3×10^{-3} cm/sec. **(08 Marks)**

PART - B

4 Design the surplus work of a tank forming part of a chain of tanks.

Combined catchment area	= 25.89 sq.km
Intercepted catchment area	= 20.71 sq.km
Maximum water level	= + 12.75
Full tank level	= + 12.00
Ground level at proposed site	= + 11.00
Ground level below proposed Weir up to a reach of 6m(Fall)	= + 10.00
Top width of tank bund	= 2.00m
Tank Bund Level (TBL)	= +14.50
Side slopes of bund on either side	= 2 : 1
Design saturation gradient (HGL)	= 4 : 1
Level of hard strata	= + 9.50
Ryve's coefficient for combined catchment	= 9
Ryve's coefficient for intercepted catchment	= 1.5

Provision may be made to make kutcha regulating arrangements to store water up to MWL in times of necessity. **(25 Marks)**

Draw :

a. Half plan at foundation and half plan at ground level. **(20 Marks)**

b. Draw half longitudinal section and half longitudinal elevation. **(15 Marks)**

c. Cross section across surplus weir. **(10 Marks)**

5 Design (Hydraulic design only) a suitable cross-drainage work given the following data at the crossing of a canal and a drainage.

Canal :

Full supply discharge	= 32 cumes
Full supply level	= + 213.5
Canal bed level	= + 212.0
Canal bed width	= 20
Trapezoidal canal section with 1.5H : 1V slopes	
Canal water depth	= 1.5m

Drainage :

High flood discharge	= 300 cumes
High flood level	= 210.0m
High flood depth	= 2.5m
General ground level	= 212.5m. **(25 Marks)**

Draw :

a. Plan showing all details. **(20 Marks)**

b. Longitudinal section. **(15 Marks)**

c. Cross section showing all details. **(10 Marks)**

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10CV661

Sixth Semester B.E. Degree Examination, June/July 2017
Theory of Elasticity

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. When a body is subjected to stresses σ_x , σ_y and σ_z in x, y and z directions respectively, Obtain an expression for σ_x as $\sigma_x = \lambda\epsilon + 2G\epsilon_x$. **(10 Marks)**

Where , $\lambda = \frac{\mu E}{(1-2\mu)(1+\mu)}$ and $\epsilon = \epsilon_x + \epsilon_y + \epsilon_z$.

Hence derive $(\lambda + G)\frac{\partial \epsilon}{\partial x} + G\nabla^2 u + x = 0$.

b. The possible state of stress in a solid is given by
$\sigma_x = c_1x^2yz$
$\sigma_y = c_2 xyz^3$
$\sigma_z = 2(x^3 + y^3 - 2yz)$
$\tau_{xy} = -3xy^2z$
$\tau_{yz} = c_3[6y^2z^2 - 5xz^4 + 8(x^2 + y^2)]$
$\tau_{zx} = -3xyz^2$. Find the values of c_1, c_2 and c_3. **(10 Marks)**

2 a. Derive the two sets of compatibility equations in terms of strains for three dimensional cases. **(10 Marks)**

b. Find the constants of c_1, c_2 and c_3 at point (2, -1) for the stress distribution given as :
$\sigma_x = -2xy^2 + c_1x^3$
$\sigma_y = -1.5c_2xy$
$\tau_{xy} = -c_2y^3 - c_3x^2y$. **(10 Marks)**

3 a. If E is replaced by $\frac{E_1}{1-\mu_1^2}$ and μ by $\frac{\mu_1}{1-\mu_1}$ in plane stress constitutive relations, prove that

$$\nabla^2(\sigma_x + \sigma_y) = -\frac{1}{(1-\mu_1)}\left(\frac{\partial X}{\partial x} + \frac{\partial Y}{\partial y}\right).$$ **(10 Marks)**

b. Determine the principal strains and their directions for an equiangular strain rosette.
Given : $\epsilon_0^0 = 550 \times 10^{-6}$ $\epsilon_{60^0} = -100 \times 10^{-6}$ $\epsilon_{120^0} = 150 \times 10^{-6}$. **(10 Marks)**
Also determine the principal stresses given $\mu = 0.3$ and E = 200GPa.

4 a. For a simply supported beam of length 2L , depth 2h and unit width loaded by concentrated load W at midspan, the stress function satisfying the loading condition is **(10 Marks)**

$\phi = \frac{b}{6}xy^3 + cxy$. Determine the constants "b" and "c". Also find the stresses in the beam.

b. Check whether the following is a stress function. If it is, investigate what problem it can solve when applied to region y = 0 , y = d and x = 0 and $x \geq 0$. **(10 Marks)**

$\phi = -\frac{F}{d^3}xy^2(3d - 2y)$.

PART – B

5 a. Derive equation of equilibrium in polar co-ordinates. **(10 Marks)**

b. Show that $\phi = \frac{-py}{\pi} \tan^{-1} \frac{y}{x}$ is a stress function. Also prove that it represents a case of simple radial stress distribution. **(10 Marks)**

6 a. Prove that for a solid rotating disk, the maximum stresses are given by

$(\sigma_r)_{max} = (\sigma_\theta)_{max} = \left(\frac{3+\mu}{8}\right) \rho w^2 b^2$. **(10 Marks)**

b. Also prove that for a hollow disk of inner radius "a" and outer radius "b",

$(\sigma_r)_{max} = \left(\frac{3+\mu}{8}\right) \rho w^2 (b-a)^2$. Show that $(\sigma_\theta)_{max} > (\sigma_r)_{max}$. **(10 Marks)**

7 Discuss the effect of a circular hole on the stress distribution in a rectangular plate subjected to a tensile stress s in x – direction only and hence evaluate stress concentration factor. **(20 Marks)**

8 a. Prove that for non – circular sections subjected to torsion $T = GJ\theta$.
Where, GJ = Torsional rigidity. **(10 Marks)**

b. A 2 – celled thin walled tube, each cell having dimensions of a × a with uniform wall thickness δ. Show that there will be no stress in the central web when the tube in twisted. **(10 Marks)**

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10CV666

Sixth Semester B.E. Degree Examination, June/July 2017
Rural Water Supply and Sanitation

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Briefly explain the various sources of water being practicing in rural area. **(06 Marks)**

b. List the water borne diseases and their controlling measures. **(08 Marks)**

c. Discuss the health significance and limits of the following parameters :
i) Fluoride ii) Nitrates iii) Sulphate iv) Chloride. **(06 Marks)**

2 a. What is Defluoridation? Explain Nalagonda technique for removal of fluoride, with neat sketch. **(10 Marks)**

b. Define Disinfection. Explain the break point chlorination with graphical representation. **(10 Marks)**

3 a. Explain the following with neat sketch : i) Aqua privy ii) Two pit latrines. **(10 Marks)**

b. Design a septic tank and soak well for the following data :
i) No. of people = 100 ii) Sewage / capita / day = 120 litres
iii) Desludging period = 1 year iv) Percolation rate = 1250 ℓ/m^3/day
v) Length to width ratio of septic tank = 4 : 1 vi) Detention period = 24 hours
vii) Rate of sludge deposited = 30litres/capita/year viii) Depth of septic tank = 1.5m
ix) Depth of soak pit = 2m x) Free board = 0.3m. **(10 Marks)**

4 a. Explain the disposal of storm water and sullage disposal in rural areas. **(10 Marks)**

b. What is Rain water harvesting? Discuss briefly with sketches how the rain water is being harvested from roof top. **(10 Marks)**

PART – B

5 a. Explain the different methods of communication of communicable diseases with examples. **(10 Marks)**

b. Define Communicable diseases and explain the general methods of control of communicable diseases. **(10 Marks)**

6 Explain the following :
a. Salvaging.
b. Dumping in low lands.
c. Composting.
d. Biogas plant. **(20 Marks)**

7 a. Explain all the essentials necessary to obtain the objectives of milk sanitation. **(08 Marks)**

b. Describe the important points to be considered for planning the construction of a cow shed. **(04 Marks)**

c. Explain any two method of pasteurization. **(08 Marks)**

8 a. Explain the life cycle of a mosquito. **(08 Marks)**

b. Mention the diseases transmitted by mosquito. **(04 Marks)**

c. Explain the various fly control measures. **(08 Marks)**

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10CV72

Seventh Semester B.E. Degree Examination, June/July 2017
Design of Steel Structures

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. Use of IS: 800-200 and steel tables is permitted.

PART – A

1 a. Describe briefly advantages and disadvantages of steel structures. **(05 Marks)**

b. What are the different loads and load combinations to be considered in the design of steel structure. **(05 Marks)**

c. Explain rolled steel sections. What are the different types of rolled steel section used in construction? **(06 Marks)**

d. Explain briefly the limit state method of design of steel structure. **(04 Marks)**

2 a. Briefly explain different types of bolts. **(04 Marks)**

b. Determine the safe load P that can be carried by the bracket. The bracket plate is of 10mm thick M20 bolt of grade 5.6 are used. **(16 Marks)**

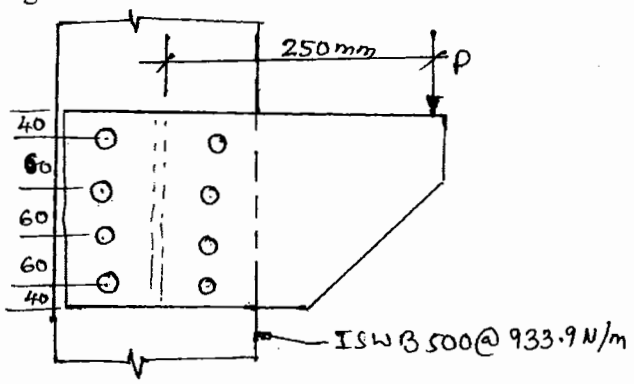

Fig Q2(b)

3 a. Describe briefly advantages and disadvantages of welded connection. **(04 Marks)**

b. What are the common defects in welding? Explain with neat sketch. **(06 Marks)**

c. A tension member consists of 2ISA 100×75×8 carries a factored tensile load of 300kN. The angles are connected to a 10mm thick gusset plate with longer legs placed back to back on either side of gusset plate. Design the joint assuming shop welding and only side weld are provided. **(10 Marks)**

4 a. Define i) Plastic hinge ii) Mechanism iii) Shape factor. **(06 Marks)**

b. Find out the collapse load for a propped cantilever subjected to a concentrated load at the midspan of the beam using upper bound theorem. **(04 Marks)**

c. Determine the plastic moment capacity (M_P) for the beam loaded as shown in Fig Q4(c). Use load factor 1.6. **(10 Marks)**

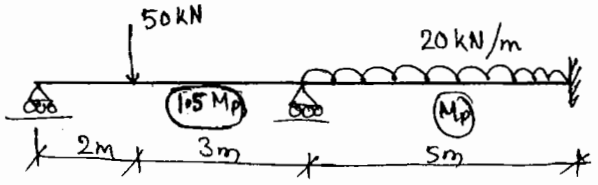

Fig Q4(c)

PART – B

5 a. Explain different forms of tension members commonly used in steel structures. **(04 Marks)**

b. Design a single unequal angle tension member to carry a factored load of 300kN. The length of the member is 3.0m. The tension member is connected to a gusset plate of 16mm thick with one line of M20 bolts of grade 8.8. Take pitch = 60mm and edge distance = 40mm. use steel of Fe 410. **(16 Marks)**

6 a. Calculate the design strength of discontinuous strut of length 3.2m. The strut consists of two unequal angles 100 × 75 × 8 with longer legs placed back to back on either side of 10mm thick gusset plate. Assume steel of grade Fe 410. **(06 Marks)**

b. Design a single lacing system for a column 8m long consists of 2 ISMC 300 placed back to back such that $I_{zz} = I_{yy}$. The column is subjected to factored load of 1250kN and is hinged at both ends. Assume steel of grade Fe 410 and bolts are of grade 4.6. **(14 Marks)**

7 Design a suitable bolted gusseted base for a built up column consists of ISHB 350@ 661.2N/m with cover plate of 400mm × 20mm on either flange carrying a axial compressive factored load of 2400kN. The box rests on M20 grade of concert pedestal. Use M24 bolts of grade 5.6 for making connection. Sketch the details. **(20 Marks)**

8 Design a steel beam for supporting RC slab with clear span of 5.0m thickness of end bearing wall 230mm. total service load acting on this floor is 10kN/m^2. The beams are provided at 3.5m C/C. The compression flange is laterally supported throughout its length. Design should satisfy all necessary checks. **(20 Marks)**

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10CV73

Seventh Semester B.E. Degree Examination, June/July 2017

Estimation and Valuation

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer full question from PART-A.***
2. Answer FOUR full questions, selecting at least TWO questions from PART-B and PART-C.

PART – A

1 Prepare a detailed estimate for residential building shown in Fig.Q1 (i) and (ii) for following items of work. Prepare an abstract also. Adopt center line method.
i) Earth work in excavation for foundation in hard soil at Rs.125/m^3
ii) C.C bed 1:4:8 for walls at Rs.2500/m^3 and basement at Rs.2500/m^3
iii) First class brick work in C.M. 1:4 in foundation and basement at Rs.4000/m^3
iv) D.P.C. 2.5 cm thick with standard water proofing compound at Rs.4100/m^2
v) First class brick work in C.M in 1 : 6 in superstructure including parapet Rs.4000/m^3. **(40 Marks)**

PART – B

2 Prepare a detailed estimate of a septic tank with a soak pit shown in Fig.Q2 for following items of work. **(15 Marks)**
i) Earth work in excavation ii) C.C. bed 1:3:6
iii) First class brickwork in C.M. 1:4 iv) 12 mm thick cement plastering of walls

3 Write detailed specification of any three of following:
i) Reinforced cement concrete (R.C.C) ii) Damp proof course 2.5 cm cc 1:1½:3
iii) First class brickwork iv) Plastering in C.M. **(15 Marks)**

4 a. What is an estimate? What are the different data required to prepare an estimate? Explain. **(07 Marks)**

b. Enumerate various types of estimate. Explain any one in brief. **(08 Marks)**

PART – C

5 Carry out rate analysis for any three of following:
i) Cement concrete 1:2:4 in foundation
ii) Coursed rubble stone masonry in superstructure in 1:6 cement mortar
iii) 12 mm thick plastering in C.M. 1:6
iv) 2.5 cm thick cement concrete 1:1½:3. Damp proof course (DPC). **(15 Marks)**

6 Prepare a detailed estimate for earth work for portion of a road from following data:

Chainage in metres	0	100	200	300	400	500
R.L. of ground	114.50	114.75	115.25	115.20	116.10	116.85
R.L. of formation in m	←115 upward gradient upto 600 as 1 in 200					

600	700	800	900	1000	1100	1200
118.00	118.25	118.10	117.80	117.75	117.90	119.50
←Downward gradient 1 in 400 →						

Formation width of road is 10 m. side slope 2:1 in banking and 1½:1 in cutting. The cost of filling is Rs.220/m^3 and cutting is Rs.150/m^3. **(15 Marks)**

7 a. Explain any two of following:
   i) Normal Muster Roll (NMR)
   ii) Measurement Book (MB)
   iii) Earnest Money Deposit (EMD) **(05 Marks)**

   b. What is valuation? What are the various purposes of valuation? **(05 Marks)**

   c. Explain sinking fund method of valuation. **(05 Marks)**

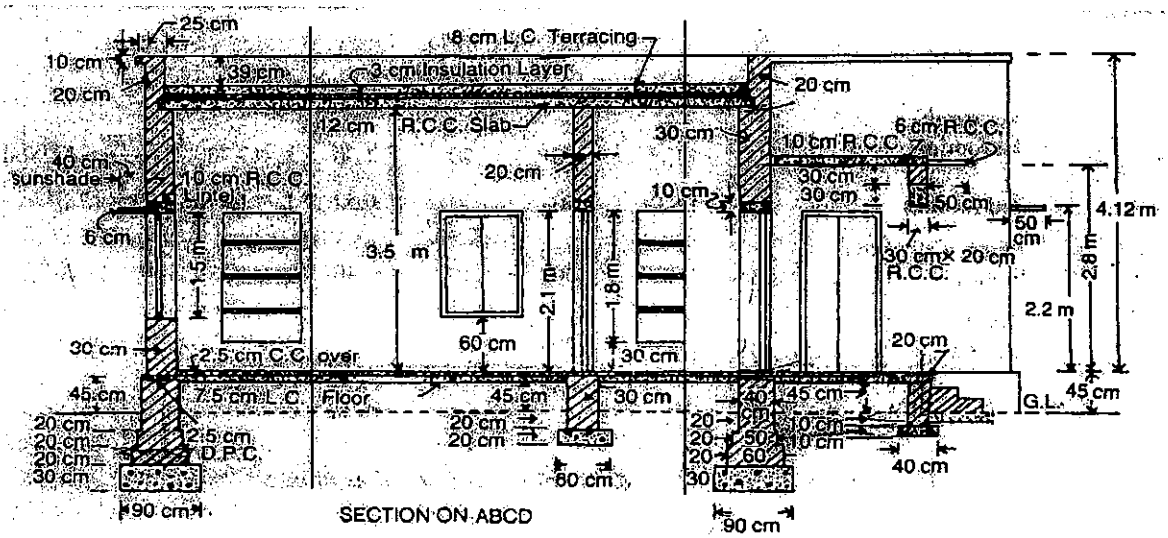


Fig.Q1(i)

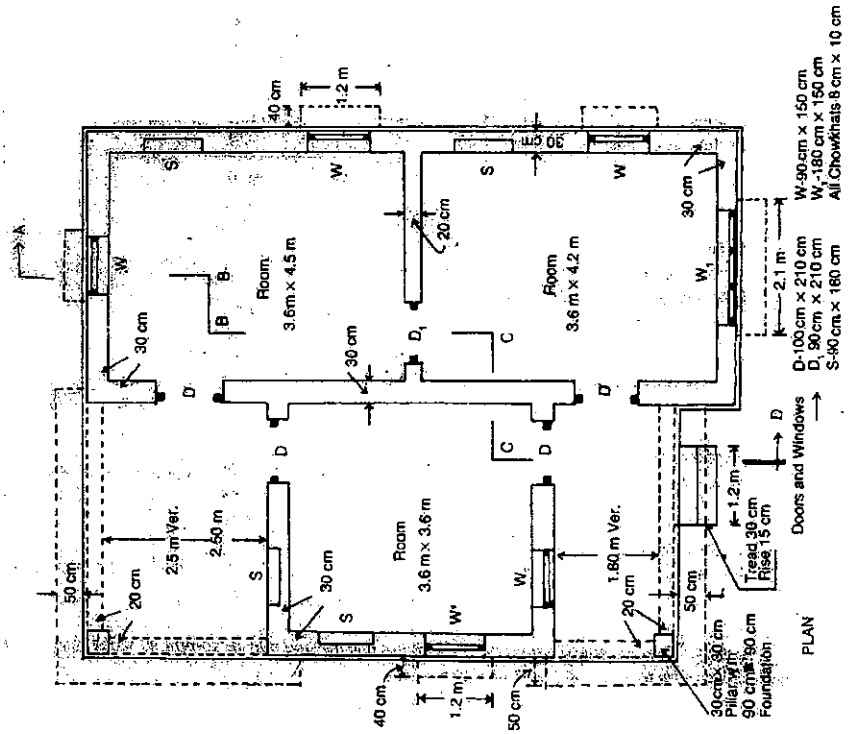
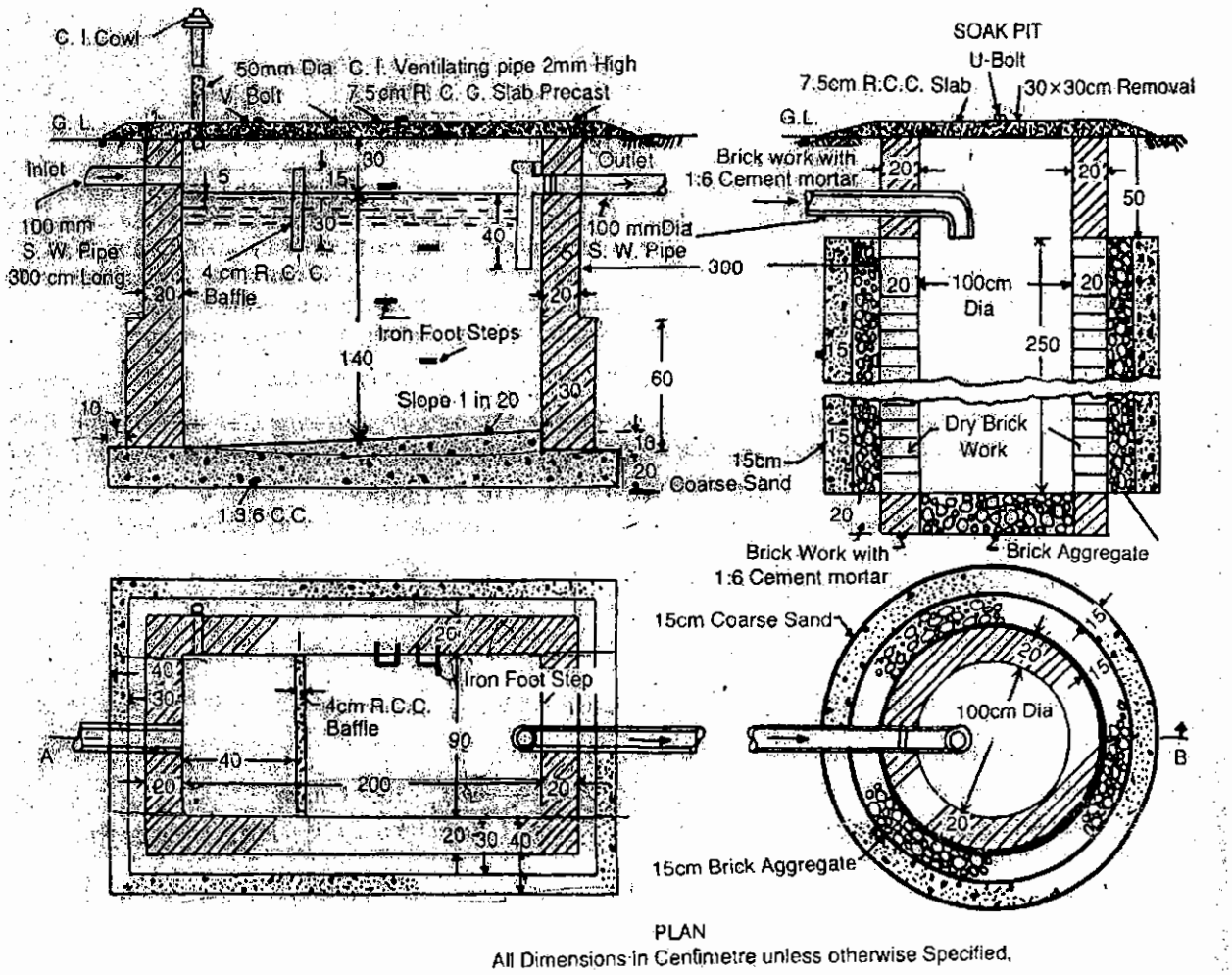


Fig.Q1(ii)



All Dimensions in Centimetre unless otherwise Specified.

Fig.Q2

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10CV74

Seventh Semester B.E. Degree Examination, June/July 2017
Design of Pre-Stressed Concrete Structures

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Use of IS : 1343 – 1980 is permitted.
3. Missing data, if any, may be suitably assumed.

PART – A

1 a. Explain why high strength steel and high strength concrete are used in pre-stressed concrete. **(08 Marks)**

b. Define pre-stressed concrete. State its advantages over reinforced concrete. **(06 Marks)**

c. What is pressure line? Explain its significance. **(06 Marks)**

2 a. Distinguish between the pre-tensioning and post- tensioning methods of pre-stressing. Explain with suitable example. **(06 Marks)**

b. A pre-stressed concrete beam, 200 mm wide and 300mm deep is used over an effective span of 6m to support an imposed load of 4 kN/m. The density of concrete is 25 kN/m^3. At the quarter span section of the beam, find the magnitude of :

i) Concentric pre-stressing force necessary for zero fibre stress at the soffit when the beam is fully loaded

ii) The eccentric pre-stressing force located 100mm from the bottom of the beam, which would nullify the bottom fibre stress due to loading. **(14 Marks)**

3 a. List and explain the various types of loss of pre-stress in pre-tensioned and post-tensioned members. **(06 Marks)**

b. A post tensioned concrete beam, 100mm wide and 300mm deep, spanning over 10m is stressed by successive tensioning and anchoring of three cables 1, 2 and 3 respectively. The cross-sectional area of each cable is 200mm^2 and initial stress in cable is 1200 N/mm^2. Modular ratio = 6. The first cable is parabolic with an eccentricity of 50mm below centroidal axis at the center of span and 50mm above centroidal axis at support sections. The second cable is parabolic with zero eccentricity at supports and an eccentricity of 50mm at the centre of span. The third cable is straight with a uniform eccentricity of 50mm below centroidal axis. Estimate percentage loss of stress in each of the cables, if they are successively tensioned and anchored. **(14 Marks)**

4 a. What are the factors influencing deflections of a PSC beam? **(06 Marks)**

b. A concrete beam with a cross-sectional area of 32 $\times 10^3$ mm^2 and radius of gyration of 72mm is pre-stressed by a parabolic cable carrying an effective stress of 1000 N/mm^2. The span of the beam is 8m. The cable, composed of 6 – 7mm diameter, has an eccentricity of 50mm at the center and zero at the supports. Neglecting all losses, find the central deflection of the beam as follow :

i) Self – weight + pre-stress, and

ii) Self-weight + pre-stress + live load of 2 kN/m. Take E = 38 kN/mm^2 and density of concrete 24 kN/m^3. **(14 Marks)**

PART – B

5 a. What are the different types of flexural failure modes observed in pre-stressed concrete beam? Explain with neat sketches. **(06 Marks)**

b. A post-tensioned beam with unbounded tendons is of rectangular section, 400mm wide with an effective depth of 800mm. The cross-sectional area of the pre-stressing steel is 2840 mm^2. The effective pre-stress in the steel after all losses is 900 N/mm^2. The effective span of the beam is 16m. f_{ck} = 40 N/mm^2, estimate the ultimate moment of resistance of section using IS : 1343 recommendations. **(14 Marks)**

6 a. Explain different methods of improving the shear resistance of PSC members. **(04 Marks)**

b. The support section of a pre-stressed concrete beam 120 mm wide and 240mm deep is required to support an ultimate shear force of 75kN. The compressive pre-stress at the centroidal axis is 5 MPa, f_{ck} = 40 MPa, f_y = 415 MPa. Concrete cover to shear reinforcement is 50mm. Design a suitable shear reinforcement as per IS 1343 recommendations. **(16 Marks)**

7 a. What is transmission length? Explain factors influencing transmission length. **(06 Marks)**

b. The end block of a post tensioned beam is 500mm × 1000mm. Two cables each comprising 55numbers of 7mm dia high tensile wires carrying a force of 2800 kN are anchored using a plate of side 305mm. The anchor plate centers are located symmetrically at 250mm from top and bottom edges of beam. Using Fe415grade yield bars, design suitable reinforcement in the end block using IS : 1343 code recommendations. **(14 Marks)**

8 a. Write briefly about the limiting zone for cables in PSC members. **(06 Marks)**

b. A pre-tensioned PSC beam of rectangular cross-section is required to support a design ultimate moment of 120 kN-m. Design the section, take f_{ck} = 50 N/mm^2 and f_p = 1600 N/mm^2. **(14 Marks)**

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10CV755

Seventh Semester B.E. Degree Examination, June/July 2017
Highway Geometric Design

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Missing data, if any, may be suitably assumed.

PART – A

1 a. Briefly explain the various factors which affect the road user characteristics. **(06 Marks)**
b. List the various factors to be considered for the geometric design of highway. **(04 Marks)**
c. Enumerate the concept of PCU in geometric design of highways and list out the various factors governing PCU. Give same typical value as recommended by IRC. **(10 Marks)**

2 a. Briefly discuss the pavement surface characteristics. **(10 Marks)**
b. Explain how to decide the width of carriageway with neat sketch and mention IRC recommended values. **(06 Marks)**
c. In a district where the rainfall is heavy, a major district road of WBM pavement 3.8m wide and a state highway of bituminous concrete pavement 7.0m wide are to be constructed. What should be the height of crown with respect to the edges in these two cases? **(04 Marks)**

3 a. What are the factors on which SSD depends? Explain the reaction time of driver using PIEV theory. **(06 Marks)**
b. Derive an expression for calculating the overtaking sight distance (OSD) on a highway. **(07 Marks)**
c. Two vehicles A and B are moving in the same direction with speeds of 100 kmph and breaking efficiency of 70% and 50% respectively. An object is seen by the both the drivers on the road approximately at a distance of 250m. Find : i) which vehicle will meet with an accident and ii) if the accident to be avoided, what is the breaking efficiency required? **(07 Marks)**

4 a. Derive necessary condition for centrifugal force ration to avoid overturning and skidding of vehicle. **(04 Marks)**
b. What are the objects of providing extra-widening of pavements on horizontal curves. **(04 Marks)**
c. A state highway passing through a rolling terrain has a horizontal curve of radius equal to the rolling minimum radius and length 200m on this highway :
i) Design all the geometric features of this curve, assuming all data
ii) Compute the set back distances required from the centre line on the inner side of the curve 60 as to provide for SSD 90m. Distance between the centerlines of the road and inner lane is 1.9m. **(12 Marks)**

PART – B

5 a. Define gradient, explain in detail the different gradients adopted on a highway with specifications as per IRC. **(07 Marks)**
b. Explain how the length of summit curve is designed. **(05 Marks)**
c. A valley curve is formed by a desending grade of 1 in 25 meeting an ascending grade of 1 in 30m. Design the length of valley curve to fulfill both comfort condition and headlight sight requirements for a design speed of 80 kmph. C = 0.6,/sec. **(08 Marks)**

6 a. With the help of heat sketches, indicate the various intersections at grade. State the advantages and disadvantages of grade separated intersections. **(10 Marks)**

b. What is an overpass and underpass? Mention the advantages and disadvantages of overpass and underpass. **(10 Marks)**

7 a. Explain with neat sketches different component of a rotary. What are the different shape adopted for rotary? **(10 Marks)**

b. Design the rotary inter section for the data given below, with suitable assumptions. The highways intersect at right angles and have a carriage way width of 15m. Also draw the diagram of the rotary designed.

Approach	Left turning								
	1	2	3	1	2	3	1	2	3
N	200	50	100	250	100	250	150	50	80
E	180	60	80	220	50	120	200	40	120
W	220	50	120	180	60	100	250	60	100
S	250	80	100	150	50	90	160	70	90

i) Passenger cars – 1 PCU
ii) Heavy commercial vehicles 2.8 PCU
iii) Scooter/motorcycles 0.75 PCU. **(10 Marks)**

8 a. Explain the significance of highway drainage. **(05 Marks)**

b. Discuss the steps involved in hydraulic analysis of highway surface drainage. **(07 Marks)**

c. The maximum quantity of water expected in one of the open longitudinal drains on clayey soil is $0.9m^3/sec$. Design the cross-section and longitudinal slope of trapezoidal drain assuming the bottom width of the section to be 1m and cross slope to be 1v to 1.5 H. The allowable velocity of flow in the drain is 1.2m.sec and mannings roughness coefficient is 0.02. **(08 Marks)**

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10CV757

Seventh Semester B.E. Degree Examination, June/July 2017
Solid Waste Management

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Substantiate answer with neat sketches.
3. Missing data, if any, may be suitably assumed.

PART – A

1 a. Define the terms : i) solid waste ii) solid waste management. **(05 Marks)**

b. With a flow diagram, explain the material balance analysis method of waste quantification. **(10 Marks)**

c. Estimate unit solid waste generation rate for a residential area having 1500 dwellinges with 6 persons per hours. The observation taken for a week at a disposal facility is as follows :

Vehicle	Number of loads	Average volume	density, kg/m^3
Truck	10	10	350
Tractor	08	1.5	150
Private vehicle	22	0.3	100

(05 Marks)

2 a. With the aid of schematic of HCS and SCS, explain the terms : pick up hond, at site and off route. **(10 Marks)**

b. What is a transfer station'? Explain factors to be considered in the design of transfer station. **(10 Marks)**

3 a. Explain the factors to be considered in container on site process technique. **(10 Marks)**

b. What is meant by 'size reduction'? Enumerate the various equipments used and with a neat sketch, explain any one. **(10 Marks)**

4 a. What is pyrolysis? With a flow diagram, explain the process of pyrolysis. **(10 Marks)**

b. Briefly discuss the various factors to be considered is design of an incinerating system. **(10 Marks)**

PART – B

5 a. With neat sketch, explain Indore and Bangalore method of composting. **(10 Marks)**

b. Enumerate and briefly discuss the factors governing aerobic composting. **(10 Marks)**

6 a. What is a sanitary landfill? List and explain principal methods used for land-filling and explain is brief. **(10 Marks)**

b. With neat sketches, briefly explain the various vent systems used to control the lateral movement of gases in landfill. **(10 Marks)**

7 a. Discuss the merits and demerits of hog feeding with solid waste. **(06 Marks)**

b. Discuss the factors to be considered while disposing the solid waste into the ocean. **(06 Marks)**

c. Briefly discuss the salient features of "The bio-medical waste (management and handling)Rules, 2000. **(08 Marks)**

8 a. What are the various opportunities available for reuse and recycling of solid waste? **(08 Marks)**

b. Briefly explain the unit operations involved in processing recyclable materials. **(06 Marks)**

c. Give the classification of plastics. Which type of plastics are recycled? Mention the uses of each type. **(06 Marks)**

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10CV763

Seventh Semester B.E. Degree Examination, June/July 2017
Pavement Materials and Construction

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 desirable properties of aggregates to be used in different types of pavement construction. **(10 Marks)**

b. What are the various tests for judging the suitability of road stone for pavement construction? Discuss the objects of carrying out each of these tests. **(10 Marks)**

2 a. How is bitumen produced? **(05 Marks)**

b. Enumerate the properties of bitumen and tar. **(07 Marks)**

c. What are the tests conducted on bitumen? Mention the importance of each. **(08 Marks)**

3 a. Explain the uses of bitumen emulsion. How are they prepared? **(10 Marks)**

b. List the different types of cutbacks. When are these used? **(10 Marks)**

4 a. List and explain the desirable properties of a bituminous mix. **(10 Marks)**

b. Explain the procedure of determining the optimum bitumen content, for a bituminous mix, by Marshall test. **(10 Marks)**

PART – B

5 a. Explain the procedure of the compacting equipment used for highway construction. Mention its specific use. **(10 Marks)**

b. Mention the special equipments for bituminous and cement concrete pavement construction **(10 Marks)**

6 a. Explain construction of embankments and cuts of roads. **(10 Marks)**

b. Enumerate the steps in the preparation of subgrade. How is the adequacy of the compaction in the field evaluated? **(10 Marks)**

7 a. Mention the specification of materials, construction steps and quality control tests for laying bituminous macadam binder course. **(10 Marks)**

b. Write explanatory notes on :
i) Penetration macadam base
ii) Built-up spray grout base. **(10 Marks)**

8 a. Draw a neat diagram showing various component layers of a CC pavement structure. Mention the objectives of each lay.

b. Briefly explain with neat sketches the method of construction of :
i) Contraction joints
ii) Expansion joints
iii) Construction joints
iv) Longitudinal joints. **(20 Marks)**

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10CV765

Seventh Semester B.E. Degree Examination, June/July 2017

Air Pollution and Control

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. Missing data if any may be suitably assumed.
3. Draw neat sketches wherever necessary.

PART – A

1 a. Define air pollution and briefly explain the various sources of air pollution. **(10 Marks)**
b. Explain primary and secondary air pollutants with examples. **(10 Marks)**

2 a. List and explain effects of air pollutants on human and vegetation.
i) Sulphur dioxide
ii) Carbon monoxide **(10 Marks)**
b. Explain briefly the case history of Bhopal gas tragedy. **(10 Marks)**

3 a. List the meterological factors influencing air pollution. **(04 Marks)**
b. Explain the following:
i) Inversion
ii) Windrose **(08 Marks)**
c. Explain different forms of plumes patterns under different stability conditions. **(08 Marks)**

4 a. Explain in brief factors to be considered in industrial plant location and planning. **(10 Marks)**
b. What is noise pollution? What are the sources and effects of noise pollution? **(10 Marks)**

PART – B

5 a. With a neat sketch, explain typical sampling train for sampling gaseous pollutant. **(10 Marks)**
b. With a neat sketch, explain the principle, construction and working of an electrostatic precipitator. **(10 Marks)**

6 a. Explain briefly air pollution due to automobiles. **(10 Marks)**
b. Write short notes on effects and control of air pollution due to automobiles. **(10 Marks)**

7 a. What is acid rain? How is it caused? Explain briefly the effect of acid rain on surface waters. **(08 Marks)**
b. What is green house effect? Explain briefly effect of green house on environment. **(08 Marks)**
c. Write brief note on indoor air pollution. **(04 Marks)**

8 Write brief note on:
a. Environmental Acts
b. Ambient air quality standards
c. Ozone layer depletion
d. Noise pollution standards **(20 Marks)**

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10CV767

Seventh Semester B.E. Degree Examination, June/July 2017
Structural Dynamics

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Missing data, if any, may be suitably assumed.

PART – A

1 a. Define fundamental frequency, time period and modal shapes. **(06 Marks)**

b. Explain the concept of mathematical model expressing mass, elasticity and damping for a SDOF system. **(10 Marks)**

c. Derive an expression for equivalent stiffness of spring when they are parallel. **(04 Marks)**

2 a. Explain the mechanism of damping. **(04 Marks)**

b. Determine the natural frequency, period of vibration for a portal frame subjected to an external loading of 20 kN. **(10 Marks)**

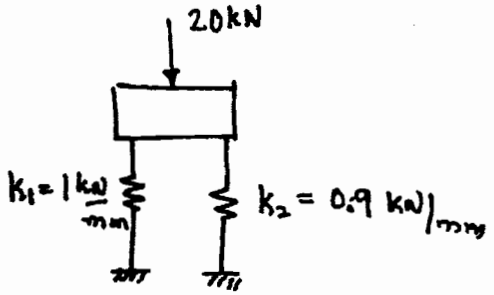

Fig.Q2(b)

c. Write standard dynamic equation of equilibrium with usual notation and explain terms. **(06 Marks)**

3 a. Derive an equation for Duhamel's integral and write an expression for total displacement of an under–damped SDOF system with an arbitrary loading. **(08 Marks)**

b. A steel plate of 12mm thick, 500mm wide and 2.5m long is damped at ends, carries a reciprocating pump at its middle, weight of pump is 700N. During the operation the plate is subjected to a harmonic excitation of 225 sin 60°. Find the amplitude of vibration of the plate and max dynamic force induced. Neglect damping ignore the mass of plate. **(12 Marks)**

4 Ermine the eigen values for the MDOF system shown in Fig.Q4. Given EI = 20000 kN/m^2 m = 12800 kg. **(20 Marks)**

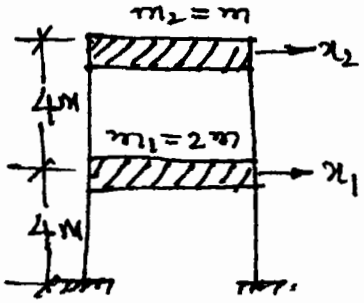

Fig.Q4

PART – B

5 a. Explain the concept of multistory shear building. Write the assumption made. **(08 Marks)**

b. Prove the property of orthogonality of modes. **(12 Marks)**

6 a. Explain damping of vibrating system. **(06 Marks)**

b. Describe viscous damping and Coloumb's damping in detail. **(14 Marks)**

7 a. Define DMF-Dynamic modification factor. **(04 Marks)**

b. Compute the DMF of a forced vibration produced by the oscillator. Find at the centre of a beam at a speed of 600 rpm. Neglect the weight of the beam. Assume damping to be equivalent to a force acting at the middle of the beam proportional to the velocity and is equal to 500N at a velocity of 2.5 cm/sec, static displacement is 25mm. **(16 Marks)**

8 Calculate the max force for a SDOF system when subjected to a triangular pulse force shown in the Fig.Q8(i) and (ii). **(20 Marks)**

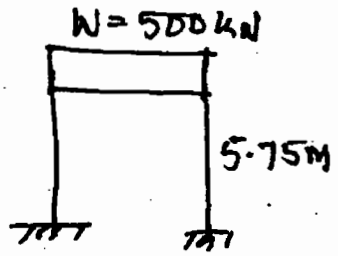

Fig.Q8(i)

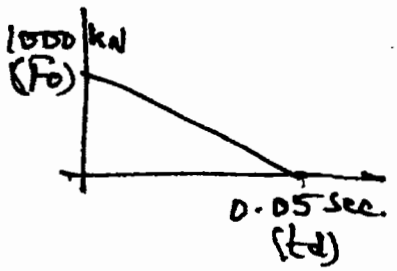

Fig.Q8(ii)

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10CV81

Modified

Eighth Semester B.E. Degree Examination, June/July 2017
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 IS10262-2009 is permitted and ACI code permitted.

PART – A

1 a. Explain the structure of hydrated cement paste, with a neat sketch. **(10 Marks)**

b. Discuss the factors that effect the strength and elasticity of concrete. **(10 Marks)**

2 a. Emphasize the function of "plasticizer" as a water reducing agent with neat sketch. **(08 Marks)**

b. How does super plasticizer influence the behaviour of concrete in fresh and hardened state? **(12 Marks)**

3 a. List the methods available for proportioning concrete mix. **(04 Marks)**

b. Design a concrete mix for a reinforced concrete structure with the following data, as per IS recommendations.

- Characteristic strength of 28 days – 25 MPa.
- Max. nominal size of agg. angular – 20 mm
- Degree of workability – Medium
- Fine aggregate – Natural river sand confirming to zone-III
- Cement – Ordinary Portland grade 43
- Sp. gravity – 3.15
- Bulk density – 1450 kg/m^3
- Aggregate properties -

	FA	CA
- Sp. gravity	2.60	2.65
- Bulk density, kg/m^3	1700	1800
- Free surface moisture, %	2.0	1.0
- Fineness modulus	2.2	6.0

(16 Marks)

4 a. State the factors influencing the permeability of concrete. Explain how size of agg. affect permeability. **(08 Marks)**

b. How does Alkali-Aggregate reaction play a role in durability of concrete? **(08 Marks)**

c. Mention the method for controlling sulphate attack. **(04 Marks)**

PART – B

5 a. Describe the three principle categories of manufacturing ready mixed concrete. **(08 Marks)**

b. State the various tests conducted to know the property of self compacting concrete. Explain any two tests with neat sketch. **(12 Marks)**

6 a. Explain the behavior of fiber reinforced concrete in tension. **(10 Marks)**

b. Calculate the increase in cracking stress of the composite uniaxial tension for a steel fiber reinforcement cement having volume fraction of fiber = 0.025. Given $E_f = 180\times10^3$ N/mm^2, $E_m = 20\times10^3$ N/mm^2. Also calculate modulus of the composite. **(10 Marks)**

7 a. What are the different aggregates that would be used in light weight concrete? Mention the demerits of light weight concrete. **(08 Marks)**

b. Design a light weight concrete mix to suit the following requirements:
(i) Specified 28 day comp. strength = 12 N/mm^2
(ii) Control factor = 0.8
(iii) Type of agg = leftag & leca
(iv) Required workability – High
(v) Relative density [air] = 1.3
Fine and coarse aggregates have 4% and 5% moisture content respectively. Use relevant codes/charts. **(12 Marks)**

8 a. List the tests conducted on Hardened concrete. Explain the tension test on concrete specimen. **(10 Marks)**

b. Mention the properties of hardened concrete that could be evaluated through N.D.T. Describe 'Rebound-Hammer' test. **(10 Marks)**

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10CV82

Eighth Semester B.E. Degree Examination, June/July 2017
Design and Drawing of Steel Structures

Time: 4 hrs. Max. Marks:100

Note: ***1. Answer any ONE full question from Part-A and ONE question from Part-B.***
2. Use of IS800-2007, SP(6)(1)-1984 or steel tables is permitted.

PART – A

1 a. A beam ISLB 400@558.20 N/m is connected to the flange of a column ISHB 300@618 N/m. Another transverse beam ISLB 350@485.60 N/m is connected to the web of column by means of stiffened seated connection. Top of the beams are at the same level. M_{20} bolts of grade 4.6 are used for all connections. Details of bolted connection are as follows:

I. 2 ISA 150mm × 115mm × 12mm are used to connect ISLB 400 with the column by 3 bolts on each leg and 6 bolts in two vertical lines between beam and other leg of angle.

II. Seat angle for ISLB350 – ISA 100×100×10mm
Stiffener angle – 2 ISA 90×90×6 mm with 5 Nos of bolts on each leg connected to web of column. Adopt suitable filler late and pitch = 80 mm.

III. Top cleat angle 90×90×6mm with 2 bolts on each leg is used to connect top flange of two beams to column. Adopt suitable pitch.

Draw to a suitable scale
(i) Sectional elevation along beam ISLB 400@558.2 N/m
(ii) Sectional elevation along transverse beam
(iii) Side view across beam ISLB 400@558.20 N/m. **(20 Marks)**

b. A built up column of height 5.0m, consists of two ISMC 400@484.6 N/m placed back to back at a spacing of 260 mm and provided with single lacing system using 65 F10 flats, inclined at 45°. 6mm fillet weld of length 100mm is required to connect flat and flange of column. Two tie plates of size 400×250mm × 10mm are used at top and bottom of column and are connected to flange of column by 5mm size fillet weld alround. Draw to a suitable scale. (i) Elevation (ii) Sectional plan. **(10 Marks)**

2 a. A column splice is provided between upper story column ISHB 200@ 366 N/m and a lower storey column ISHB 200@366 N/m and a lower storey column ISHB 250@500 N/m. The columns are co-axial. At junction between face of columns a base plate of 40 mm thickness is provided. Four numbers of web cleat angle ISA 100×100×8 mm are used to connect web of column with the base plate using 2 bots along each leg of angles. Flange splice plate of 10mm thick is provided with suitable filler plate. 6 No. of bolts is provided in 2 vertical rows at each flange of column for connection. Two numbers of extra bolts are provided at each face of upper column due to filler plate. All the bolts used for the joints are M_{20} (10k) HSFG bolts. Adopt suitable pitch and edge distance for bolts.
Draw to a suitable scale;
(i) Elevation of column splice (ii) Side view. **(15 Marks)**

b. Draw to a suitable scale sectional plan, front elevation and side elevation of a column with slabbase using following data:
Column – ISHB 350@ 710.2 N/m
Base plate – 650mm × 500mm × 35mm.
Cleat angle – ISA 130×130×8 mm of length 500mm.
Concrete pedestal – 1.20m × 1.00m × 0.70m.
Anchor bolts – 4 Nos of 16mm diameter near each corner of base plate.
4 Nos of M_{20} bolts on each side of flange to connect cleat angle to the column and same nos of countersunk bolts to connect angles to base plate.
Web cleat angle – ISA 75×75×8 mm with 4 mm weld alround (2 Nos). **(15 Marks)**

PART – B

3 Line diagram of a Howe truss with tabulation of member forces are shown in Fig.Q3. Design various member of roof truss along with their end connections with gusset plate of 10 mm thick, by using M_{16} bolts of grade 4.60. The truss rests on 300mm × 500mm size column made of M_{20} grade concrete. Design the support bearing plate, base plate for a reaction of 120 kN and anchor bolts for an uplift force of 18 kN. **(40 Marks)**
Draw to a suitable scale:
(i) Elevation of truss greater than half span.
(ii) Enlarged view of support joint
(iii) Enlarged view of apex joint of truss. **(30 Marks)**

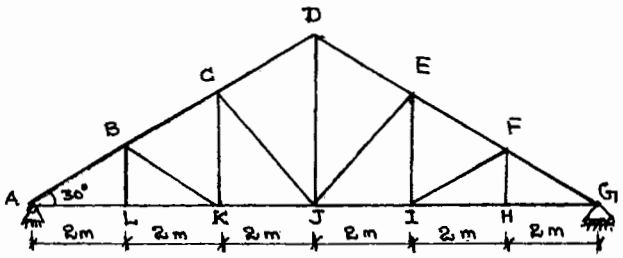

Fig.Q3

Tabulation of member forces.

Members	AB, GF	BC, FE	CD, ED	AL, GH	LK, HI	KJ, IJ	BL, FH	BK, FI	CK, EI	CJ, EJ	DJ
Force(kN)	240	210	160	208	208	182	0	30	15	66	60
Nature of force	C	C	C	T	T	T	-	C	T	C	C

C – Compression, T – Tension

4 Using post critical method design a welded plate girder of 20m span and laterally restrained throughout. It has to support a udl of 60 kN/m throughout the span, exclusive of the self weight. In addition to this girder has to support two concentrated loads of 500 kN at a distance of 5m from either supports. Design the central section, end and load bearing stiffners and their connections, inter mediate stiffeners and their connections, connection between flange and web. **(40 Marks)**
Draw to a suitable scale;
(i) Elevation of plate girder greater than half span.
(ii) Cross section at support
(iii) Cross section at midspan
(iv) Sectional plan. **(30 Marks)**

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10CV834

Eighth Semester B.E. Degree Examination, June/July 2017
Earthquake Resistant Design of Structures

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Use of IS1893-2002 is permitted.

PART – A

1 a. What is plate tectonic theory of origin of earthquakes and explain associated type of movement at the plate boundaries. **(10 Marks)**

b. Explain the characteristics of different types of seismic waves. **(10 Marks)**

2 a. How are the earthquakes classified based on different aspects? **(05 Marks)**

b. Explain the different earthquake ground motion characteristics. **(08 Marks)**

c. Discuss about the response spectrum and design spectrum. **(07 Marks)**

3 a. Write a short note on following code based seismic analysis:
(i) Response spectrum method **(06 Marks)**
(ii) Equivalent static analysis **(04 Marks)**

b. Explain briefly about the seismic design philosophy. **(05 Marks)**

c. What is base isolation? Discuss briefly the principles of base isolation. **(05 Marks)**

4 a. Explain briefly about different types of vertical irregularities and their consequences. **(10 Marks)**

b. Explain /discuss about any five building configuration problems and suggest remedial measures. **(10 Marks)**

PART – B

5 Compute the seismic forces for each storey of a building situated in a seismic zone-IV by equivalent lateral force method as per IS 1893(2002) with following details:

Type of building – 0 MRF (Office building)
No. of storages – 04
Height of the building – 12 m (ht. of each floor = 3m)

Seismic weights

Roof – 2500 kN
All other floors – 3000 kN
Foundation on – Hard rock

(Assume without brick infill condition) **(20 Marks)**

6 For an RCC (SMRF) building with foundation on a soft soil, situated in zone – V as shown in Fig.Q6. Compute the seismic forces for each storey using dynamic analysis procedure.
Given, Free vibration results
Frequency : { W } = {47.832, 120.155, 167.0}
Modes : { ϕ_1 } = {1, 0.759, 0.336}
{ ϕ_2 } = {1, -0.805, -1.157}
{ ϕ_3 } = {1, -2.427, 0.075}
$W_1 = W_2 = W_3 = 196.2$ kN
$K_1 = K_2 = 160\times10^3$ kN/m; $K_3 = 240\times10^3$ kN/m

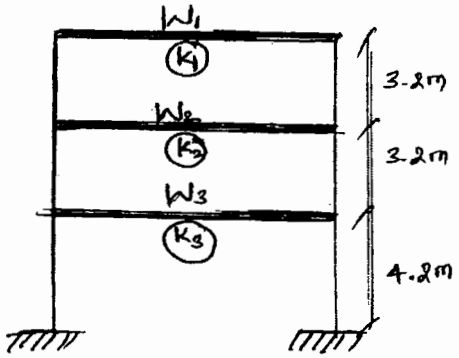

Fig.Q6 **(20 Marks)**

7 a. What are the different load combinations to be used for seismic analysis of RCC buildings as per IS1893(2002). **(04 Marks)**
b. What is ductility? Discuss different factors which are helpful in ductility of RC structures [Reinforced concrete]. **(08 Marks)**
c. Briefly describe soft storey and explain how a frame with soft storey behave under earthquake. Explain special design provisions as per IS 1893. **(08 Marks)**

8 a. Discuss the behavior of masonry buildings during earthquakes representing failure patterns. **(10 Marks)**
b. Discuss the various lateral load resting features that can be introduced in a masonry building for enhanced performance during an earthquake. **(10 Marks)**

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10CV835

Eighth Semester B.E. Degree Examination, June/July 2017
Industrial Wastewater Treatment

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Write the difference between Domestic wastewater and Industrial wastewater. **(05 Marks)**
b. Briefly explain the effects of Industrial pollutant on surface water bodies. **(10 Marks)**
c. Briefly explain effluent standards and stream standards and write their salient features. **(05 Marks)**

2 a. Briefly explain the factors to be considered for stream sampling. **(08 Marks)**
b. Write the BIS for discharge of Industrial wastewater into water bodies and public sewers. **(06 Marks)**
c. With the help of a neat diagram, write the salient features of oxygen sag curve. **(06 Marks)**

3 Briefly explain the following theories applied in the treatment of Industrial wastewater :
a. Volume Reduction.
b. Strength Reduction.
c. Equalization and Proportioning.
d. Neutralization. **(20 Marks)**

4 a. Briefly explain the following process for removal of suspended solids from industrial waste water : i) Sedimentation ii) Flotation. **(10 Marks)**
b. Briefly explain the following process for removal of inorganic dissolved solids from Industrial wastewater : i) Dialysis ii) Ion – exchange process. **(10 Marks)**

PART – B

5 a. Discuss the feasibility study of treating the industrial wastewater along with the municipal wastewater. **(10 Marks)**
b. Discuss different methods of sampling and write their importance in wastewater sampling. **(10 Marks)**

6 a. With the help of flowchart, explain the sources and characteristics of Tannery wastewater. **(10 Marks)**
b. Discuss with the help of flow diagram, the various treatment units required for the treatment of cotton textile mill wastewater. **(10 Marks)**

7 a. With the help of flowchart, explain the treatment of distillery wastewater and also write their effects on water bodies. **(10 Marks)**
b. With the help of a flowchart, explain the sources and characteristics of wastewater generated from pulp and paper mill. **(10 Marks)**

8 Write short notes on :
a. Sources of Industrial wastewater.
b. Characteristics of pharmaceutical wastewater.
c. Advantages of joint treatment.
d. Reusing and Recycling of wastewater. **(20 Marks)**

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10CV843

Eighth Semester B.E. Degree Examination, June/July 2017
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. Define "System Approach". Explain the system approach to transport planning with a flow diagram. **(10 Marks)**

b. Explain the Interdependence of Land use and Traffic. **(10 Marks)**

2 Define :

a. Trip Generation.
b. Trip Purpose.
c. Trip Distribution.
d. Modal Split.
e. Trip Assignment. **(20 Marks)**

3 a. Explain Zoning and Study area. **(10 Marks)**

b. Explain the surveys that are usually carried out during Urban Transport Planning. **(10 Marks)**

4 a. What are the factors Governing Trip Generation and Attraction rates? **(10 Marks)**

b. Explain Multiple Linear Regression Analysis used in Trip Generation. Give examples. **(10 Marks)**

PART – B

5 a. Explain any two growth factor methods and any one synthetic method. **(10 Marks)**

b. Estimate the future trip distribution by Furness method from the following data : **(10 Marks)**

O \ D	1	2	3	4	Future Trips
1	10	20	15	18	140
2	21	16	17	14	150
3	30	21	25	27	200
4	10	9	16	13	100
Future Trips	150	120	180	160	

6 a. What are the factors affecting modal split? **(08 Marks)**

b. Draw the flow diagram for modal split carried out between Trip Generation and Trip Distribution and explain. **(12 Marks)**

7 a. List the different Assignment Techniques and explain any one Assignment techniques. **(10 Marks)**

b. Discuss on Traffic Assignment Applications in India. **(10 Marks)**

8 a. Explain the difficulties in Transport Planning. **(10 Marks)**

b. Discuss about Recent case studies on Urban Transport Planning. **(10 Marks)**

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10CV847

Eighth Semester B.E. Degree Examination, June/July 2017
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. What is an Environmental Impact Assessment? Explain the principles of EIA. **(10 Marks)**
b. Differentiate between REIA – CEIA and CEQ - FONSI. **(10 Marks)**

2 a. Explain the step – by – step procedure for conducting EIA. **(10 Marks)**
b. Explain the limitations of EIA **(10 Marks)**

3 a. Outline the framework for EIA studies, with the help of flow chart. **(08 Marks)**
b. What are the various types of methodologies in EIA? Discuss any two methodologies in brief. **(12 Marks)**

4 a. Write brief note on Cultural and Socio – Economic Environment. **(08 Marks)**
b. Explain the prediction and assessment of impact on the following attributes :
i) Air ii) Water iii) Soil iv) Land Ecology. **(12 Marks)**

PART – B

5 a. Briefly explain eh Rapid EIA and comprehensive EIA. **(08 Marks)**
b. Write a note on EIA guidelines for development projects with suitable examples. **(12 Marks)**

6 a. Explain the importance of Public Participation Pprogramme in Environmental decision making. **(12 Marks)**
b. Explain briefly Practical Considerations in Preparing EIA. **(08 Marks)**

7 a. Enumerate the salient features of the Project activity and environment parameter relationship. **(12 Marks)**
b. Briefly explain the different Environment Impact Matrices. **(08 Marks)**

8 Outline the EIA aspects of following projects :
a. Water resource development projects. **(10 Marks)**
b. Highway projects. **(10 Marks)**

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