KLE.Dr.M.S.SHESHGIRI
COLLEGE OF ENGINEERING & TECHNOLOGY
BELAGAVI-08
LIBRARY AND INFORMATION CENTER
QUESTION PAPERS
3rd, 4th, 5th, 6th, 7th & 8th SEM
CIVIL
JUNE/JULY-2018

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15MAT31

Third Semester B.E. Degree Examination, June/July 2018

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1 a. Obtain the Fourier series for the function :
$$f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$$
Hence deduce that $\dfrac{\pi^2}{8} = \dfrac{1}{1^2} + \dfrac{1}{3^2} + \dfrac{1}{5^2} + ----$. **(08 Marks)**

   b. Obtain the half–range cosine series for the function $f(x) = (x-1)^2$, $0 \le x \le 1$. Hence deduce that $\dfrac{\pi^2}{6} = \dfrac{1}{1^2} + \dfrac{1}{2^2} + \dfrac{1}{3^2} + -----$. **(08 Marks)**

OR

2 a. Find the Fourier series of the periodic function defined by $f(x) = 2x - x^2$, $0 < x < 3$. **(06 Marks)**

   b. Show that the half range sine series for the function $f(x) = \ell x - x^2$ in $0 < x < \ell$ is
$$\frac{8\ell^2}{\pi^3} \sum_0^\infty \frac{1}{(2n+1)^3} \sin\left(\frac{2n+1}{\ell}\right)\pi x .$$
(05 Marks)

   c. Express y as a Fourier series upto 1st harmonic given :

x	0	1	2	3	4	5
y	4	8	15	7	6	2

(05 Marks)

Module-2

3 a. Find the Fourier transform of
$$f(x) = \begin{cases} 1 - |x|, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$$
and hence deduce that $\displaystyle\int_0^\infty \frac{\sin^2 t}{t^2}\,dt = \frac{\pi}{2}$. **(06 Marks)**

   b. Find the Fourier Sine and Cosine transforms of $f(x) = e^{-\alpha x}$, $\alpha > 0$. **(05 Marks)**

   c. Solve by using z – transforms $y_{n+1} + \dfrac{1}{4} y_n = \left(\dfrac{1}{4}\right)^n$ $(n \ge 0), y_0 = 0$. **(05 Marks)**

OR

4 a. Find the Fourier transform of $f(x) = e^{-|x|}$. **(06 Marks)**

   b. Find the Z – transform of $\sin(3n + 5)$. **(05 Marks)**

   c. Find the inverse Z – transform of : $\dfrac{z}{(z-1)(z-2)}$. **(05 Marks)**

Module-3

5 a. Find the correlation coefficient and the equation of the line of regression for the following values of x and y. **(06 Marks)**

x	1	2	3	4	5
y	2	5	3	8	7

   b. Find the equation of the best fitting straight line for the data : **(05 Marks)**

x	0	1	2	3	4	5
y	9	8	24	28	26	20

   c. Use Newton – Raphson method to find a real root of the equation $x \log_{10} x = 1.2$ (carry out 3 iterations). **(05 Marks)**

OR

6 a. Obtain the lines of regression and hence find the coefficient of correlation for the data :

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

   (06 Marks)

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

x	1	2	3	4	5
y	10	12	13	16	19

   c. Use the Regula–Falsi method to find a real root of the equation $x^3 - 2x - 5 = 0$, correct to 3 decimal places. **(05 Marks)**

Module-4

7 a. Given $\sin 45° = 0.7071$, $\sin 50° = 0.7660$, $\sin 55° = 0.8192$, $\sin 60° = 0.8660$ find $\sin 57°$ using an appropriate interpolation formula. **(06 Marks)**

   b. Construct the interpolation polynomial for the data given below using Newton's divided difference formula :

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

   (05 Marks)

   c. Use Simpson's $\frac{1}{3}$rd rule with 7 ordinates to evaluate $\displaystyle\int_{2}^{8} \dfrac{dx}{\log_{10} x}$. **(05 Marks)**

OR

8   a.   Given f(40) = 184, f(50) = 204, f(60) = 226, f(70) = 250, f(80) = 276, f(90) = 304, find f(38) using Newton's forward interpolation formula.   **(06 Marks)**

    b.   Use Lagrange's interpolation formula to fit a polynomial for the data :

x	0	1	3	4
y	−12	0	6	12

Hence estimate y at x = 2.   **(05 Marks)**

    c.   Evaluate $\int_0^1 \dfrac{x}{1+x^2}\,dx$ by Weddle's rule taking seven ordinates and hence find $\log_e 2$.

   (05 Marks)

Module-5

9   a.   Find the area between the parabolas $y^2 = 4x$ and $x^2 = 4y$ using Green's theorem in a plane.   **(06 Marks)**

    b.   Verify Stoke's theorem for the vector $\vec{F} = (x^2 + y^2)i - 2xyj$ taken round the rectangle bounded by x = 0, x = a, y = 0, y = b.   **(05 Marks)**

    c.   Find the extremal of the functional : $\int_{x_1}^{x_2} [y' + x^2(y')^2]\,dx$.   **(05 Marks)**

OR

10   a.   Verify Green's theorem in a plane for $\oint_c (3x^2 - 8y^2)\,dx + (4y - 6xy)\,dy$ where c is the boundary of the region enclosed by $y = \sqrt{x}$ and $y = x^2$.   **(06 Marks)**

    b.   If $\vec{F} = 2xyi + yz^2j + xzk$ and S is the rectangular parallelopiped bounded by x = 0, y = 0, z = 0. x = 2, y = 1, z = 3 evaluate $\iint_S \vec{F} \cdot \hat{n}\,ds$.   **(05 Marks)**

    c.   Find the geodesics on a surface given that the arc length on the surface is $S = \int_{x_1}^{x_2} \sqrt{x[1 + (y')^2]}\,dx$.   **(05 Marks)**

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Third Semester B.E. Degree Examination, June/July 2018
Additional Mathematics – I

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. Find the modulus and amplitude of $\dfrac{(1+i)^2}{3+i}$. **(05 Marks)**

  b. Prove that $\left(\dfrac{1+\cos\theta+i\sin\theta}{1+\cos\theta-i\sin\theta}\right)^n = \cos n\theta + i\sin n\theta$. **(05 Marks)**

  c. If $z = \cos\theta + i\sin\theta$, then show that $x^n + \dfrac{1}{x^n} = 2\cos n\theta$, $x^n - \dfrac{1}{x^n} = 2i\sin n\theta$. **(06 Marks)**

OR

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

  b. Find the unit vector perpendicular to both $\vec{a}$ and $\vec{b}$, where $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$, $\vec{b} = 2\hat{i} + \hat{j} + \hat{k}$ **(05 Marks)**

  c. Show that (3, –2, 4), (6, 3, 1), (5, 7, 3) and (2, 2, 6) are coplanar. **(06 Marks)**

Module-2

3 a. Find the nth derivative of $\sin(3x)\cos x$. **(05 Marks)**

  b. Find the angle between radius vector and tangent to the curve $\gamma^m \cos m\theta = a^m$. **(05 Marks)**

  c. Find the pedal equation of $\gamma = a(1 + \cos\theta)$. **(06 Marks)**

OR

4 a. If $u = \tan^{-1}\left(\dfrac{x^3 + y^3}{x - y}\right)$, prove that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = \sin(2u)$. **(05 Marks)**

  b. If $u = f\left(\dfrac{x}{y}, \dfrac{y}{z}, \dfrac{z}{x}\right)$, prove that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} + z\dfrac{\partial u}{\partial z} = 0$. **(05 Marks)**

  c. If $u = x + y$, $v = y + z$, $w = z + x$, find $J\left(\dfrac{uvw}{xyz}\right)$. **(06 Marks)**

Module-3

5   a.   Evaluate $\int\limits_{0}^{\pi} x\cos^6 x \, dx$.   **(05 Marks)**

    b.   Evaluate $\int\limits_{0}^{\infty} \dfrac{x^2}{(1+x^6)^{7/2}} \, dx$.   **(05 Marks)**

    c.   Evaluate $\int\limits_{0}^{1} x^5(1-x^2)^{5/2} \, dx$.   **(06 Marks)**

OR

6   a.   Evaluate $\int\limits_{1}^{2}\int\limits_{3}^{4} (xy + e^y) \, dy \, dx$.   **(05 Marks)**

    b.   Evaluate $\int\limits_{0}^{1}\int\limits_{x}^{\sqrt{x}} xy \, dy \, dx$.   **(05 Marks)**

    c.   Evaluate $\int\limits_{0}^{1}\int\limits_{0}^{1}\int\limits_{0}^{y} xyz \, dx \, dy \, dz$.   **(06 Marks)**

Module-4

7   a.   Find the angle between the tangents to the curve $x = t^2, y = t^3, z = t^4$ at $t = 2$, and $t = 3$.

                                                                                                                             (05 Marks)

    b.   Find the unit normal to the curve $\vec{\gamma} = 4\sin t\,\hat{i} + 4\cos t\,\hat{j} + 3t\,\hat{k}$.   **(05 Marks)**

    c.   Find the velocity and acceleration to the curve $\vec{\gamma} = t^2\,\hat{i} - t^3\,\hat{j} + t^4\,\hat{k}$ at $t = 1$.   **(06 Marks)**

OR

8   a.   Find the directional derivative of $\varphi = x^3 y^3 z^3$ at $(1, 2, 1)$ in the direction of $\hat{i} + 2\hat{j} + 2\hat{k}$.

                                                                                                                             (05 Marks)

    b.   Find the unit normal to the surface $xy + x + zx = 3$ at $(1,1,1)$.   **(05 Marks)**

    c.   If $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$, find $\operatorname{div}\vec{F}$.   **(06 Marks)**

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Module-5

9 a. Solve $\dfrac{dy}{dx} = \dfrac{y^2}{xy - x^2}$. **(05 Marks)**

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

c. Solve $y(x + y)dx + (x + 2y - 1)dy = 0$. **(06 Marks)**

OR

10 a. Solve $(x^2 + y)dx + (y^3 + x)dy = 0$. **(05 Marks)**

b. Solve $\dfrac{dy}{dx} + \dfrac{y}{x} = xy^2$. **(05 Marks)**

c. Solve $(x^2 + y^2)\dfrac{dy}{dx} = xy$. **(06 Marks)**

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15CV/CT32

Third Semester B.E. Degree Examination, June/July 2018
Strength of Materials

Time: 3 hrs.   Max. Marks: 80

**Note: 1. Answer any FIVE full questions, choosing
ONE full question from each module.
2. Missing data, if any, may be suitably assumed.**

Module-1

1 a. For a bar of uniform section derive an expression for elongation due to self weight. **(06 Marks)**
   b. Evaluate the deformation of the bar, given, $E_1 = E_2 = E_3$ = 200GPa, refer Fig.Q1(b).
   (10 Marks)
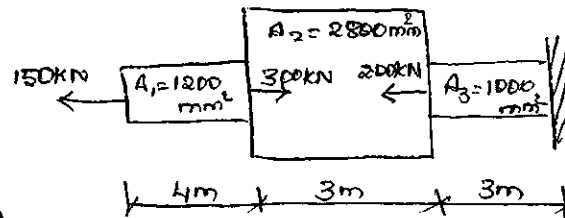
Fig.Q1(b)

OR

2 a. Derive an expression between Young's modulus, Modulus of rigidity and Poisson's ratio.
   (10 Marks)
   b. A circular rod of dia 200mm and 500mm long is subjected to a tensile force of 45kN modulus of elasticity = 200 kN/mm^2, Find stress, strain and elongation of bar due to applied load. **(06 Marks)**

Module-2

3 At a certain point in a stressed body, the principal stresses are σ_x = 80 MPa and σ_y = –40MPa. Determine σ and τ on the planes whose normal's are at +30° and +120° with x – axis. **(16 Marks)**

OR

4 a. Derive an expression of tangential stress and longitudinal stress of thin walled pressure vessels. **(08 Marks)**
   b. A rectangular block of material is subjected to a tensile stress of 100N/mm^2 on one plane and a tensile stress of 50N/mm^2 on a plane at right angles together with shear stress of 60 N/mm^2 on same planes, find : i) direction of the principal plane ii) magnitude of the principal plane iii) magnitude of greatest shear stress. **(08 Marks)**

Module-3

5 a. Define : i) bending moment ii) shear force iii) shear force diagram iv) bending moment diagram. **(08 Marks)**
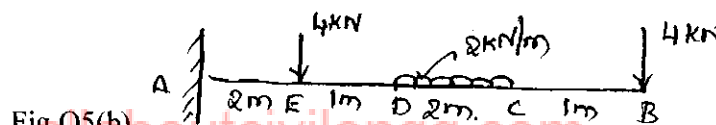   b. Draw SFD and BMD for the cantilever beam shown in Fig.Q5(b). **(08 Marks)**

Fig.Q5(b)

OR

6   a. Derive the relation between load intensity, bending moment and shear force.   **(06 Marks)**
    b. A beam ABC, 8m long has supplied at A and B, it is long between A and B. The beam carries an udl of 10kN/m between A and B. At free end point C, a point load of 15 kN acts. Draw BMD and locate point of contra-flexure, if any.   **(10 Marks)**

Module-4

7   a. Explain pure bending with an suitable example and mention the assumptions of pure bending.   **(06 Marks)**
    b. A cast iron beam section shown in Fig.Q7(b) is freely supported on a span of 5m. IF the tensile stress is not to exceed 20 N/mm². Find the safe UDL which the beam can carry. Find also the maximum compressive stress.   **(10 Marks)**
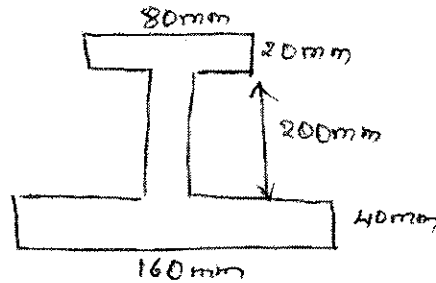
Fig.Q7(b)

OR

8   a. Derive an Euler's crippling load when both ends of the column are pinned.   **(08 Marks)**
    b. A hollow cylindrical cost iron column is 4m long both ends being fixed. Design the column to carry a axial load of 250 kN. Use Rankine's formula and factor of safety = 5. The internal diameter may be taken as 0.80 time the external diameter. Take E_C = 550 N/mm² and $\alpha = \dfrac{1}{1600}$.   **(08 Marks)**

Module-5

9   a. Derive torsional equation for circular shaft.   **(08 Marks)**
    b. A steel shaft transmits 105kN at 160 rpm. If the shaft is 100mm in diameter. Find the torque on the shaft and the maximum sharing stress induced.   **(08 Marks)**

OR

10 a. Define pure torsion, polar modulus and torsional rigidity.   **(06 Marks)**
    b. A solid shaft is subjected to a torque of 15 kN-m. Find the necessary diameter of the shaft if the allowable shearing stress is 60N/mm² and the allowable twist is 1 degree in a length of 20 diameters of the shaft. Take C = 8 × 10⁴ N/mm².   **(10 Marks)**

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Third Semester B.E. Degree Examination, June/July 2018
Fluid Mechanics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1   a.   Distinguish between
         i)   Ideal fluid and real fluid
         ii) Newtonion and non Newtonion fluid
         iii) Cohesion and adhesion   **(06 Marks)**
    b.   State and prove Pascal's law.   **(04 Marks)**
    c.   Calculate the specific weight, density, specific volume and specific gravity of two litres of a
         liquid which weighs 15 N.   **(06 Marks)**

OR

2   a.   With the help of neat sketches, explain (i) simple U-tube manometer and (ii) differential
         U-tube manometer.   **(06 Marks)**
    b.   What is capillarity? Derive an expression for capillary rise and a liquid in a glass tube.
                                                                       (04 Marks)
    c.   A U tube differential manometer connects two pipes A and B. Pipe A contains carbon tetra
         chloride having specific gravity 1.594 under a pressure of 117.72 kN/m^2 and pipe B contains
         oil of specific gravity 0.8 under a pressure of 117.72 kN/m^2. The pipe A lies 2.5 m above
         pipe B. Find the difference in pressure measured by mercury as fluid filling U-tube. Assume
         mercury in the right limb is 50 cm below centre of pipe B.   **(06 Marks)**

Module-2

3   a.   Distinguish between:
         i) Steady and unsteady flow
         ii) Rotational and irrotational flow   **(04 Marks)**
    b.   Derive the expressions for total pressure and centre of pressure for a plane surface
         submerged vertically in a liquid.   **(06 Marks)**
    c.   A circular opening 3m diameter, in a vertical side of a tank is closed by a disc of 3m
         diameter which can rotate about a horizontal diameter. Calculate: (i) The force on the disc,
         and (ii) The torque required to maintain the disc in equilibrium in vertical position when the
         head of water above the horizontal diameter is 6m.   **(06 Marks)**

OR

4   a.   Define the terms velocity potential function and stream function.   **(04 Marks)**
    b.   Derive an expression for continuity equation for a three dimensional flow.   **(06 Marks)**
    c.   A stream function in a two dimensional flow is $\psi = 2xy$. Show that the flow is irrotational
         and determine the corresponding velocity potential ϕ.   **(06 Marks)**

Module-3

5 a. What is pitot tube? How will you determine velocity using pitot tube? (04 Marks)
  b. State and prove Bernoulli's theorem for steady flow of an incompressible fluid. (06 Marks)
  c. The water is flowing through a tapper pipe of length 100 m having diameters 600 mm at the upper end and 300 mm at the lower end at the rate of 50 litres/s. The pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher end is 196.2 kPa.
  (06 Marks)

OR

6 a. Define the terms: i) forced vertex flow and ii) free vertex flow. (04 Marks)
  b. What is venturimeter? Derive an expression for discharge through a venturimeter. (06 Marks)
  c. A pipe of 300 mm diameter conveying 300 litres/s of water has a right angled bend in a horizontal plane. Find the resultant force exerted on the bend if the pressure at inlet and outlet of bend are 245.25 kPa and 235.44 kPa. (06 Marks)

Module-4

7 a. Explain different hydraulic coefficient and establish the relation between them. (04 Marks)
  b. Derive an expression for discharge over a triangular notch. (06 Marks)
  c. The head of water over an orifice of diameter 100 mm is 5m. The water coming out from the orifice is collected in a circular tank of diameter 2 m. The rise of water level in circular tank is 450 mm in 30 seconds. Also the coordinates at a certain point on the jet, measured from vena-contracta are 1000 mm horizontal and 52 mm vertical. Find the hydraulic coefficients C_V, C_d and C_C. (06 Marks)

OR

8 a. Explain the terms:
  i) Velocity of approach
  ii) Effect of end contractions in notches (04 Marks)
  b. What is Cipolletti notch? Derive an expression for discharge over a Cipolletti notch.
  (06 Marks)
  c. Water flows over a rectangular weir 1.2m wide at a depth of 15 cm and afterwards passes through a triangular right angled weir. Taking coefficient of discharge for rectangular Weir 0.62 and for triangular Weir 0.59 find the depth over the triangular Weir. (06 Marks)

Module-5

9 a. Explain briefly:
  i) Hydraulic gradient line and
  ii) Energy gradient line (04 Marks)
  b. Derive an expression for head loss due to friction in pipes. (06 Marks)
  c. A rigid pipe conveying water is 3200 m long. The velocity of flow is 1.2 m/s. Calculate the rise of pressure behind a valve at the lower end if it is closed (i) in 20 seconds (ii) in 3 seconds. Take bulk modulus and water equal to 2000 N/mm². (06 Marks)

OR

10 a. Explain briefly the phenomenon of water hammer. (04 Marks)
   b. Derive an expression for head loss due to sudden enlargement in a pipe flow. (06 Marks)
   c. At a sudden enlargement of a water main from 240 mm to 480 mm diameter, the hydraulic gradient rises by 10 mm. Estimate the rate of flow. (06 Marks)

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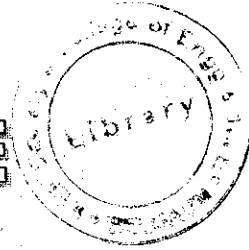
USN ☐☐☐☐☐☐☐☐☐☐

15CV34

Third Semester B.E. Degree Examination, June/July 2018
Basic Surveying

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1. a. Define surveying. **(02 Marks)**
    b. What are the primary divisions of surveying? Explain briefly. **(05 Marks)**
    c. The area of the plan of an old survey plotted to a scale of 10 meters to 1cm measures now as 100.2 sq.cm as found by a planimeter. The plan is found to have shrunk, so that a line originally 10cm long now measures 9.7cm only. There was a note on the plan that the 20m chain used was 8cm too short. Find the true area of plan. **(09 Marks)**

OR

2. a. By means of neat sketches show any six conventional symbols used in surveying. **(06 Marks)**
    b. Define precision and accuracy. **(02 Marks)**
    c. In passing an obstacle in the form of a pond, stations A and D on the main line were taken on the opposite sides of pond, on the left of AD, a line AB, 200m long was laid down and a second line AC, 250m long was ranged on right of AD points B, D and C being in the same straight line, BD and DC were then chained and found to be 125m and 150m. Find the length AD. **(08 Marks)**

Module-2

3. a. Differentiate between prismatic and surveyors compass (any 3). **(06 Marks)**
    b. Convert the whole circle bearings to quadrantal bearings :
    i) 22°30'   ii) 170°12'   iii) 211°54'   iv) 327°24'. **(02 Marks)**
    c. Determine the value of included angles in a closed compare surrey ABCD conducted in clockwise direction given the following data. Apply the check.

Line	FB
AB	40°
BC	70°
CD	210°
DA	280°

(08 Marks)

OR

4. a. Define : i) Face left ii) Transiting iii) Swining as applied to theodolite surveying. **(03 Marks)**
    b. With a neat sketch, explain the method of measurement of horizontal angle by repletion method. State the errors eliminated by this method. **(05 Marks)**
    c. The following angles were observed in the clockwise direction in an open traverse.
    $\angle ABC = 124°15'$, $\angle BCD = 156°30'$, $\angle CDE = 102°00'$, $\angle DEF = 95°15'$, $\angle EFG = 215°45'$
    The magnetic bearing of the line AB = 240°30' what would be the bearing of line FG? **(08 Marks)**

Module-3

5 a. Explain closed and open traversed with neat sketches. **(06 Marks)**
b. State Bowditch's and Transil rule. **(04 Marks)**
c. Calculate latitudes, departures and closing error for the following traverse conducted at a place.

Line	Length (m)	Web
AB	89.31	45°10'
BC	219.76	72°05'
CD	151.18	161°52'
DE	159.10	228°43'
EA	232.26	300°42'

(06 Marks)

OR

6 a. Define tacheometry under what circumstances it is used? **(04 Marks)**
b. State any four characteristics of a tacheometer. **(02 Marks)**
c. A tacheometer is setup at an intermediate point on a traverse course PQ and the following observations are made on a vertically held staff.

Staff stn	Vertical angle	Staff intercept	Axial hair reading
P	+8°36'	2.350	2.105
Q	+6°6'	2.055	1.895

The instrument is fitted with an anallatic lens and the constant is 100.000. Compute the length of PQ and reduced level of Q, if that of P being 321.50 meters. **(10 Marks)**

Module-4

7 a. Define the terms : i) Back sight ii) Fore sight iii) Intermediate sight iv) change point. **(04 Marks)**
b. Compare height of instrument method and rise and fall method of reduction of levels. **(04 Marks)**
c. The following consecutive readings were taken with a level and 5m leveling staff on continuously sloping ground at a common interval of 20 meters :
0.835, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625, 2.005, 3.110 and 4.485m.
The reduced level of first point was 208.125m. Rule outer page of level field book and enter the readings. Calculate the reduced levels of points by rise and fall method and apply check. Calculate also the gradient of line joining the first and last point. **(08 Marks)**

OR

8 a. Explain reciprocal leveling. **(04 Marks)**
b. An observer standing on the deck of ship just sees a light house. The top of light house is 42m above the sea level and the height of observers Eye is 6m above the sea level. Find the distance of observes from the light house. **(05 Marks)**
c. In order to ascertain the elevation of the top (Q) of the signal on a hill, observations were made from two instrument stations P and R at a horizontal distance 100m apart, the stations P, R, and Q are in a line. The angles of elevation of Q at P and R were 28°42' and 18°6' respectively. The staff reading on a bench mark of elevation 287.28m from P = 2.870, from R = 3.750. Determine the Elevation of foot of signal if height of signal = 3M. **(07 Marks)**

Module-5

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

Chainage (m)	0	30	60	90	120	150	180	210
Offset length (m)	0	2.65	3.80	3.75	4.65	3.60	5.00	5.80

Calculate the area between the chain lines and irregular boundary, first and last offsets by
i) Trapezoidal rule ii) Simpson's rule. (08 Marks)

   b. Calculate the area enclosed by a traverse ABCD for the following data : Assume co-ordinater as (100, 200).

Line	Latitude (m)	Departure(m)
AB	+32.05	+40.20
BC	−3	+92.00
CD	−97.85	+6.402
DE	−15.8	−107.00
EA	+84.6	−31.602

(08 Marks)

OR

10 a. With neat sketches explain any six characteristics of contours. (06 Marks)
   b. Calculate the area of zero circle with the following data :

IR	FR	Position anchor point	Remarks
6.520	2.724	Outside the fig	Zero of counting dise crossed index once clockwise
1.222	7.720	Inside the fig	Zero of counting dise crossed and index twice anticlockwise

Assume that tracing arm of planimeter was so set that tone revolution of measuring wheel measures 100cm^2 on paper. (06 Marks)

   c. Write short notes on :
   i) Interpolation of contours
   ii) Contour gradient. (04 Marks)

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15CV/CT35

Third Semester B.E. Degree Examination, June/July 2018
Engineering Geology

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1   a. Describe the importance and applications of geology in civil engineering practices.
                        (05 Marks)
   b. Describe the internal structure and composition of the earth with a neat diagram.   **(05 Marks)**
   c. Define what is a mineral? Describe how minerals are classifieds. Describe the physical properties. Luster and fracture with mineral examples.   **(06 Marks)**

OR

2   a. Define what is rock? Classify the different types of rocks and describe how it is formed. Give examples. Explain the rock cycle.   **(06 Marks)**
   b. What is fold? Describe with a neat diagram the different parts of a fold.   **(05 Marks)**
   c. What are joints? Describe the classification of joints. Explain the different types joints present in igneous, sedimentary and metamorphic rocks.   **(05 Marks**

Module-2

3   a. What is fault? Draw a net diagram of the fault and describe the different parts. Write the classification of fault with neat sketch.   **(08 Marks)**
   b. Describe the geological considerations of joints and folds in the construction of dams and tunnels.   **(08 Marks)**

OR

4   Describe in detail with neat sketches concordant and discordant igneous intrusions. **(16 Marks)**

Module-3

5   a. What is weathering? Describe in detail about physical weathering and chemical weathering.
                        (08 Marks)
   b. Give a detailed account of geologic work of rivers.   **(08 Marks)**

OR

6   a. What is earth quake? Write the causes and effects.   **(08 Marks)**
   b. What are seismic waves? Describe in detail the different seismic waves.   **(08 Marks)**

Module-4

7   What is an aquifer? Explain the different types of aquifers and its properties.   **(16 Marks)**

OR

8   What is ground water investigation? Describe the different methods involved in selection of well sites. Describe the electrical resistivity method of selecting a well site.   **(16 Marks)**

Module-5

9   What is remote sensing? Explain the basic concepts of remote sensing with a neat sketch. Explain the advantages and disadvantages of remote sensing.   **(16 Marks)**

OR

10   Describe in detail the impact of mining, quarrying and reservoirs on environment.   **(16 Marks)**

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15CV36

Third Semester B.E. Degree Examination, June/July 2018
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 of good building stone? Explain the dressing of stones. **(08 Marks)**
   b.   List the various tests conducted on coarse aggregate. Explain any one of them in brief. **(08 Marks)**

OR

2   a.   Explain the different types of preservations commonly adopted in the preservation of stones. **(08 Marks)**
   b.   What are the requirements of good bricks and explain the field and laboratory tests on bricks. **(08 Marks)**

Module-2

3   a.   Explain the essential requirements of a good foundation. **(08 Marks)**
   b.   With the help of neat sketches explain the various types of Joints used in stone masonry. **(08 Marks)**

OR

4   a.   What is safe bearing capacity (SBC) of a soil? Briefly explain various methods adopted to improve SBC. **(08 Marks)**
   b.   Explain the following :
     (i) Header,   (ii) Flemish bond,   (iii) Load bearing,   (iv) Partition walls. **(08 Marks)**

Module-3

5   a.   Define lintels and mention its function and classification. **(08 Marks)**
   b.   Sketch a King post truss made of timber, which has to support tile roofing. Name the components. **(08 Marks)**

OR

6   a.   Give the classification of arches and explain stability of an arch. **(08 Marks)**
   b.   Discuss the various flooring materials used and explain any two of them in detail. **(08 Marks)**

Module-4

7   a.   Briefly explain the factors to be considered while locating the position of doors and windows. **(08 Marks)**
   b.   With the help of a neat sketch briefly explain the dog legged staircase and its components. **(08 Marks)**

OR

8   a.   With the help of a neat sketch explain the following :
     (i) Wooden paneled door   (ii) Collapsible door. **(08 Marks)**
   b.   Write a note on different types of stairs and explain the requirements of a good stair. **(08 Marks)**
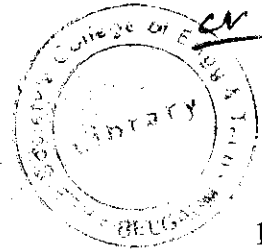
Module-5

9 a. Briefly explain the purpose of plastering and explain the various methods of plasters.

(08 Marks)

   b. Explain in brief causes and effects of dampners in a building.   (08 Marks)

OR

10 a. What are the objects of plastering and painting.   (08 Marks)

    b. Describe the different types of paints available in market and their specific usage. (08 Marks)

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15MAT41

Fourth Semester B.E. Degree Examination, June/July 2018
Engineering Mathematics – IV

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1 a. Use Taylor's series method to find y at x = 1.1, considering terms upto third degree given that $\frac{dy}{dx} = x + y$ and y(1) = 0. **(05 Marks)**

   b. Using Runge-Kutta method, find y(0.2) for the equation $\frac{dy}{dx} = \frac{y-x}{y+x}$; y(0) = 1, taking h = 0.2. **(05 Marks)**

   c. Given $\frac{dy}{dx} = x^2 - y$, y(0) = 1 and the values y(0.1) = 0.90516, y(0.2) = 0.82127, y(0.3) = 0.74918, evaluate y(0.4), using Adams-Bashforth method. **(06 Marks)**

OR

2 a. Using Euler's modified method, find y(0.1) given $\frac{dy}{dx} = x - y^2$, y(0) = 1, taking h = 0.1. **(05 Marks)**

   b. Solve $\frac{dy}{dx} = xy$; y(1) = 2, find the approximate solution at x = 1.2, using Runge-Kutta method. **(05 Marks)**

   c. Solve $\frac{dy}{dx} = x - y^2$ with the following data y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762, compute y at x = 0.8, using Milne's method. **(06 Marks)**

Module-2

3 a. Using Runge-Kutta method of order four, solve $y'' = y + xy'$, y(0) = 1, y'(0) = 0 to find y(0.2). **(05 Marks)**

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

   c. If α and β are two distinct roots of $J_n(x) = 0$ then prove that $\int_0^1 x J_n(\alpha x)J_n(\beta x)dx = 0$, if α ≠ β. **(06 Marks)**

OR

4 a. Given $y'' = 1 + y'$; y(0) = 1, y'(0) = 1, compute y(0.4) for the following data, using Milne's predictor-corrector method.
   y(0.1) = 1.1103   y(0.2) = 1.2427   y(0.3) = 1.399
   y'(0.1) = 1.2103   y'(0.2) = 1.4427   y'(0.3) = 1.699. **(05 Marks)**

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

   c. Derive Rodrigue's formula $P_n(x) = \frac{1}{2^n n!} \frac{d^n}{dx^n}\left[(x^2 - 1)^n\right]$. **(06 Marks)**

Module-3

5 a. Derive Cauchy-Riemann equations in polar form. **(05 Marks)**

b. Evaluate $\oint_C \dfrac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2(z-2)} dz$ where C is the circle $|z| = 3$, using Cauchy's residue theorem. **(05 Marks)**

c. Find the bilinear transformation which maps $z = \infty$, i, 0 on to $w = 0$, i, ∞. **(06 Marks)**

OR

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

b. If $u = \dfrac{\sin 2x}{\cosh 2y + \cos 2x}$, find the corresponding analytic function $f(z) = u + iv$. **(05 Marks)**

c. Discuss the transformation $w = z^2$. **(06 Marks)**

Module-4

7 a. Derive mean and standard deviation of the binomial distribution. **(05 Marks)**

b. If the probability that an individual will suffer a bad reaction from an injection of a given serum is 0.001, determine the probability that out of 2000 individual (i) exactly 3 (ii) more than 2 individuals will suffer a bad reaction. **(05 Marks)**

c. The joint probability distribution for two random variables X and Y is as follows:

X \ Y	-3	-2	4
1	0.1	0.2	0.2
3	0.3	0.1	0.1

Determine: i) Marginal distribution of X and Y   ii) Covariance of X and Y
iii) Correlation of X and Y **(06 Marks)**

OR

8 a. Derive mean and standard deviation of exponential distribution. **(05 Marks)**

b. In an examination 7% of students score less than 35% marks and 89% of students score less than 60% marks. Find the mean and standard deviation if the marks are normally distributed. Given $P(0 < z < 1.2263) = 0.39$ and $P(0 < z < 1.14757) = 0.43$. **(05 Marks)**

c. The joint probability distribution of two random variables X and Y is as follows:

Y \ X	-4	2	7
1	1/8	1/4	1/8
5	1/4	1/8	1/8

Compute: i) E(X) and E(Y)   ii) E(XY)   iii) COV(X, Y)   iv) ρ(X, Y) **(06 Marks)**

Module-5

9 a. Explain the terms: i) Null hypothesis   ii) Type I and Type II errors. **(05 Marks)**

b. The nine items of a sample have the values 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these differ significantly from the assumed mean of 47.5? **(05 Marks)**

c. Given the matrix $A = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ \frac{1}{2} & \frac{1}{2} & 0 \end{pmatrix}$ then show that A is a regular stochastic matrix. **(06 Marks)**

OR

10 a. A die was thrown 9000 times and of these 3220 yielded a 3 or 4, can the die be regarded as unbiased? **(05 Marks)**

b. Explain: i) Transient state   ii) Absorbing state   iii) Recurrent state **(05 Marks)**

c. A student's study habits are as follows. If he studies one night, he is 70% sure not to study the next night. On the other hand, if he does not study one night, he is 60% sure not to study the next night. In the long run, how often does he study? **(06 Marks)**

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Fourth Semester B.E. Degree Examination, June/July 2018
Additional Mathematics – II

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Find the rank of the matrix $\begin{bmatrix} 5 & 3 & 14 & 4 \\ 0 & 1 & 2 & 1 \\ 1 & -1 & 2 & 0 \end{bmatrix}$ by reducing to echelon form. **(06 Marks)**

   b. Use Cayley-Hamilton theorem to find the inverse of the matrix $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$. **(05 Marks)**

   c. Apply Gauss elimination method to solve the equations $x + 4y - z = -5$; $x + y - 6z = -12$; $3x - y - z = 4$ **(05 Marks)**

OR

2 a. Find all the eigen values and eigen vector corresponding to the largest eigen value of $\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$. **(06 Marks)**

   b. Find the rank of the matrix by elementary row transformations $\begin{bmatrix} 1 & 1 & 1 \\ 2 & 2 & 2 \\ 3 & 3 & 3 \end{bmatrix}$. **(05 Marks)**

   c. Solve the system of linear equations $x + y + z = 6$; $2x - 3y + 4z = 8$; $x - y + 2z = 5$ by Gauss elimination method. **(05 Marks)**

Module-2

3 a. Solve $\dfrac{d^2 y}{dx^2} + 4y = \tan 2x$ by the method of variation of parameters. **(06 Marks)**

   b. Solve $\dfrac{d^2 x}{dt^2} + 5\dfrac{dx}{dt} + 6x = 0$, given $x(0) = 0$, $\dfrac{dx}{dt}(0) = 15$. **(05 Marks)**

   c. Solve $(D^2 + 5D + 6)y = e^x$. **(05 Marks)**

OR

4 a. Solve by the method of undetermined coefficients $(D^2 - 2D + 5)y = 25x^2 + 12$. **(06 Marks)**

   b. Solve $(D^2 + 3D + 2)y = \sin 2x$. **(05 Marks)**

   c. Solve $(D^2 - 2D - 1)y = e^x \cos x$. **(05 Marks)**

Module-3

5 a. Find the Laplace transforms of, (i) $t\cos^2 t$ (ii) $\dfrac{1 - e^{-t}}{t}$ **(06 Marks)**

   b. Find the Laplace transforms of, (i) $e^{-2t}(2\cos 5t - \sin 5t)$ (ii) $3\sqrt{t} + \dfrac{4}{\sqrt{t}}$. **(05 Marks)**

   c. Express the function, $f(t) = \begin{cases} t, & 0 < t < 4 \\ 5, & t > 4 \end{cases}$ in terms of unit step function and hence find its Laplace transform. **(05 Marks)**

OR

6 a. Find the Laplace transform of the periodic function defined by $f(t) = E \sin \omega t$, $0 < t < \dfrac{\pi}{\omega}$

having period $\dfrac{\pi}{\omega}$. **(06 Marks)**

b. Find the Laplace transform of $2^t + t \sin t$. **(05 Marks)**

c. Find the Laplace transform of $\dfrac{2 \sin t \sin 3t}{t}$. **(05 Marks)**

Module-4

7 a. Using laplace transforms method, solve $y'' - 6y' + 9 = t^2 e^{3t}$, $y(0) = 2$, $y'(0) = 6$. **(06 Marks)**

b. Find the inverse Laplace transforms of, (i) $\dfrac{s^2 - 3s + 4}{s^3}$ (ii) $\dfrac{s + 3}{s^2 - 4s + 13}$ **(05 Marks)**

c. Find the inverse Laplace transforms of, (i) $\log\left(\dfrac{s+1}{s-1}\right)$ (ii) $\dfrac{s^2}{(s-2)^3}$ **(05 Marks)**

OR

8 a. Solve the simultaneous equations $\dfrac{dx}{dt} + 5x - 2y = t$, $\dfrac{dy}{dt} + 2x + y = 0$ being given $x = y = 0$

when $t = 0$. **(06 Marks)**

b. Find the inverse Laplace transforms of $\cot^{-1}\left(\dfrac{s}{2}\right)$. **(05 Marks)**

c. Find the inverse Laplace transforms of $\dfrac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6}$. **(05 Marks)**

Module-5

9 a. For any three arbitrary events A, B, C prove that ,
$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(C \cap A) + P(A \cap B \cap C)$ **(04 Marks)**

b. A class has 10 boys and 5 girls. Three students are selected at random, one after the other. Find probability that, (i) first two are boys and third is girl (ii) first and third boys and second is girl. (iii) first and third of same sex and the second is of opposite sex. **(06 Marks)**

c. In a certain college 25% of boys and 10% of girls are studying mathematics. The girls constitute 60% of the student body. (i) what is the probability that mathematics is being studied ? (ii) If a student is selected at random and is found to be studying mathematics, find the probability that the student is a girl? (iii) a boy? **(06 Marks)**

OR

10 a. State and prove Bayes theorem. **(04 Marks)**

b. A problem in mathematics is given to three students A, B and C whose chances of solving it are $\dfrac{1}{2}$, $\dfrac{1}{3}$ and $\dfrac{1}{4}$ respectively. What is the probability that the problem will be solved? **(06 Marks)**

c. A pair of dice is tossed twice. Find the probability of scoring 7 points. (i) Once, (ii) at least once (iii) twice. **(06 Marks)**

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Fourth Semester B.E. Degree Examination, June/July 2018
Analysis of Determinate Structures

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. Distinguish between Statically Determinate Beams and Indeterminate Beams with examples.
(05 Marks)

b. Define Degree of freedom. What is the degree of freedom for a (i) Fixed support (ii) Hinged support. **(03 Marks)**

c. Determine static and kinematic indeterminacy for the following shown in Fig.Q1(c).

Fig.Q1(c)   **(08 Marks)**

OR

2 a. Find the forces in all members of the pin-jointed truss shown in Fig.Q2(a) by method of joints. **(08 Marks)**
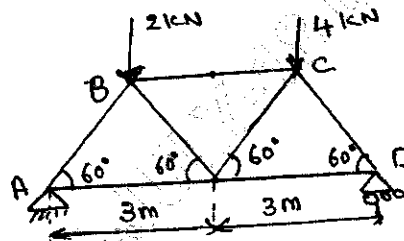
Fig.Q2(a)

b. Determine the nature and magnitude of forces in members FE, FD, CD by method of sections for the truss shown in Fig.Q2(b). **(08 Marks)**
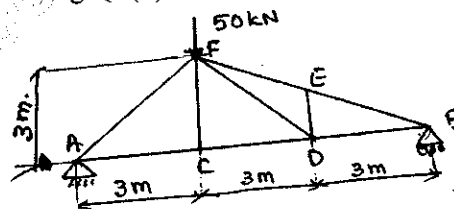
Fig.Q2(b)

Module-2

3 a. Derive Moment Curvature equation. **(06 Marks)**

   b. A beam of length 6m is simply supported at its ends and carries a point load of 40 kN at a distance of 4m from the left support. Find the slopes at the supported ends and deflection under the load by Maculay's method. **(10 Marks)**

OR

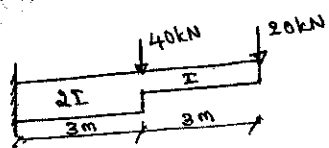4 a. Find the slope and deflection at the free end of the cantilever beam shown Fig.Q4(a) by moment area method. **(08 Marks)**

Fig.Q4(a)

   b. Find the deflection under the concentrated load for the beam shown in Fig.Q4(b) using conjugate beam method. EI = 40000 kN-m^2. **(08 Marks)**
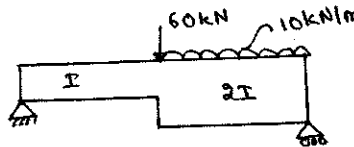

Fig.Q4(b)

Module-3

5 a. State (i) Castigliano's theorems (ii) Principal of virtual work. **(08 Marks)**

   b. Determine the vertical deflection of joint C of the truss shown in Fig.Q5(b). Take E = 200×10^6 kN/m^2 and cross sectional area of each bar as 150×10^{-6} m^2. **(08 Marks)**
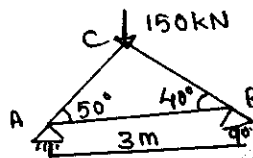

Fig.Q5(b)

OR

6 a. Determine the deflection of the cantilever beam shown in Fig.Q6(a) at its free end, by Castigliano's method. Take EI = 12000 Nm^2. **(06 Marks)**
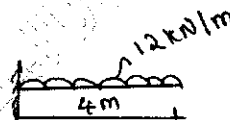

Fig.Q6(a)

   b. Determine the vertical and horizontal deflection at end C of the bent frame shown in Fig.Q6(b) by unit load method. Take E = 200 GPa and I = 6(10)^7 mm^4. **(10 Marks)**
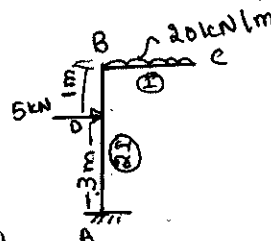

Fig.Q6(b)

Module-4

7 A three hinged parabolic arch has a span of 24m and a central rise of 4m. It carries a concentrated load of 75 kN at 18m from the left support and uniformly distributed load of 45 kN/m over the left half of the portion. Find out the resultant reactions. Also determine the bending moment, normal thrust and radial shear at a section 6m from the left support. **(16 Marks)**

OR

8 A suspension cable of snap 100m and dip 10m carries a uniformly distributed load of 10 kN/m over the full span. Find
   (i)   Maximum and minimum Tension in the cable and its inclination.
   (ii)   Minimum required cross sectional area of the cable if the allowable stress is 280 MPa.
   (iii) Length of the cable
   (iv)   Vertical and horizontal forces transmitted to the supporting pylons (a) if the cable passed over a smooth pulley (b) if the cable is clamped to a saddle with roller on the top of the pier.
   The anchor cable makes 30° to the horizontal at the pylons. **(16 Marks)**

Module-5

9 A simple girder of 20m span is traverssed by a moving uniformly distributed load of 6m length with an intensity of 20 kN/m from left to right. Find the maximum bending moment and maximum positive and negative shear forces at sections 4m from left support. Also find the absolute maximum bending moment that may occur anywhere in the girder. **(16 Marks)**

OR

10 Using relevant influence line diagram find (i) Maximum bending moment (ii) The maximum positive and negative shear forces at 4m from left support of a simply supported girder of span 10m, when a train of 4 wheel loads of 10 kN, 15 kN, 30 kN and 30 kN spaced at 2m, 3m and 3m respectively cross the span left to right with 10 kN load leading. [Refer Fig.Q10] **(16 Marks)**
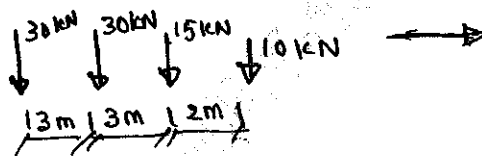
Fig.Q10

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Fourth Semester B.E. Degree Examination, June/July 2018
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 Dimensional Homogeneity? Give example. **(06 Marks)**
   b. The Frictional Torque (T) of a Disc of diameter (D) rotating at a speed (N) in a fluid of viscosity (μ) and density (ρ) in a turbulent flow using dimensional analysis prove

   $$T = D^5 N^2 \rho \, \phi \left[\frac{\mu}{D^2 N \rho} \right].$$

   (10 Marks)

OR

2. a. Explain three types of similarities in model analysis. **(06 Marks)**
   b. A ship 300m long moves in a sea water, whose density is 1030 kg/m^3. A 1:100 model of this ship is to be tested in a wind tunnel. The velocity of air in the wind tunnel around the model is 30m/s and the resistance of the model is 60N. Determine the velocity of ship in sea water and also the resistance of the ship in sea water. The density of air is 1.24 kg/m^3. Take the kinematic viscosity of sea water and air as 0.012 stokes and 0.018 stokes respectively. **(10 Marks)**

Module-2

3. a. Explain classification of flow in open channel. **(06 Marks)**
   b. Derive conditions for most economical rectangular channel. **(04 Marks)**
   c. A trapezoidal channel has side slopes of 1H:2V and the slope of bed is 1 in 1500. The area of the section is 40m^2. Find the most economical dimensions of channel. Also determine the discharge of the channel. Take C = 50. **(06 Marks)**

OR

4. a. Explain with sketch the specific energy curve. **(06 Marks)**
   b. The discharge of water through a rectangular channel of width 8m is 15 m^3/s, when depth of flow of water is 1.2m. Calculate:
   i) Specific energy of flowing water.
   ii) Critical depth and critical velocity.
   iii) Value of minimum specific energy. **(10 Marks)**

Module-3

5. a. Derive equation of a hydraulic jump in a horizontal rectangular channel. **(10 Marks)**
   b. A hydraulic jump forms at the downstream end of a spillway carrying 17.93 m^3/s discharge. If the depth before jump is 0.8m, determine the depth after jump and energy loss. **(06 Marks)**

OR

6 a. Explain following slope profiles: i) Critical slope   ii) Mild slope   iii) Steep slope also draw profiles of M1, M2 and M3. (06 Marks)

   b. Derive expression for the length of backwater curve. (10 Marks)

Module-4

7 a. Derive expression for force and work done on a curved plate, which is moving in the direction of jet. (06 Marks)

   b. A jet of water having a velocity of 40 m/s strikes a curved vane which is moving with a velocity of 20 m/s. The jet makes an angle of 30° with the direction of motion of vane at inlet and leaves at angle of 90° to the direction of motion of vane at outlet. Draw the velocity triangles at inlet and outlet and determine the vane angles at inlet and outlet so that the water enters and leaves the vanes without shock. (10 Marks)

OR

8 a. Explain classification of Turbines. (06 Marks)

   b. The Penstock supplies water from a reservoir to the pelton wheel with a gross head of 500m. One-third of gross head is lost in friction in the penstock. The rate of flow of water through the nozzle fitted at the end of penstock is 2 m^3/s. The angle of deflection of the jet is 165°. Determine the power given by the water to the runner and also hydraulic efficiency take speed ratio as 0.45 and coefficient of velocity as 1. (10 Marks)

Module-5

9 a. Explain with a neat sketch the working of a inward flow reaction turbine (Francis turbine). (06 Marks)

   b. A Kaplan turbine runner is to be designed to develop 9100 kW. The net available head is 5.6m. If the speed ratio is 2.09, flow ratio is 0.68, overall efficiency is 86% and the diameter of the boss is 1/3 × diameter of the runner. Find the diameter of the runner, its speed and specific speed of the turbine. (10 Marks)

OR

10 a. Explain components and working of a centrifugal pump. (06 Marks)

   b. A centrifugal pump having outer diameter = 2 times the inner diameter and running at 1000 RPM works against a total head of 40m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are set back at an angle of 40° at outlet. If the outer diameter of the impeller is 500mm and width at outlet is 50mm, determine: i) Vane angle at inlet   ii) Work done by impeller on water/sec   iii) Manometric efficiency. (10 Marks)

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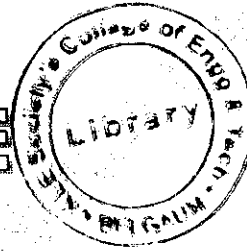
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15CV/CT44

Fourth Semester B.E. Degree Examination, June/July 2018
Concrete Technology

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. IS-10262 mix design code is allowed.

Module-1

1　a. Why is concrete the most widely used engineering material? (04 Marks)
　b. What is an admixture? Name different types of admixtures. (04 Marks)
　c. Explain the manufacture of cement by dry process, with neat flow chart. (08 Marks)

OR

2　a. What are Bogue's compounds? Explain the influence of C_2S in strength gaining process. (06 Marks)
　b. Name the different tests on cement. (04 Marks)
　c. Explain briefly the action of accelerator and super plasticizers in the concrete mix, also name any two accelerators used in industry. (06 Marks)

Module-2

3　a. What is workability? Explain the factors affecting workability. (08 Marks)
　b. Explain good and bad practices of making of fresh concrete. (08 Marks)

OR

4　a. What is segregation? How to prevent segregation in the concrete mix? (08 Marks)
　b. Name the tests conducted on workability of concrete. (04 Marks)
　c. What is curing? Name the methods of curing. (04 Marks)

Module-3

5　a. What is strength of concrete? What are the factors affecting the strength of concrete? (08 Marks)
　b. Define creep, what are the factors affecting the creep of concrete. (08 Marks)

OR

6　a. How do you define durability? What are the factors improves the durability of concrete and explain briefly? (08 Marks)
　b. What is sulphate attack? How to minimize sulphate attack? Also mention its action with equations. (08 Marks)

Module-4

7　a. Explain the main factors on which the IS-10262 mix design depends. (08 Marks)
　b. Draw flow chart of IS code mix design. (08 Marks)

OR

8 It is required to design a M_{35} grade concrete mix having a slump of the order of 150-175mm for pile foundations of a structure. Use IS:10262-Indian standard recommended guidelines to estimate preliminary mix proportions. Consider very severe exposure condition during the service life of the structure.

Data:
I)   Size of aggregate = 10mm to 20m
II)   Specific gravity of aggregate = 2.67
III) Moisture content = 1 percent
IV)   Absorption = 0.5 percent
V)   Fine aggregate fineness modulus = 2.80 (grading zone 1)
VI)   Specific gravity = 2.62
VII) Moisture content = 4.1
VIII) Absorption = 1%
IX)   Cement OYC grade 53
X)   Specific gravity of cement = 3.15.

Other conditions
i)   Standard deviation = 2MPa
ii)   Air content = 4 to 5%
iii) Maximum allowable w/c ratio = 0.45
iv)   Minimum cement content = 340 kg/m³
v)   Density of water = 1000 kg/m³
vi)   Bulk density of
Cement = 1450 kg/m³
Fire aggregate = 1700 kg/m³
Coarse aggregate = 1800 kg/m³.   **(16 Marks)**
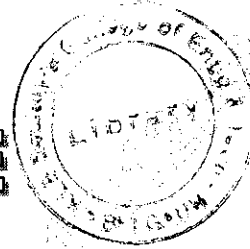
Module-5

9 a. What is RMC? What are the factors on which the property of RMC depends?   **(08 Marks)**
   b. What is light weight concrete? Name the aggregates used as light weight aggregate? Explain its property.   **(08 Marks)**

OR

10 a. What is self compacting concrete? How it is different from high performance concrete?
                                                                                (04 Marks)
   b. What are the different types of fibers used in fiber reinforced concrete?   **(04 Marks)**
   c. Explain maximum and minimum values of workability values measured in L-box. V-tunel and flow test. Explain the above tests briefly.   **(08 Marks)**

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15CV45

Fourth Semester B.E. Degree Examination, June/July 2018
Basic Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 80

Note: 1. *Answer any FIVE full questions, choosing one full question from each module.*
2. *Missing data, if any, may be suitably assumed and clearly stated.*

Module-1

1 a. With the help of phase diagrams, explain : i) Dry soil   ii) Partially saturated soil
      iii) Saturated soil.   **(06 Marks)**
   b. 500g of dry soil was subjected to a sieve analysis. The weight of soil retained on each sieve is as follows :

I.S. Sieve size	Wt. of soil, g	I.S. Sieve size	Wt. of soil. g
4.75mm	10	212 μ	40
2.00mm	165	150 μ	30
1.00mm	100	75 μ	50
425 μ	85		

Plot the grain size distribution curve and determine the following :
   i) Percentage of gravel , coarse sand , medium sand , fine sand and silt – clay fraction as per IS : 1498 – 1970.
   ii) Effective size   iii) Uniformity coefficient   iv) Coefficient of curvature
   v) The gradation of the soil.   **(10 Marks)**

OR

2 a. List the consistency limits and their indices.   **(04 Marks)**
   b. Explain the Indian standard soil classification system and mention the use of plasticity chart.   **(06 Marks)**
   c. The weight of soil coated with the thin layer of paraffin wax was 6.90 N. The soil alone weighs 6.83 N. When the sample is immersed in water it displaces 360 mℓ of water. The specific gravity of soil is 2.73 and that of wax is 0.89. Find the void ratio and degree of saturation, if the moisture content is 17%.   **(06 Marks)**

Module-2

3 a. List and explain various soil structures.   **(08 Marks)**
   b. The following results refers to compaction test as per IS light compaction :

Water content (%)	8.5	12.2	13.75	15.5	18.2	20.2
Wt. of wet soil (kg)	1.8	1.94	2.00	2.05	2.03	1.98

If the specific gravity of soil is 2.7 and volume of compaction mould is 1000 CC. Plot the compaction curve and obtain the maximum dry unit weight and optimum moisture content.   **(08 Marks)**

OR

4 a. With the help of neat sketches, explain any two clay minerals.   **(08 Marks)**
   b. During compaction test on soil having specific gravity of 2.7 gave a maximum dry unit weight of 18kN/m³ and the water content of 15%. Determine the degree of saturation , air content and percentage air voids at the maximum dry unit weight. What would be the theoretical maximum dry unit weight corresponding to zero air void at the optimum water content?   **(08 Marks)**

1 of 2

Module-3

5 a. Explain : i) Superficial velocity   ii) Seepage velocity   iii) Capillary rise of water in soil. **(06 Marks)**

   b. A soil stratum with permeability $K = 5 \times 10^{-7}$ cm/s overlies an impervious stratum. The impervious stratum lies at a depth of 18m below the ground surface. A sheet pile wall penetrates 8m into the permeable soil stratum. Water stands to a height of 9m on upstream side and 1.5m on downstream side above the surface of soil stratum. Sketch the flow net and determine   i) Quantity of seepage   ii) Seepage pressure at 'P' located 8m below the surface of soil stratum and 4m away from the sheet pile wall on its upstream side. **(10 Marks)**

OR

6 a. What is a Flownet? What are its characteristics and uses? **(06 Marks)**

   b. A clay strata 6m thick laying below sand layer 5m thick. The water table is located at a depth of 2m from surface. The sand has porosity of 38% and specific gravity of 2.7. The sand above the water table may be taken as dry. The water content of clay layer if 60% and $G = 2.65$. Calculate total stress, pore water pressure and effective stress at the middle of clay layer and draw the distribution diagram. **(10 Marks)**

Module-4

7 a. Explain Mass – Spring analogy theory of consolidation of soil. **(06 Marks)**

   b. A saturated soil stratum 5m thick lies above an impervious stratum and below a pervious stratum. It has a compression index of 0.25 and coefficient of permeability 3.2×10^{-4} cm/s void ratio at stress 150kN/m² is 1.9. Compute   i) Change in void ratio due to increase of stress to 200kN/m²   ii) Settlement due to increased load   iii) Time required for 50% consolidation. **(10 Marks)**

OR

8 a. With the help of neat sketch, explain determination of pre-consolidation pressure by Casagrende's method. **(06 Marks)**

   b. Differentiate between Normally consolidated and Over consolidated soils. **(04 Marks)**

   c. A 3m thick layer of saturated clay in the field under a surcharge loading with achieve 90% consolidation in 75 days in double drainage conditions. Find the co-efficient of consolidation of the clay. **(06 Marks)**

Module-5

9 a. Explain Mohr – Coulomb failure theory of soil. **(06 Marks)**

   b. Compute the shear strength of soil along a horizontal plane at a depth of 5m in a deposite of sand having the following particulars : Angle of internal friction , $\phi = 36^0$;
   Dry unit weight , $\gamma_d = 17$ kN/m³ ;   Specific gravity , $G = 2.7$.
   Assume the ground water table is at a depth of 2.4m below the ground level. Also determine change in shear strength if water level raises to ground level. **(10 Marks)**

OR

10 a. Explain the types of shear test based on different drainage conditions. **(06 Marks)**

   b. In a drained triaxial compression test, a saturated sandy sample failed at a deviator stress of 360kN/m² and cell pressure of 100kN/m². Find the effective shear parameters of sand. If another identical sample is tested under a cell pressure of 200kN/m² , determine graphically the deviator stress at which the specimen fails. Check the results analytically. **(10 Marks)**

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Fourth Semester B.E. Degree Examination, June/July 2018
Advanced Surveying

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. Define degree of a curve. Establish the relationship between degree of a curve and its radius. **(04 Marks)**

   b. Two tangents intersect each other at a chainage of 59 + 60, the deflection angle being 50°30′. It is required to connect the two tangents by a simple curve of 15 chain radius. Taking peg interval of 100 links, calculate the necessary data for setting out the curves by Rankine's method of deflection angles. Take length of the chain as 20m = 100 links. Also write a brief procedure for setting out the curve. **(12 Marks)**

OR

2 a. Distinguish between a compound curve and a reverse curve with sketches. **(06 Marks)**

   b. A compound curve consists of two simple circular of radii 350m and 500m, respectively and is to be laid out between two tangents T_1I and IT_2. PQ is the common tangent and D is the point of compound curvature. The angles $\underline{|IPQ}$ and $\underline{|IQP}$ are 55° and 25° respectively. Given the chainage of point of intersection as 1800.00m, calculate the chainages of T_1, T_2 and D. **(10 Marks)**

Module-2

3 a. What are the important factors to be considered in selection of site for a base line? **(06 Marks)**

   b. From a triangulation satellite station 'Q' 5.80m away from the main station A, the following directions were observed :
   A : 0° 0′ 0″, B : 132° 18′ 30″, C: 232° 24′ 6″, and D : 296° 6′ 11″.
   The inter connected base lines AB, AC and AD were measured as 3265.50m, 4022.20m and 3086.40m respectively. Determine the directions of AB, AC and AD. **(10 Marks)**

OR

4 a. Define the terms :
   i) True error
   ii) Residual error
   iii) Conditioned equation
   iv) Indirect observation. **(04 Marks)**

   b. Three observed angles α, β and γ from a station $\underline{P}$ with probable errors of measurement are given below :
   $\alpha = 78° 12′ 12″ ± 2″$,
   $\beta = 136° 48′ 30″ ± 4″$,
   $\gamma = 144° 59′ 8″ ± 5″$
   Determine their corrected values. **(12 Marks)**

1 of 2

Module-3

5 a. Define the terms :
   i) Celestial sphere
   ii) Hour angle
   iii) Prime vertical
   iv) Latitude of a place. (04 Marks)
   b. Find the shortest distance between two places A and B given that their latitudes are 12°N and 13° 04'N with respective longitudes 72° 30' E and 80° 12' E. (12 Marks)

OR

6 a. Briefly explain the solution of spherical triangle by Napiers rule of circular parts. (06 Marks)
   b. The standard time meridian in India is 80° 30' E. If the standard time of place is $20^H \ 24^M \ 06^S$, find the local mean time of two places having the longitudes as 20° E and 20° W respectively. (10 Marks)

Module-4

7 a. With a neat sketch, derive the expression for the scale of a vertical photograph. (08 Marks)
   b. A line AB 2.00 kilometer long, lying at an elevation of 500m measures 8.65cm on a vertical photograph of focal length 20cm. Determine the scale of the photograph at an average elevation of 800m. (08 Marks)

OR

8 a. Define the terms :
   i) Tilt
   ii) Exposure station
   iii) Principal point
   iv) ISO centre. (08 Marks)
   b. Mention the reasons for photograph over lap. Justify the same. (08 Marks)

Module-5

9 a. Define EDM. (03 Marks)
   b. Explain the working of remote sensing equipment. (05 Marks)
   c. What are the advantages of LIDAR technology? (08 Marks)

OR

10 a. Explain the working of total station. (08 Marks)
   b. Explain the civil engineering applications in GIS and remote sensing. (08 Marks)

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15CV/CT51

Fifth Semester B.E. Degree Examination, June/Jul 2018
Design of RC Structural Elements

Time: 3 hrs.   Max. Marks: 80

Note: 1. Answer FIVE full questions, choosing one full question from each module.
2. Use of IS456-2000, SP16 permitted.

Module-1

1   a.   Differentiate between working stress method and limit state method of RCC design.
(05 Marks)

   b.   Define:
   i)   Partial safety factor for load and materials.
   ii)   Characteristic load.
   iii) Characteristic strength.   **(03 Marks)**

   c.   A simply supported beam of rectangular section spanning over 6m has a width of 300mm and overall depth 600mm. The beam is reinforced with 4-25mm bars on tension side. The beam is subjected to moment of 160kNm. Check the beam for serviceability limit state of cracking. Assume M25 and Fe415.   **(08 Marks)**

OR

2   a.   Derive the expression for stress block parameter for compresive force C_u, tensile force T_u and locate the depth of neutral axis $y = 0.42 \, x_u$ from top of the beam.   **(05 Marks)**

   b.   Explain briefly under reinforced, over reinforced and balanced sections with sketch.
(03 Marks)

   c.   A simply supported beam of rectangular section 250mm wide by 450mm overall depth is used over an effective span of 4m. the beam is reinforced with 3 bars of 20mm. Two hanger bars of 10mm diameter are provided. The self weight of the beam is 4kN/m and service load is 10kN/m. Assume M20, Fe415.
   Compute: i) Short term deflection;   ii) Long term deflection.   **(08 Marks)**

Module-2

3   a.   Define simply and doubly reinforced beams list the situations when they are adopted.
(05 Marks)

   b.   Determine moment of resistance of T-beam for the following data:
   Width of the flange = 2500mm, effective depth = 800mm, width of the web = 300mm, number of bars = 8 of 25mm diameter, depth of flange = 150mm. Assume M20 and Fe415 steel.   **(11 Marks)**

OR

4   a.   A simply reinforced concrete beam 250 × 450mm deep upto the centre of reinforcement is reinforced with 3-16mm bars with an effective cover of 50mm. The effective span of the beam is 6m. Determine the central point load that the beam can carry excluding self weight. Assume M20 and Fe415.   **(08 Marks)**

   b.   A doubly reinforced beam is 250mm wide and 450mm deep to the centre of tensile reinforcement. It is reinforced with 2-16 compression reinforcement and 4-25 as tensile reinforcement. Calculate the ultimate moment of resistance of the beam. Assume M15 and Fe250 steel.   **(08 Marks)**

Module-3

5 a. Design a reinforced concrete beam of rectangular section using the following data:
Effective span = 5m, width of the beam = 250mm, overall depth = 500mm,
D.L + L.L. = 40 kN/m, effective cover = 50mm. **(07 Marks)**

b. A T beam slab floor of an office comprises of a slab 150mm thick resting on beams 3m c/c.
The effective span of beam is 8m. Assume live load on the floor as $4kN/m^2$. Use M20 and
Fe415. Design one of the intermediate T beams. **(09 Marks)**

OR

6 a. A reinforced concrete beam over an effective span 5m carries a load of 8kN/m inclusive of
self weight. Assume M20 and Fe415. Design the beam to satisfy the collapse and
serviceability limit states. **(08 Marks)**

b. A cantilever beam of 4m span carries a load of 40kN/m. The width of the beam is 230mm.
Design the beam for flexure and shear. Sketch the details of reinforcement. Assume M20
and Fe415. **(08 Marks)**

Module-4

7 a. Distinguish between one way slab and two way slab. **(04 Marks)**

b. Explain the importance of bond, anchorage length. **(04 Marks)**

c. Design a two way slab for an office floor of 3.5 × 4.5m simply supported on all sides with
corners prevented from lifting. Take live load of $4kN/m^2$. Assume M20 and Fe415.
(08 Marks)

OR

8 a. What is development length? Write the expression for development length. **(04 Marks)**

b. Design one of the flights of dog logged stair case spanning between landing beams using the
following data:

Number of steps in the flight = 10
Tread = 300mm
Rise = 150mm
Width of landing beams = 300mm
Assume M20 and Fe415. **(12 Marks)**

Module-5

9 a. What is the role of transverse reinforcement in columns? What are the codal provisions to
design the transverse reinforcement? **(05 Marks)**

b. Design the reinforcement for a column of size 300 × 500mm to support a factored load of
500kN and a factored moment of 200 kNm. Assume M20 and Fe415. Sketch the
reinforcement details. **(11 Marks)**

OR

10 a. Explain the different between short columns and long columns. Why is reduction coefficient
applied to long column? **(04 Marks)**

b. Design a isolated forting for a rectangular column of 300mm × 500mm supporting an axial
load of 1500kN factored. Assume SBC of soil as 185 kN/m^2. Use M20 and Fe415. Sketch
the reinforcement and perform the necessary checks. **(12 Marks)**

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Fifth Semester B.E. Degree Examination, June/July 2018
Applied Geotechnical Engineering

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. What is subsurface exploration? What are objectives of soil exploration? **(08 Marks)**
   b. What are Geophysical methods? Explain seismic refraction method with neat sketch.
                                                                              (08 Marks)

OR

2 a. List and explain different types of samplers used in soil sampling. **(08 Marks)**
   b. What are the methods available for dewatering? Explain dewatering by well point system.
                                                                              (08 Marks)

Module-2

3 a. Derive the expressions for vertical stress and shear by using Boussinesq's theory. Also write expression for Westerguard's theory. **(08 Marks)**
   b. What is Newmark's influence chart and also describe construction procedure for Newmarks's influence chart. **(08 Marks)**

OR

4 a. What are the types of settlement? Explain them with equations. **(08 Marks)**
   b. A soft, normally consolidated clay layer 18 m thick. The natural water content, saturated unit weights specific gravity and liquid limit are 45%, 18 kN/m^3, 2.70 and 63% respectively. The vertical stress increment at centre of the layer due to the foundation load is 9 kN/m^2. The ground water level is at the surface of the clay layer. Determine the settlement of the foundation. **(08 Marks)**

Module-3

5 a. Define with neat sketch At rest, Active and Passive earth pressure. **(06 Marks)**
   b. A retaining wall, 8 m high with a smooth vertical back, retains a clay backfill with $C' = 15$ kN/m^2, $\phi' = 15°$ and $\gamma = 18$ kN/m^3. Calculate the total active thrust on the wall assuming that tension cracks may develop to the full theoretical depth. **(10 Marks)**

OR

6 a. Explain the causes for slope failure and also list the type of slope failures. **(08 Marks)**
   b. A 7m deep canal has side slope of 1:1. The properties of soil are $C_u = 20$ kN/m^2, $\phi_u = 15°$, e = 0.9 and G = 2.75. If Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when canal runs full. Also find the factor of safety in case of sudden draw down, if the Taylor's stability number for this condition is 0.137. **(08 Marks)**

Module-4

7 a. Write a note on standard penetration test and its corrections. **(08 Marks)**
   b. Define safe bearing capacity, safe bearing pressure and allowable bearing pressure and also write expressions for the same. **(08 Marks)**

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

OR

8   a.   Discuss the effect of ground water table on bearing capacity of soil.   **(08 Marks)**

     b.   A square footing 2.5m × 2.5m is built on homogenous bed of sand of density 19 kN/m³ and having an angle of shearing resistance of 36°. The depth of foundation is 1.5m below ground surface. Calculate safe load that can be applied on the footing with factor of safety 3. Take bearing capacity factors as $N_c = 27$, $N_q = 30$ and $N\gamma = 35$.   **(08 Marks)**

Module-5

9   a.   Explain the types of piles and also mention their uses.   **(08 Marks)**

     b.   200 mm diameter, 8 m long piles are used as foundation for column in a uniform deposit of medium clay ($q_u = 100$ kN/m²). The spacing between the piles is 500mm. There are 9 piles in the ground arranged in a square pattern. Calculate the ultimate pile load capacity of the group. Assume adhesion factor = 0.9.   **(08 Marks)**

OR

10   Write short notes on :

     a.   Piles in granular soils   **(04 Marks)**

     b.   Settlement of pile group   **(04 Marks)**

     c.   Negative skin friction   **(04 Marks)**

     d.   Pile load tests.   **(04 Marks)**

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15CV/CT551

Fifth Semester B.E. Degree Examination, June/July 2018
Air Pollution and Control

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1 a. Explain the classification of air pollutants. Give examples. **(08 Marks)**
   b. Explain effects of air pollutants on plants. **(08 Marks)**

OR

2 a. With a neat sketch, explain inversion occurs due to high pressure system. **(06 Marks)**
   b. Define : (i) Fog, (ii) Mists (iii) Smoke (iv) Soot **(04 Marks)**
   c. Explain the effects of carbon monoxide on human beings. **(06 Marks)**

Module-2

3 a. Define DALR and ELR. **(02 Marks)**
   b. Calculate the minimum stack height required for a thermal power plant which burns 100 tonnes of coal with 5.5%, Sulphur content. The particulate concentration in flue gases is 8000 mg/m^3 and gas flow rate is 20 m^3/s. **(08 Marks)**
   c. Explain the application of wind rose diagram. **(06 Marks)**

OR

4 a. A thermal plant burns 5.45 tonnes with 4.2% sulphur per hour and discharge through a stack of effective height 75 m. The average wind speed at top of stack is 6 m/s. Atmosphere is slightly to moderately stable. Find Ground Level Concentration (GLC) at 3 km downwind and 0.4 km crosswind distance. Take $\sigma_z = 170$ and $\sigma_y = 280$. **(08 Marks)**
   b. With neat sketches, explain different types of plume behavior. **(08 Marks)**

Module-3

5 a. With neat sketches, explain the components of sampling train. **(10 Marks)**
   b. Explain the gravitational method for estimating particulate matter. **(06 Marks)**

OR

6 a. Explain the factors influencing indoor air quality. **(06 Marks)**
   b. With a neat sketch, explain Pollution Standard Index (PSI). **(06 Marks)**
   c. What is meant by super Isokinetic sampling? **(04 Marks)**

Module-4

7 a. With a neat sketch, explain the working of cyclones in particulate removal. **(08 Marks)**
   b. Calculate the settling velocity of fog with a particle size of 1 μm. **(08 Marks)**

OR

8 a. With a neat sketch, explain working principle of electrostatic precipitator. (10 Marks)
   b. A fabric filter is to be constructed using bags of 0.3 m in diameter and 6 m long. The bag house is to receive 800 m^3/min of air. Determine the number of bags required for cleaned operation. (06 Marks)

Module-5

9 a. Explain the types of emissions due to automobiles. (09 Marks)
   b. How noise can be reduced at source? Explain. (07 Marks)

OR

10 a. Define acid rain. Explain the sources and effects of acid rain. (08 Marks)
   b. List Air Pollution Control Acts. (04 Marks)
   c. Explain the reason for Bhopal gas tragedy. (04 Marks)

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CBCS SCHEME

15CV61

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Sixth Semester B.E. Degree Examination, June/July 2018
Construction Management and Entrepreneurship

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1   a.   Define Construction management. Explain the objectives of construction management.
                                                                             (08 Marks)
    b.   What are the functions of management? Explain any two of them.   **(08 Marks)**

OR

2   a.   What is construction planning? List the objectives of construction planning.   **(06 Marks)**
    b.   Explain Bar chart or Gantt chart. Write its limitations.   **(04 Marks)**
    c.   Draw the network for the project based on the following data of events:
         Find Early start time, Early finish time, Late finish time, and determine the least number of
         days required to complete the work. Draw the critical path.

Event	Duration (Days)	Preceders
A	2	-
B	4	-
C	1	A
D	6	B
E	7	C, D

                                                                             (06 Marks)

Module-2

3   a.   Explain the importance of resource management in the construction of a project.   **(08 Marks)**
    b.   Explain (i) Minimum wages act 1948 (ii) Labour production rate of productivity. **(08 Marks)**

OR

4   a.   Explain the advantages of utilization of construction equipments in construction field. List
         the various classifications of equipments.   **(08 Marks)**
    b.   Describe material management and objectives of material management. **(08 Marks)**

Module-3

5   a.   Define quality. Describe quality control and quality assurance.   **(08 Marks)**
    b.   Explain the importance of safety in construction. Explain the safety measures during
         (i) Excavation (ii) Drilling and blasting   **(08 Marks)**

OR

6   a.   Describe the safety insurance. Explain constructors all risk insurance.   **(08 Marks)**
    b.   Differentiate between morals and values.   **(04 Marks)**
    c.   List the professional rights.   **(04 Marks)**

Module-4

7   a.   What is economics? List the goals of economics.   **(08 Marks)**
    b.   Differentiate between Microeconomics and Macroeconomics.   **(08 Marks)**

OR

8 a. Explain : (i) Time value of money (ii) Simple interest (iii) Compound interest. **(10 Marks)**
 b. Mr. X is planning to build his own house. He plans to deposit Rs. 40,000/- every year for next 10 years in a bank. The bank gives 12% interest rate compound annually. Find the maturity value of his account after 10 year. **(06 Marks)**

Module-5

9 a. Explain in brief the role of entrepreneurship in economic development. **(08 Marks)**
 b. What do you mean by small-scale industry? List the characteristics of small scale industries. **(08 Marks)**

OR

10 a. What is business plan? Explain the importance of business plan. **(08 Marks)**
 b. Explain in detail the contents of a good project report. **(08 Marks)**

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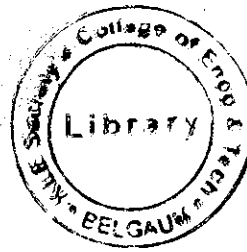
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15CV62

Sixth Semester B.E. Degree Examination, June/July 2018
Design of Steel Structural Elements

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Use of IS:800-2007, SP(6)-I or Steel table is permitted.

Module-1

1 a. What are the advantages and disadvantages of steel structures? **(08 Marks)**
   b. What are rolled steel sections? Mention any six shapes used as structural elements with sketches. **(08 Marks)**

OR

2 a. Identify plastic hinge distance 'X' is 0.414ℓ from the simple support of a propped cantilever beam supporting a UDL of w kN/m over the entire span. **(08 Marks)**
   b. Analyse the continuous beam ABC subjected to working loads shown in Fig.Q2(b) and determine the maximum plastic moment. Take load factor of 1.85. **(08 Marks)**
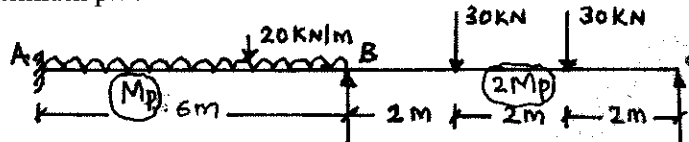
Fig.Q2(b)

Module-2

3 a. What are HSFG bolts? What are the advantages of HSFG bolts? **(06 Marks)**
   b. Design a bolted connection for a lap joint of plate thickness 10 mm and 12 mm to carry a factored load of 150 kN. Use M_{16} and 4.6 grade bolt. Assume the bolts as fully threaded. **(10 Marks)**

OR

4 a. What are the advantages and disadvantages of welded connections? **(08 Marks)**
   b. 18 mm thick plate is joined to a 16 mm thick plate by 200 mm (Effective) butt weld. Determine the strength of joint if, (i) A double V-butt weld is used (ii) A single V-butt weld is used. Take $f_u = 410$ N/mm^2 and $\gamma_{mw} = 1.25$. **(08 Marks)**

Module-3

5 a. Explain Laced and Battended columns with sketches. **(06 Marks)**
   b. Determine the design strength of a column section ISHB 350@67 kg/m. The column is 3m height with one end fixed and other end hinged. Take $f_y = 250$ N/mm^2. **(10 Marks)**

OR

6 Design a compression member using double channel section (2ISLC300@33.1 kg/m) face to fall to carry a factored load of 1600 kN. The length of the column is 5 m with one end fixed and one end hinged. Assume M_{18} bolts and fcd = 200 N/mm^2. Also design single lacing system. **(16 Marks)**

Module-4

7 a. What is lug angle? Explain briefly with sketch. **(04 Marks)**

   b. A single unequal angle ISA 100×75×6 mm is connected to 10 mm thick gusset plate with six 16 mm ϕ bolts to transfer tension. Determine design tensile strength if longer legs are connected to gusset. Assume pitch and edge distance of 40 mm each. **(12 Marks)**

OR

8 a. Briefly explain types of column bases. **(04 Marks)**

   b. Design a slab base for a column ISHB 300@58.8 kg/m subjected to a service load of 1500 kN. The grade of concrete for pedestal is M_{20} and SBC of soil is 180 kN/m^2. Design slab base and concrete base with welded connection. **(12 Marks)**

Module-5

9 A floor of hall measuring 9m × 21m is of 150 mm thick R.C. slab supported on steel beams [I section] spaced at 3.5 m c/c. The finishing load of floor is 1.5 kN/m^2 and live load is 3 kN/m^2. Design the steel beam and apply the necessary checks. Assume self weight of beam = 1 kN/m and thickness of wall = 0.3 m. **(16 Marks)**

OR

10 Simply supported beam ISMB 350@52.4 kg/m is used over a span of 5 m. The beam carries an Udl live load of 20 kN/m and dead load 15 kN/m. The beam is laterally supported throughout check the safety of the beam. **(16 Marks)**

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CBCS Scheme

15CV63

Sixth Semester B.E. Degree Examination, June/July 2018
Highway Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1. a. Explain the various characteristics of road transport. **(08 Marks)**
   b. What are the significant recommendations of Jayakar committee report? Explain how it is implemented in the road development of a country. **(08 Marks)**

OR

2. a. Briefly explain about planning surveys for a highway project. **(08 Marks)**
   b. The area of a district is 13400 sq km and there are 12 towns as per 1981 census. Determine the length of different categories of roads to be provided in the district by the year 2001. Assume overall density of road length is 82 km per 100 sq km area. **(08 Marks)**

Module-2

3. a. Explain with sketches the various factors controlling the alignment of a road. **(08 Marks)**
   b. What are the objectives of preliminary survey for highway alignment? Enumerate the details to be collected and the various steps to be followed in the conventional method. **(08 Marks)**

OR

4. a. Derive an expression for finding the extra widening required on horizontal curve. **(08 Marks)**
   b. The speeds of overtaking and over taken vehicles are 70 kmph and 40 kmph respectively on a two way traffic road. The average acceleration during overtaking may be assumed as 0.99 m/sec^2. Calculate safe overtaking sight distance and show the details of overtaking zone with sketch. **(08 Marks)**

Module-3

5. a. What are the desirable properties of sub grade soil? Enumerate the identification and classification tests of soils. **(08 Marks)**
   b. Design a flexible pavement for a two lane undivided carriage way using the following data: Design CBR value of subgrade 5.0% initial traffic on completion of construction is 300 C.V/day. Average growth rate is 6.0% per year. Design life is 10 years VDF value is 2.5. Lane distribution factor is 0.75. **(08 Marks)**
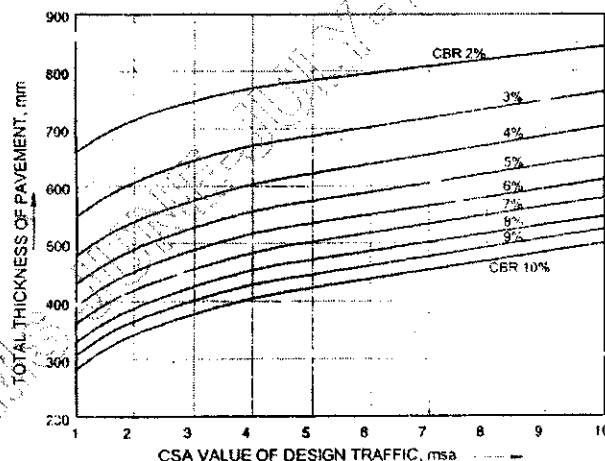

Fig.5(b) CBR design chart for determination of total pavement thickness for traffic with CSA of 1.0 to 10 msa.

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OR

6 a. What are the desirable properties of road aggregates? What tests are conducted for judging the desirable properties? Mention the significance of each test. **(08 Marks)**

   b. A plate load test was conducted on a soaked sub grade during monsoon using a plate diameter of 30cm. The load values corresponding to the mean settlement dial readings are given below. Determine the modulus of sub grade reaction for the standard plate. **(08 Marks)**

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

Module-4

7 a. What are the desirable properties of Bituminous mixes? Discuss briefly. **(08 Marks)**

   b. What are the essential requirements of soil properties suitable for the construction of highway sub grade? Explain the method of construction of highway sub grade. **(08 Marks)**

OR

8 a. Explain the method of construction of water Bound Macadam base. **(08 Marks)**

   b. What are the functions of granular material sub base? Explain the construction method of granular sub base. **(08 Marks)**

Module-5

9 a. Discuss the importance of highway drainage. **(08 Marks)**

   b. The maximum quantity of water expected in longitudinal drains on clayey soil is 0.9 m³/sec. Design the cross section and longitudinal slope of trapezoidal drain assuming the bottom width of the trapezoidal section to be 1.0m and cross slope to be 1.0 vertical to 1.5 horizontal. The allowable velocity of flow in the drain is 1.2 m/sec and Manning's roughness coefficient is 0.02. **(08 Marks)**

OR

10 a. Discuss the various components of quantifiable and non-quantifiable benefits to the road users due to highway development project. **(08 Marks)**

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

Item	Total cost lakhs	Estimated life years	Rate 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 appurtenance	15.0	5	10%

The average cost of maintenance of the road is Rs.1.5 lakhs per year. **(08 Marks)**

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15CV64

Sixth Semester B.E. Degree Examination, June/July 2018
Water Supply and Treatment Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1 a. Enumerate points to be considered for water supply scheme. **(08 Marks)**
   b. What is fire demand? Compute fire demand for a city having population 1,40,000 by various formula. **(08 Marks)**

OR

2 a. What is peaking factor? Explain the factor governing design period. **(08 Marks)**
   b. The population of 5 decades from 1970 to 2010 are given in the table. Find the population after one, two and three decades beyond the last known decade by : i) geometric increase method ii) incremental increase method.

Year	1970	1980	1990	2000	2010
Population	25000	28000	34000	42000	47000

(08 Marks)

Module-2

3 a. What is the purpose of analysis of water point out significant of each unit in water treatment? **(08 Marks)**
   b. What is sampling? Explain the steps involved in collection of river water sample. **(08 Marks)**

OR

4 a. Enumerate the necessity of microbiological examination of water. Explain membrane filler technique for bacteriological examination of water. **(08 Marks)**
   b. Write the permissible limits and effects of following water quality parameter according (IS10500 – 1991) i) Turbidily ii) p^H iii) Chloride iv) Lead. **(08 Marks)**

Module-3

5 a. Briefly explain mechanism of filtration. **(08 Marks)**
   b. A rectangular settling tank without mechanical equipment is to treat 1.8 million liters per day of raw water. The sedimentation period is to be 4 hours, the velocity of flow 8cm/min and the depth of water and sediment 4.2m. If an allowance of 1.2m for sediments is made. Design the dimension of the tank. **(08 Marks)**

OR

6 a. Briefly explain design elements of a rectangular sedimentation tank. **(08 Marks)**
   b. What are the characteristics of good coagulant? **(04 Marks)**
   c. Explain the causes for Fouling of membrane and how it can be controlled. **(04 Marks)**

Module-4

7 a. What is permanent hardness? With the help of chemical formula explain zeolite process of removing hardness. **(08 Marks)**

b. Discuss the importance of nano filtration and explain different forms of chlorination. **(08 Marks)**

OR

8 a. Discuss the characteristics of ideal disinfectants and explain the mechanism of disinfection. **(08 Marks)**

b. Explain reverse osmosis principle with the help of neat sketch. **(04 Marks)**

c. Enumerate importance of deflouridation. Mention the methods of deflouridation. **(04 Marks)**

Module-5

9 a. Briefly explain economical diameter of raising main. **(04 Marks)**

b. Mention the points to be considered for selection of a site for intake structure. **(04 Marks)**

c. A city has a population of 1,50,000 water is to be supplied at the rate of 160 liters per head per day. If the static lift of the pump is 40 meters. Calculate the B.H.P of motor. The raising main is 300m long and its diameter is 50cm. Assume that motor efficiency is 85%. Pump efficiency is 60% f = 0.04 and peak hour demand is 1.5 times of average demand. **(08 Marks)**

OR

10 Briefly explain the following :

a. Sluice valve

b. Reflux value

c. Post fire hydrant

d. Air valve. **(16 Marks)**

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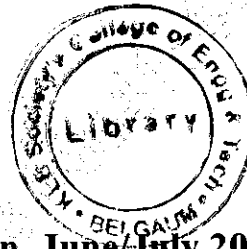
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Sixth Semester B.E. Degree Examination, June/July 2018
Solid Waste Management

Time: 3 hrs.   Max. Marks: 80

Note: 1. *Answer any FIVE full questions, choosing one full question from each module.*
     2. *Missing data if any, may be suitably assumed.*

Module-1

1 a. Briefly explain physical and chemical characteristics of solid waste. **(10 Marks)**
   b. From the following data estimate the waste generation rate per day for a residential area consisting of 1200 houses. The observation location is a local transfer station that receives all the waste collected for disposal. The observation period is for one week. Assume 5 persons in each house. **(06 Marks)**

Vehicle type	No. of loads	Vol. of vehicle (m³)	Sp. Wt. of solid waste (kg/m³)
Compactor truck	10	15.30	296.50
Flat bed load	08	1.53	133.40
Private cars/trucks	25	0.23	88.90

OR

2 a. With a neat sketch, explain the operational sequence of Hauled Container System. **(08 Marks)**
   b. Estimate the moisture content, bulk density and energy content of 1000kg sample of solid waste with the following composition. Also estimate energy content on dry weight basis and on ash free dry basis. Take ash content as 7 percent. **(08 Marks)**

| Component	Food waste	Paper	Cardboard	Plastics	Wood
% by mass	45	5	15	15	20
Moisture %	70	6	5	2	20
Bulk density kg/m³	290	85	50	65	240
Energy content kJ/kg	4650	16750	16300	32600	18600

Module-2

3 a. Explain with a neat sketch, working of a municipal incinerator. **(08 Marks)**
   b. Explain briefly the following processing technique :
      i) Mechanical volume reduction   ii) Mechanical size reduction. **(08 Marks)**

OR

4 a. Explain briefly the following component separation techniques :
      i) Magnetic separation   ii) Air separation. **(08 Marks)**
   b. Write a short note on following :
      i) Garbage chutes   ii) Bailing and Campaction. **(08 Marks)**

Module-3

5 a. Explain the factors that governs the selection of site for sanitary land filling. **(08 Marks)**
   b. Determine the amount of air required to oxidize one tone of waste having the chemical equation $C_{50}H_{100}O_{40}N$. **(08 Marks)**

$$C_aH_bO_cNd + \left[\frac{4a + b - 2c - 3d}{4}\right]O_2 \rightarrow aco_2 + \left[\frac{b - 3d}{2}\right] + H_2O + dNH_3$$
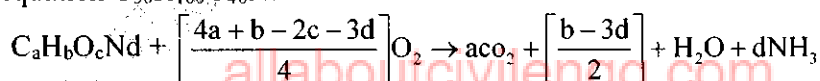
OR

6 a. Explain with neat sketch, Indore process and Bangalore process of composting of municipal solid waste. **(08 Marks)**
   b. Determine the landfill area required for municipality with population 50,000. given that,
      i)   Solid waste generation rate = 450 gm/person/day. **(08 Marks)**
      ii) Compacted density of landfill = 504 kg/m^3.
      iii) Avg. depth of compacted solid work = 5mt.

Module-4

7 a. Define Hazardous waste. Explain briefly about collection and disposal of hazardous waste.
                                                                                        (08 Marks)
   b. Explain the characteristics of Bio – medical waste and its disposal method. **(08 Marks)**

OR

8 a. Briefly explain about E – Waste and its environmental significance. **(08 Marks)**
   b. Explain briefly about reuse of construction and demolition waste in Construction Industry.
                                                                                        (08 Marks)

Module-5

9 a. What are 3Ts of incineration process? Explain briefly. **(08 Marks)**
   b. Define Pyrolysis. Briefly explain about process of Pyrolysis. **(08 Marks)**

OR

10 a. Explain with a flow diagram, energy recovery system from solid waste. **(08 Marks)**
   b. Define Incineration. Explain briefly about air pollution control methods adopted in an incineration process. **(08 Marks)**

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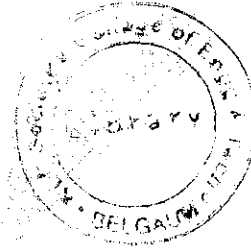
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15CV652

Sixth Semester B.E. Degree Examination, June/July 2018
Matrix Method of Structural Analysis

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1   a. Obtain the relationship between global stiffness matrix $[K_\Delta]$ and member stiffness matrix $[K]$ using displacement transformation matrix $[A]$ in the form $[K]_\Delta = [A]^T [K] [A]$. **(08 Marks)**

   b. Develop stiffness and flexibility matrix for the beam element shown in Fig.Q.1(b), with respect to coordinates (1) and (2). Also show that they are inverse of each other. **(08 Marks)**

Fig.Q.1(b)
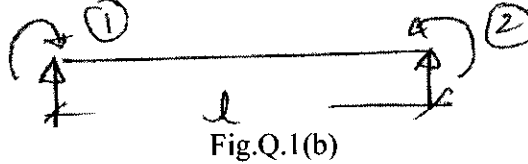
OR

2   a. Define the following: i) Stiffness [k]   ii) Flexibility [f]   iii) Static indeterminacy   iv) Kinematic indeterminacy. **(08 Marks)**

   b. Explain: i) Principle of contragradience   ii) Minimum potential energy. **(08 Marks)**

Module-2

3   Analyze the continuous beam shown in Fig.Q.3 by force method. Draw BMD take moment at 'B' as redundant. **(16 Marks)**

Fig.Q.3

OR

4   Analyze the rigid jointed frame shown in Fig.Q.4 by flexibility method. Use force transformation approach. Take horizontal and vertical reaction at 'A' as redundant. **(16 Marks)**
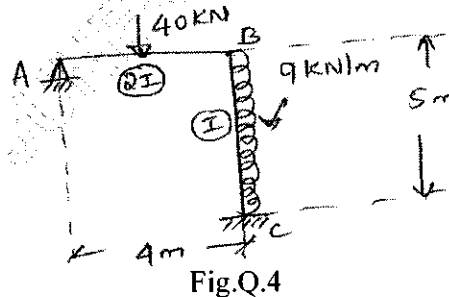
Fig.Q.4

Module-3

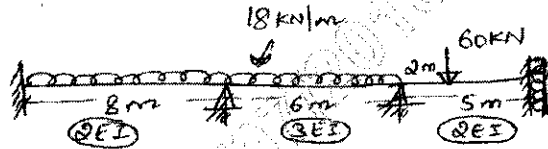5 Analyze the continuous beam by stiffness matrix method using transformation approach. Refer Fig.Q.5. **(16 Marks)**

Fig.Q.5

OR

6 Find forces in all members for the given pin jointed frame shown in Fig.Q.6 and also displacement of joint A. Take E = 200GPa. **(16 Marks)**
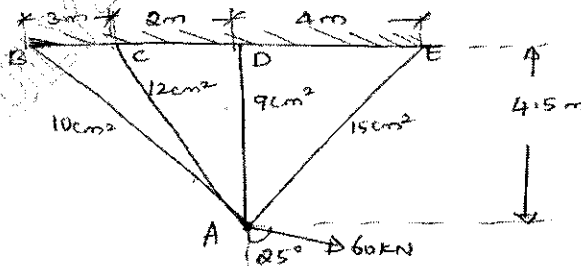

Fig.Q.6

Module-4

7 In the pin jointed truss shown in Fig.Q.7 all the members are cooled upto 20°C. Take $\alpha = 1.2 \times 10^{-5}/°C$. $E = 2 \times 10^{5}$ N/mm^2 for all the members. Find the displacement and forces in all the members. **(16 Marks)**
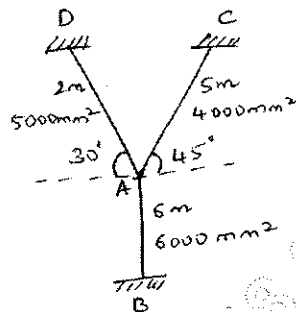

Fig.Q.7

OR

8 Analyze the truss by flexibility method member AD is too long by 3mm, AC is too short by 5mm AB is too short by 8mm. Member AB is subjected to an increase in temperature by 25°C. AE is constant for all members. Take $\alpha = 12.5 \times 10^{-6}/°C$. AE = 250 × 10^{3}kN. Refer Fig.Q.8. Choose AD as redundant. **(16 Marks)**
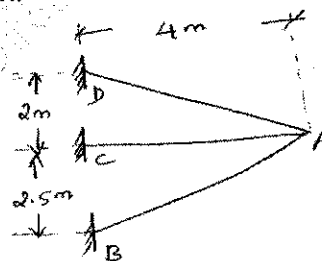

Fig.Q.8

Module-5

9 Analyze the continuous beam as shown in Fig.Q.9 by direct stiffness method. Draw BMD.
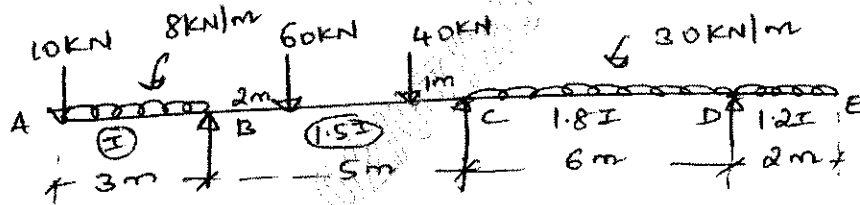
(16 Marks)

Fig.Q.9

OR

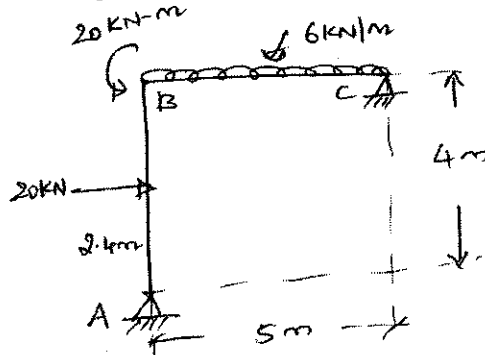**10** Analyze the frame as shown in Fig.Q.10 by direct stiffness method
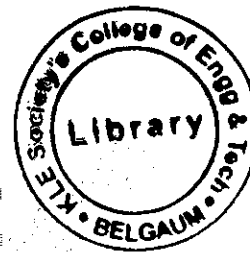
(16 Marks)

Fig.Q.10

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Sixth Semester B.E. Degree Examination, June/July 2018
Alternative Building Materials

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 80

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

Module-1

1　a. Explain the concept of energy embodied in building materials.　　(08 Marks)
　　b. Explain the role of construction industry in global warming.　　(08 Marks)

OR

2　a. List out the various environmental friendly and cost effective building technologies. Explain any one in brief.　　(08 Marks)
　　b. What are the advantages of LEED? List out the five main credit categories in LEED rating system.　　(08 Marks)

Module-2

3　a. Write a note on : (i) Fal-G blocks　(ii) Laterite blocks.　　(08 Marks)
　　b. List and explain the properties of Good mortar.　　(08 Marks)

OR

4　a. Explain the method of manufacturing stabilized mud blocks.　　(08 Marks)
　　b. A brick masonry prism is made up of 6 bricks joined by mortar of thickness 2 cms. The brick is 8 cm is thickness. The prism is subjected to a uniform vertical stress of 5 MPa. The brick has a modulus of 800 MPa and the mortar has a modulus of 9000 MPa. Determine the horizontal lateral stress in brick and mortar. Assume the Poisson's ratio of brick and mortar = 0.1　　(08 Marks)

Module-3

5　a. Write the properties and uses of lime Pozzolana cement.　　(08 Marks)
　　b. List out the different methods employed in manufacturing of FRP and explain any one in brief.　　(08 Marks)

OR

6　a. List out the different agro and industrial wastes. Explain their use as a building material.　　(08 Marks)
　　b. Explain the applications of FRP composites.　　(08 Marks)

Module-4

7　a. List out the advantages and disadvantages of Mivan Construction Techniques.　　(08 Marks)
　　b. Explain the process of constructing masonry domes and vaults.　　(08 Marks)

OR

8　a. What are the materials used in ferro cement? Explain its construction methods in brief.　　(08 Marks)
　　b. What are the primary functions of a roof? Explain briefly the various roofing alternatives.　　(08 Marks)
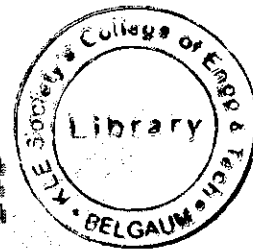
Module-5

9 a. What are the advantages and disadvantages of manufacturing concrete from RMC plants?

   (08 Marks)

   b. What is the meaning of percast elements? What are the advantages of precast concrete?

   (08 Marks)

OR

10 a. Write a note on :
   (i) Types of concrete mixer
   (ii) Cost concept in building.   **(08 Marks)**

   b. What are the equipments used for producing stabilized blocks? Explain them in brief.

   (08 Marks)

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15CV661

Sixth Semester B.E. Degree Examination, June/July 2018
Water Resources Management

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1	a.	With a sketch, explain hydrologic cycle.	(08 Marks)
	b.	Give a summary on global water resources and Indian water resources.	(08 Marks)

OR

2	a.	With a sketch, explain confined and un-confined aquifer.	(08 Marks)
	b.	What is water scarcity? Summarize the contributing factors of water scarcity.	(08 Marks)

Module-2

3	a.	Explain the necessity of water resources planning and management.	(08 Marks)
	b.	Explain the spatial and temporal scales of planning and management.	(08 Marks)

OR

4	a.	With a typical analytical frame work for water resources management studies, explain inception, development and selection phases.	(08 Marks)
	b.	Summarize the questions addressed in adaptive integrated policy an activities of water resources planning and management.	(08 Marks)

Module-3

5	a.	With a sketch showing the components, explain the principles of integrated water resources management (IWRM).	(08 Marks)
	b.	Explain the guiding principles : Dublin statement and Rio declaration of integrated water resources management.	(08 Marks)

OR

6	a.	With a figure of three pillars: Economic efficiency, equity and environmental sustainability, explain the implementation process of IWRM.	(08 Marks)
	b.	Summarize the sectors benefited by IWRM.	(08 Marks)

Module-4

7	a.	Explain the existing legal framework and constitutional provisions for water in India.	(08 Marks)
	b.	Explain the various deficiencies in the existing legal framework of water resources development in India.	(08 Marks)

OR

8	a.	Summarize the salient features of Indian National Water Policy 2012.	(08 Marks)
	b.	Summarize the scope of Water User's Association (WUA) and list it's functions.	(08 Marks)

Module-5

9	a.	What is rainwater harvesting? Explain the needs for rainwater harvesting.	(08 Marks)
	b.	Explain the different types of lining done to control seepage in Ponds.	(08 Marks)

OR

10	a.	What is Percolation tank? Describe the general guidelines to be followed in proposing a percolation tank.	(08 Marks)
	b.	Briefly explain the various techniques of rain water harvesting in urban area.	(08 Marks)

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CBCS SCHEME

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Sixth Semester B.E. Degree Examination, June/July 2018
Numerical Methods and Applications

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1.   a.   Using fixed point iteration method, find real root of $2x - \log_{10} x = 7$.   **(08 Marks)**

    b.   Solve, by Jacobi's iteration method, the equations $20x + y - 2z = 17$; $3x + 20y - z = -18$, $2x - 3y + 20z = 25$.   **(08 Marks)**

OR

2.   a.   Using Gauss-Jordan method, find the inverse of the matrix.

$$\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}.$$

           (08 Marks)

    b.   Solve the equations $27x + 6y - z = 85$, $x + y + 54z = 110$; $6x + 15y + 2z = 72$, by Gauss-Seidel method.   **(08 Marks)**

Module-2

3.   a.   Find the missing term in the following table using interpolation formula:

x	0	1	2	3	4
y	1	3	9	-	81

           (08 Marks)

    b.   Find the cubic polynomial which takes the following values:

x	0	1	2	3
f(x)	1	2	1	10

And hence evaluate f(4).   **(08 Marks)**

OR

4.   a.   Evaluate f(9) using Newton's divided difference formula.

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

           (08 Marks)

    b.   Find the cubic splines for the following data

x	1	2	3
y	-6	-1	16

Take $M_0 = M_2 = 0$.   **(08 Marks)**

Module-3

5.   a.   The following data gives the velocity of a particle for 20 seconds at an interval of 5 seconds. Find the initial acceleration using the entire data:

Time t(sec)	0	5	10	15	20
Velocity v(m/sec)	0	3	14	69	228

           (08 Marks)

    b.   Evaluate $\int_0^1 \left(\frac{1}{1+x}\right) dx$, using Romberg's method.   **(08 Marks)**

OR

6 a. Evaluate $\int_{0.2}^{1.4}(Sinx - \log x + e^x)dx$, using Simpson's $\left(\dfrac{1}{3}\right)^{rd}$ rule, taking 7 ordinates. **(08 Marks)**

   b. Using trapezoidal rule, evaluate $I = \int_{1}^{1.4}\int_{2}^{2.4}\left(\dfrac{1}{xy}\right)dxdy$, taking 4 sub interval. **(08 Marks)**

Module-4

7 a. Using Taylor's series method, compute y at x = 0.1 and x = 0.2. Given that $\dfrac{dy}{dx} = x + y$; y(0) = 1. **(08 Marks)**

   b. Compute y at x = 0.8 by Adams Basforth method: Given $\dfrac{dy}{dx} = x - y^2$; y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762. **(08 Marks)**

OR

8 a. Apply Runge-Kutta fourth order method to find value of y at x = 0.4 given that $\dfrac{dy}{dx} = \dfrac{y^2 - x^2}{y^2 + x^2}$ with y(0) = 1 (taking h = 0.2). **(08 Marks)**

   b. If $\dfrac{dy}{dx} = 2e^x - y$; y(0) = 2, y(0.1) = 2.010, y(0.2) = 2.040; y(0.3) = 2.090. Find y(0.4) by using Milne's predictor corrector method. **(08 Marks)**

Module-5

9 a. Solve the Laplace equation $u_{xx} + u_{yy} = 0$ given that
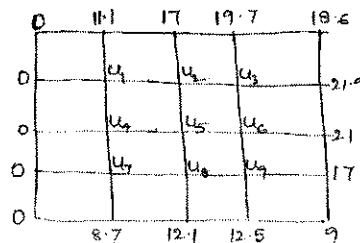
(08 Marks)

   b. Solve $\dfrac{\partial u}{\partial t} = \dfrac{\partial^2 u}{\partial x^2}$ in 0 < x < 5, t ≥ 0 given that u(x, 0) = 20, u(0, t) = 0, u(5, t) = 100. Compute u for the time-step with h = 1 by Crank-Nicholson method. **(08 Marks)**

OR

10 a. Solve the wave equation $\dfrac{\partial^2 u}{\partial t^2} = 4\dfrac{\partial^2 u}{\partial x^2}$; subject to condition u(0, t) = 0; u(4, t) = 0; $u_t(x, 0) = 0$ and u(x, 0) = x(4-x) by taking h = 1, k = 0.5 upto 4 steps. **(08 Marks)**

   b. Solve the equation $\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square mesh with sides x = 0, y = 0, x = 3, y = 3 with u = 0 on the boundary and mesh length = 1. **(08 Marks)**

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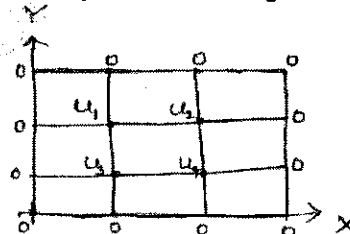
10CV71

Seventh Semester B.E. Degree Examination, June/July 2018
Environmental Engineering – II

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a.   What is conservancy system (dry system) of sanitation? Give any two merits and demerits of this system.   **(06 Marks)**
    b.   Define sewerage and explain combined sewerage system with its merits and demerits.   **(08 Marks)**
    c.   Explain:
         i)   time of entry
         ii) time of flow
         iii) time of concentration   **(06 Marks)**

2   a.   What is dry weather flow (DWF)? What are its sources and give any two factors affecting DWF?   **(06 Marks)**
    b.   Using rational method, determine the discharge for a storm water drain. Area of catchment 100 hactares. Intensity of rainfall 50 mm/hr. Details of catchment area is as follows.

Type of Area	Percentage Area	Impermeability Coefficient
Roofs	15	0.9
Pavements	20	0.8
Lawns and gardens	40	0.15
Unpaved	15	0.20
Wooded	10	0.05

(06 Marks)

    c.   What are sewer appurtenances? List any four of them and explain with a neat sketch the catch basin.   **(08 Marks)**

3   a.   Explain the test for straightness and obstructions in sewers.   **(04 Marks)**
    b.   Calculate the diameter and discharge of a circular sewer laid at a slope of 1 in 400 when it is running half full and with a velocity of 1.9 m/sec. Take 'n' in Manning's Formula as 0.012.   **(08 Marks)**
    c.   Explain self cleansing and non scouring velocities in sewers. Give any two factors on which it depends.   **(08 Marks)**

4   a.   What is a sewer? What are the requirements of good sewer materials? List any four sewer materials commonly used.   **(08 Marks)**
    b.   Distinguish between BOD and COD and explain their role in wastewater treatment.   **(06 Marks)**
    c.   What is a trap? Give its classifications.   **(06 Marks)**

PART – B

5 a. Explain:
      i) Sludge drying beds
      ii) Disposal of screenings. **(06 Marks)**

   b. What is meant by modifications of ASP and list any four modifications. Explain any one briefly. **(06 Marks)**

   c. Calculate the dimensions of an oxidation pond for treating sewage from a residential colony with a population of 8000 persons. Assume the rate of sewage flow as 200 lpcd and 5 day BOD of sewage as 250 mg/L. Take organic loading as 300 kg/ha/day and L = 4B and depth of pond as 1.2 m. Apply check for detention time and comment on the design. **(08 Marks)**

6 a. List any six conditions favourable for land disposal of sewage. **(06 Marks)**

   b. Explain the different zones of purification in dilution method of sewage disposal and oxygen sag curve. **(10 Marks)**

   c. Give the significance of skimming tank and grit chamber in sewage treatment plant. **(04 Marks)**

7 a. Discuss with one example each for reuse and recycle of waste-water. **(04 Marks)**

   b. Explain the working principle of trickling filter and activated sludge process treatment of sewage. **(06 Marks)**

   c. Explain with a neat sketch the septic tank. **(05 Marks)**

   d. Give any three objectives of sludge digestion. **(05 Marks)**

8 a. A rectangular sedimentation tank is used to treat 2 MLD of sewage. For a design period of 2.5 hours, velocity of flow of 0.2 m/minute and effective depth of 3m, determine:
      i) The length of tank required
      ii) Width of tank and
      iii) Over flow rate of tank in $m^3/m^2/day$ **(08 Marks)**

   b. Explain F/M ratio and sludge volume index (SVI) with significance in ASP. **(06 Marks)**

   c. Give the working principle and any two advantages and disadvantages of oxidation ponds. **(06 Marks)**

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10CV72

Seventh Semester B.E. Degree Examination, June/July 2018
Design of Steel Structures

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. What are the advantages and disadvantages of steel structures? **(08 Marks)**
   b. Mention different types of loads and load combination. **(04 Marks)**
   c. Explain design consideration of steel structures. **(08 Marks)**

2 a. Explain with neat sketch on modes of failures in bolted joint. **(06 Marks)**
   b. Determine the strength and efficiency of lap joint consist of 10 mm and 8 mm thick plates. Use M18 grade 5.6 black bolt and Fe440 grade plate. Edge distance = 40 mm, Pitch = 50 mm of Fig. Q2 (b). Assume fully threaded bolt. **(14 Marks)**
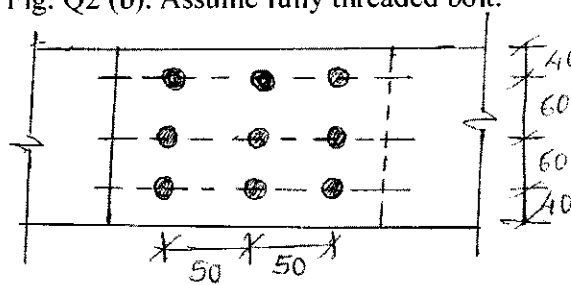

Fig. Q2 (b)

3 a. What are the advantages and disadvantages of welding? **(06 Marks)**
   b. Determine the Bracket load 'P' the column can carry as shown in Fig. Q3 (b). Take size of weld as 8 mm, $f_u = 410$ N/mm². **(14 Marks)**
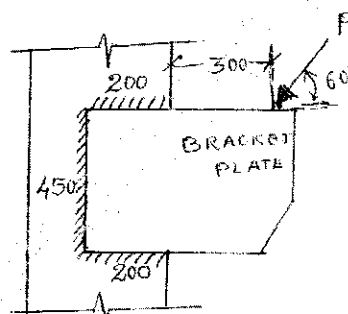
All dimensions are in mm

Fig. Q3 (b)

4 a. Calculate the shape factor of a T section having a flange of 200 mm and 20 mm thickness, web of 180 mm depth and 10 mm thickness. **(08 Marks)**
   b. Calculate plastic moment for the beam shown in Fig. Q4 (b), Use load factor 2. **(12 Marks)**
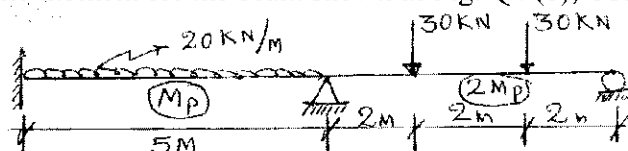

Fig. Q4 (b)

PART – B

5 a. Explain the different modes of failure of tension members.   (06 Marks)
   b. Determine the strength of the plate 160mm×10mm thick, connected with bolts subjected to a force as shown in Fig. Q5 (b). Use M18 dia bolts, take $f_y = 250$ N/mm², $f_u = 410$ N/mm².   (14 Marks)
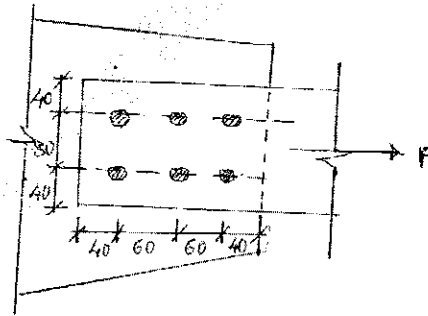

Fig. Q5 (b)

6 a. Design a compression member using double channel section to carry a load of 1500 KN, the height of column is 6 m and both ends are fixed, channels are arranged back to back. Assume $f_{cd} = 150$ N/mm².   (10 Marks)
   b. Design a compression member using four angle sections arranged in a box shape of size 400mm × 400mm to carry a load of 2500 kN. The height of the column is 5 M with one end fixed and other end hinged. Assume $f_{cd} = 180$ N/mm².   (10 Marks)

7 a. Mention type of column base. Explain the terms with a neat sketch.   (06 Marks)
   b. Design a column base (slab base) and concrete base for a column ISHB400 subjected to an axial load of 1000 KN. Use M20 grade concrete, safe bearing capacity of soil is 200 KN/m². Draw neat sketch with bolted connection (M22 grade 9.8 HSFG Bolt).   (14 Marks)

8 The RCC floor of a class room 6m×12m is supported on beam kept @ 3 m C/C. The beams are simply supported at ends over a span of 6 m, and rest on 300 mm thick masonry walls. Assuming the thickness of slab = 125 mm, Live Load on slab = 4 KN/m². Design an interior beam using IS specification. Apply all the necessary checks.   (20 Marks)

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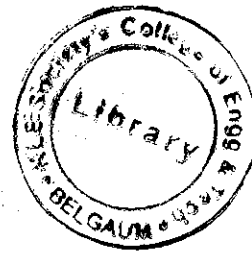
Seventh Semester B.E. Degree Examination, June/July 2018

Estimation and Valuation

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　Max. Marks:100

Note: 1. *PART-A is compulsory.*
　　　　2. *Answer any two full questions from PART-B and PART-C each.*
　　　　3. *Missing data may be assumed suitably.*

PART – A

1　The details of residential building is as shown in Fig.Q1. Work out the quantities and cost for the following items of work, by the centre line method.
　　i)　Centre line calculation with line diagram.　　　　　　　　　**(06 Marks)**
　　ii)　Earth work excavation for foundation in ordinary soil at Rs.180/m³.　　**(05 Marks)**
　　iii)　Size stone masonry in CM 1:8 for foundation and basement at Rs.3800/m³.　　**(09 Marks)**
　　iv)　First class brick work in super structure in CM 1:6 upto roof slab at Rs.4300/m³.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(09 Marks)
　　v)　Plastering to inside walls in CM 1:3 with lime rendering at Rs.220/m².　　**(06 Marks)**
　　vi)　Total cost abstract for above items.　　　　　　　　　　　**(05 Marks)**

PART – B

2　Estimate the detailed quantity of a fully paneled teak wooden door of size 1.2m × 2.10m as shown in Fig.Q2. Also work out the cost of a Honne wood and fastening and fixture required. Use your local prevailing rates. The data given are as under:
Frame = 8 × 12 cms
Top rails = 10 × 4.5 cms
Lock rail = 15 × 4.5 cms
Frieze rail = 10 × 4.5 cms
Hanging styles = 10 × 4.5 cms
Bottom rail = 20 × 4.5 cms.　　　　　　　　　　　　　　　　**(15 Marks)**

3　The details of a manhole is given is Fig.Q3. Find the quantities of the following items.
　　i)　Earthwork in excavation for foundation in hard soil.
　　ii)　B.B.M in CM 1:4 for walls
　　iii)　R.C.C. roof covering slab in CC 1:2:4.
　　iv)　Plastering in CM 1:3 for inside walls.　　　　　　　　　　**(15 Marks)**

4　Write the detailed specification for any three of the following items:
　　i)　Burnt brick masonry in CM 1:6
　　ii)　R.C.C. work in roof slab in CC 1:2:4
　　iii)　Plastering in CM 1:3 for inside walls
　　iv)　Mangalore tiled roof over sal wood battens.　　　　　　　　**(15 Marks)**

PART – C

5　Work out from first principles the analysis of rate for the following any three items:
　　i)　Current concrete foundation bed in CC 1:3:6
　　ii)　Coursed rubble stone masonry in CM 1:8 for foundation.
　　iii)　Damp proof course 25 mm thick in CM 1:3
　　iv)　12 mm thick Cement plastering in CM 1:3.　　　　　　　　**(15 Marks)**

6 Estimate the quantities of earth work from chainage 70 to 76 measured with a standard 20 m chain from the following data. Use mean sectional area method. Side slopes 1:1 in cutting and 2:1 in banking.

Chainage	70	71	72	73	74	75	76
Ground RL's	88.10	87.74	87.80	88.20 90.40	90.75	90.20	89.98
Formation level	88.50		← raising gradient 1 in 100				

Formation width of road is 10 m. Draw the longitudinal section of the proposed road.

(15 Marks)

7 Write short notes on:
i) Earnest money and security deposit
ii) Measurement book and nominal muster roll
iii) Administrative approval and technical sanction

(15 Marks)

SCHEDULE OF OPENING

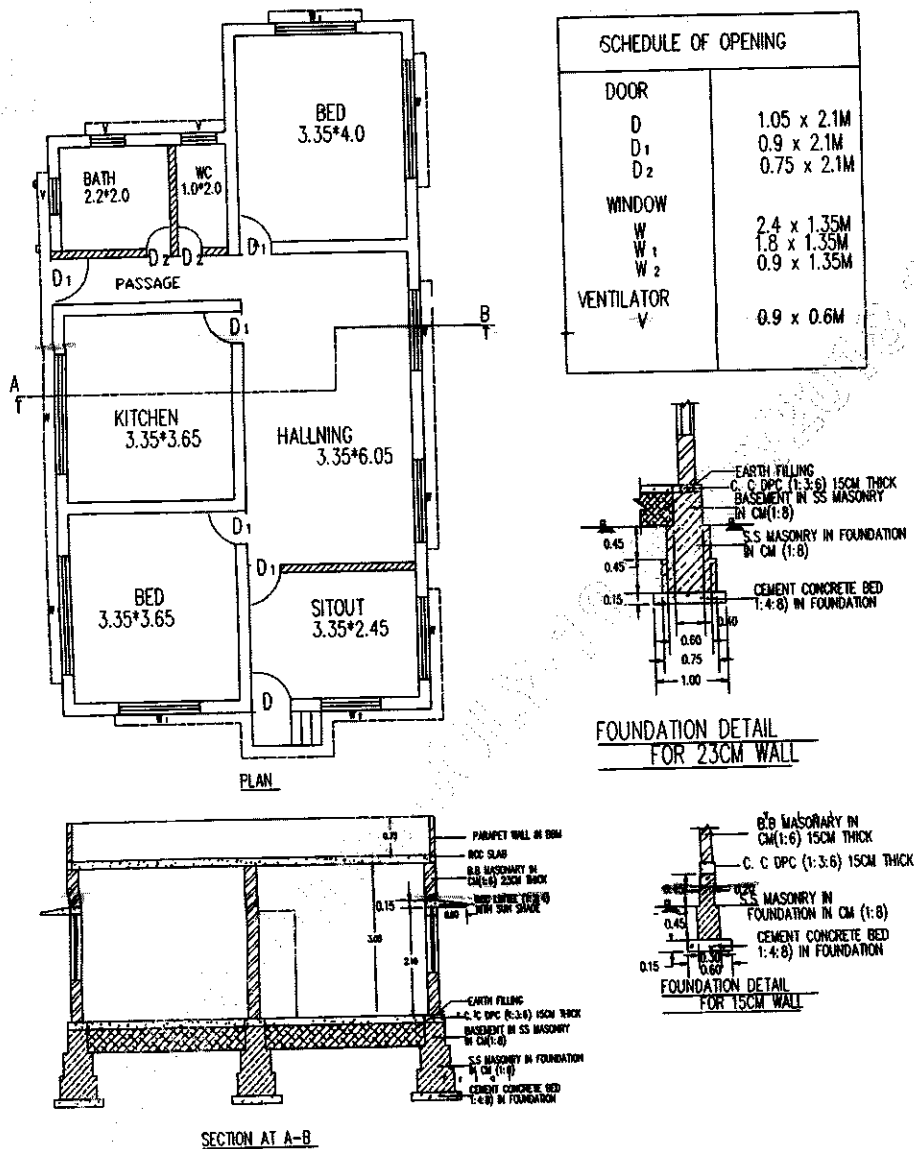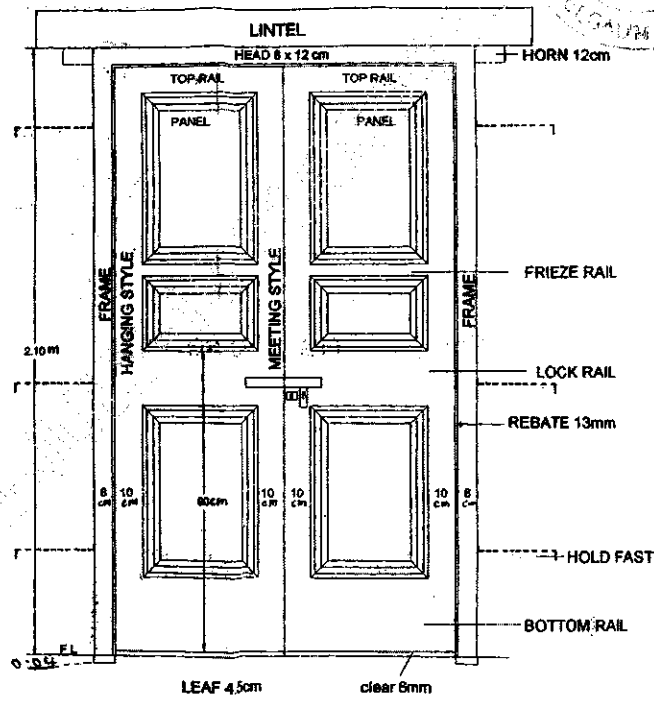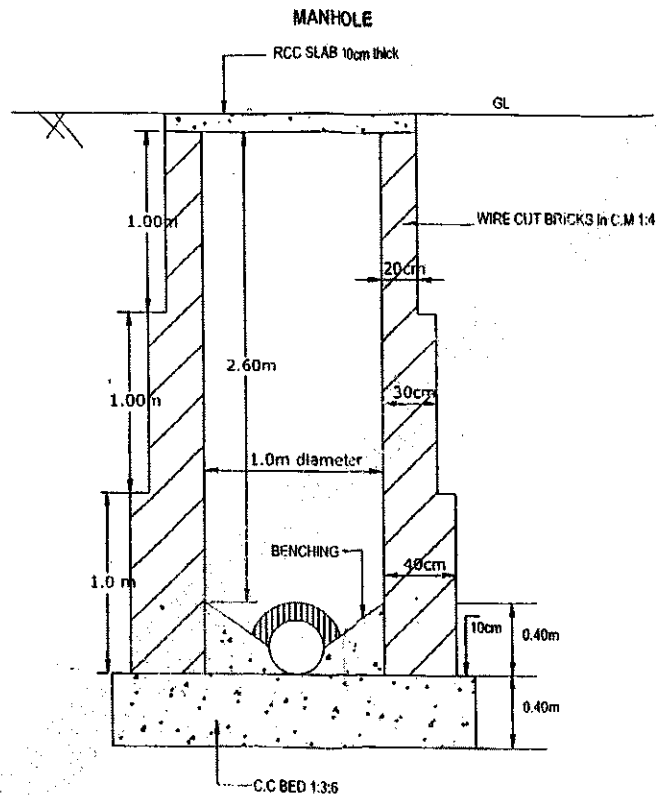| DOOR	
D	1.05 x 2.1M
D₁	0.9 x 2.1M
D₂	0.75 x 2.1M
WINDOW	
W	2.4 x 1.35M
W₁	1.8 x 1.35M
W₂	0.9 x 1.35M
VENTILATOR	
V	0.9 x 0.6M

Fig.Q1

Fig.Q2

CROSS SETIONAL DETAILS

Fig.Q3

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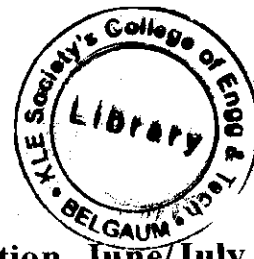
10CV74

Seventh Semester B.E. Degree Examination, June/July 2018
Design of Prestressed 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 IS1343 code is permitted.

PART – A

1 a. What is the necessity of using high strength concrete in P.S.C. work?   **(06 Marks)**
   b. What is the necessity of using high strength steel in P.S.C. construction?   **(04 Marks)**
   c. List the advantages and disadvantages of prestressed concrete over reinforced cement concrete.   **(10 Marks)**

2 A prestressed concrete T-beam is to be designed to support a superimposed load of 4.4 kN/m over a span of 5 m. The 'T' beam is made up of a flange 400 mm 40 mm thick. The rib is 100 mm wide and 200 mm deep. The stress in concrete must not exceed 15 N/mm^2 at the bottom fibre and zero at the top fibre, due to self weight and prestressing force. Evaluate the prestressing force and it's eccentricity. Evaluate the resulting stresses after L.L is applied. Assume the density of concrete is 24 kN/m^3 and the loss of prestress at 20%.   **(20 Marks)**

3 a. List the various losses of prestress in tensioned steel.   **(03 Marks)**
   b. A post tensioned concrete beam 100 mm wide and 300 mm deep, spanning over 10 m is stresses by   **(17 Marks)**

4 a. Discuss the various factors affecting deflections in P.S.C. beams.   **(06 Marks)**
   b. The beam of uniform section is prestressed with a bent cable as shown below Fig.Q4(b), in which the initial prestress is 300 kN. Taking the loss ratio as 80%. Determine
       (i)   Maximum deflection at transfer of prestress
       (ii) Maximum deflection at working load 8 kN/m. Assume M$_{40}$ concrete.   **(14 Marks)**

Fig.Q4(b)

PART – B
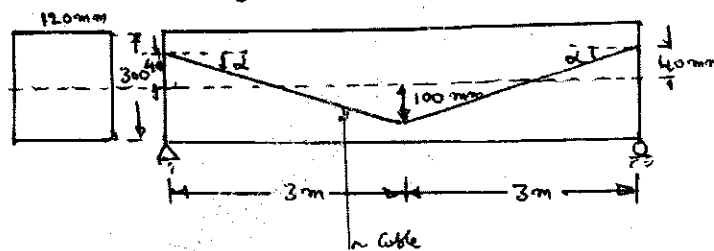
5 a. What are the different types of failure observed in a prestressed concrete beam? Explain with sketches.   **(08 Marks)**
   b. A post tensioned bridge girder with unbounded tendons is of base section of overall dimensions 1200 mm wide by 1800 mm deep with wall thickness of 150 mm. The high tensile steel has an area of 4000 mm^2 and its located at an effective depth of 1600 mm. The effective prestress in steel after losses is 1000 N/mm^2, and the effective span of the girder is 24 m. If f$_{ck}$ = 40 N/mm^2 and f$_p$ = 1600 N/mm^2. Estimate the ultimate flexural strength of the section.   **(12 Marks)**

6   a. Discuss briefly the modes of failure due to shear. **(04 Marks)**
    b. List the methods of improving resistance in P.S.C beams. **(02 Marks)**
    c. A simply supported beam of span 6 m is 120 × 300 mm in section. It is prestressed with a parabolic cable which carries an effective prestress of 200 kN. The cable has a maximum eccentricity of 100 mm at mid span section and minimum eccentricity of 50 mm at the support section. Determine the principal tension at 20 mm above the centroidal fibre in a section which lies at 0.6 m from the left support. The beam carries an all inclusive load of 15 kN/m. **(14 Marks)**

7   a. Explain the stress distribution in end block of a post tensioned prestressed concrete member with neat sketch. **(06 Marks)**
    b. The end block of a prestressed concrete girder is 200 mm wide by 300 deep. The beam is post tensioned by two Freyssinet anchorages each of 100 mm diameter with their centres located at 75 mm from the top and bottom of the beam. The force transmitted by each anchorage being 2000 kN. Compute the bursting force and design suitable reinforcements according to Indian standard IS1343 code provisions. Sketch the arrangement of anchorage zone reinforcement. **(14 Marks)**

8   A post tensioned prestressed concrete beam of rectangular section 300 mm wide is to be designed to resist a live load moment of 360 kN-m on a span of 12m. Assuming 10% less and limiting tensile and compressive stress to 1.5 N/mm^2 and 18 N/mm^2 respectively. Calculate the minimum possible depth and the prestressing force and corresponding eccentricity. Take density of concrete as 24 kN/m^3. **(20 Marks)**

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10CV757

Seventh Semester B.E. Degree Examination, June/July 2018
Solid Waste Management

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a.   Define Solid waste. Explain the importance of solid waste management.   (10 Marks)
    b.   Explain the factors affecting the generation of solid waste.   (10 Marks)

2   a.   With the help of neat sketch, explain hauled stationary system with advantages and disadvantages.   (10 Marks)
    b.   Estimate the energy content of a solid waste sample on unit energy content on dry basis and on ash free dry basis.   (10 Marks)

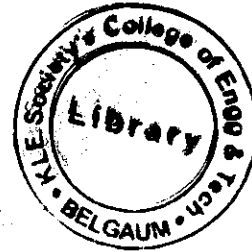| Component	% by mass	% moisture content	Energy [KJ/kg]
Food waste	15	70	4650
Paper	45	6	16750
Card board	10	5	16300
Plastic	10	2	32600
Garden Trimming	10	60	6500
Wood	05	20	18600
Tin can	05	03	700

Assume Ash 5%.

3   a.   Briefly explain mechanical volume reduction method. Also explain compaction equipment used for volume reduction.   (10 Marks)
    b.   Explain the factors to be considered in evaluating on site processing techniques.   (10 Marks)

4   a.   With the help of neat sketch, explain municipal incinerator.   (10 Marks)
    b.   Mention the various types of air pollution control equipment. Explain any one method.   (10 Marks)

PART – B

5   a.   Explain the factors considered for aerobic composting process.   (10 Marks)
    b.   Explain : i) Bangalore method of composting   ii) Vermi composting.   (10 Marks)

6   a.   Explain the various factors to be considered in the selection of a site for a sanitary land fill.   (10 Marks)
    b.   Enumerate the various methods of land fill and explain in brief.   (10 Marks)

7   a.   Discuss the advantages and disadvantages of the disposal method of open dumping.   (10 Marks)
    b.   Categorize the biomedical waste with example.   (10 Marks)

8   a.   Discuss the 3R concept in plastic usage.   (10 Marks)
    b.   Describe the reuse and recycle of solid waste materials.   (10 Marks)

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USN ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚ **10CV763**

Seventh Semester B.E. Degree Examination, June/July 2018
Pavement Material & Construction

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a. Explain the desirable properties of aggregates to be used in different types of pavement construction. State the tests conducted for each property.   **(08 Marks)**
    b. Explain the following tests on aggregates and state the permissible limits as per MORTH guidelines for flexible pavements :
        (i)   Crushing test.
        (ii)   Impact test.   **(12 Marks)**

2   a. Compare bitumen and tar. What are the requirements of bitumen used for road works?
                                                               (10 Marks)
    b. Explain with neat sketch manufacturing process of bitumen.   **(10 Marks)**

3   a. Compare the salient features / characteristics of outback and emulsions. Under what condition each one is used.   **(10 Marks)**
    b. What is stripping? What are its adverse effects? Explain any one test on bitumen adhesion.
                                                               (10 Marks)

4   a. Explain proportioning of aggregates by Rothfutch's method.   **(08 Marks)**
    b. Explain the step by step procedure of Marshall method of mix design. **(12 Marks)**

PART – B

5   a. What is a power Shovel? With a neat sketch, explain its operation and applications.
                                                               (10 Marks)
    b. What are the different types of compacting equipments used for pavement construction? Write an explanatory note on rollers in road construction.   **(10 Marks)**

6   a. What are the desirable properties of subgrade soil? Enumerate the steps in preparation of subgrade. How do you evaluate adequacy of compaction.   **(12 Marks)**
    b. Explain the circumstances in which construction of embankment becomes necessary.
                                                               (08 Marks)

7   a. Explain the material specification and construction steps for Bituminous surface dressing.
                                                               (10 Marks)
    b. Explain the objectives, type of material and method of application for (i) Prime coat (ii) Tack coat.   **(10 Marks)**

8   a. Explain with a neat sketch, different joints in rigid pavement.   **(10 Marks)**
    b. Enumerate the steps involved in the construction of cement concrete pavements. **(10 Marks)**

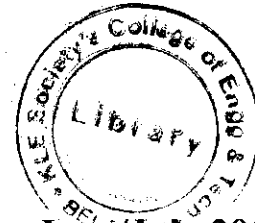* * * * *

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10CV81

Eighth Semester B.E. Degree Examination, June/July 2018
Advanced Concrete Technology

Time: 3 hrs.

Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting*
atleast TWO questions from each part.
2. Missing daya may be suitably assumed.
3. Use of IS:10262-2009 and IS456-2000 are permitted.

PART – A

1   a. Enumerate the importance of Bogue's compounds in ordinary portland cement. **(07 Marks)**
    b. Explain the rheology of concrete in terms of Bingham's parameter. **(07 Marks)**
    c. Determine capillary porosity, total porosity and gel space ratio for a cement paste with W/C ratio 0.5 and degree of hydrogen 90% **(06 Marks)**

2   a. Explain the mechanism of 'deflocculation' of cement particles by super plasticizers with neat sketches. **(10 Marks)**
    b. Explain the Marsh cone test for optimum dosage of superplasticizer. **(05 Marks)**
    c. Explain the effect of Flyash on hardened concrete. **(05 Marks)**

3   a. Explain the factors affecting the mix design of concrete. **(06 Marks)**
    b. Design a concrete mix of M_{20} grade for the following data [M_{20} grade].
    Maximum size of aggregate = 20 mm
    Workability = 100 mm [Slurry]
    Degree of quality control = good
    Type of exposure = mild
    Specific gravity of cement = 3.15.
    Specific gravity of coarse aggregate = 2.65
    Specific gravity of fine aggregate = 2.60
    Water absorption of coarse aggregate = 0.5%
    Water absorption of fine aggregate = 1.0%
    Free surface moisture coarse aggregate = Nil
    Free surface moisture fine aggregate = 2.0%
    Coarse aggregate percentage of different fractions 60% : 40%
    Fine aggregate belongs to Zone II. **(14 Marks)**

4   a. Explain the influence of W/C ratio and age on permeability of concrete. **(07 Marks)**
    b. Discuss in brief alkali aggregate reaction. What precautions are necessary to minimize? **(07 Marks)**
    c. What is sulphate attack? Explain briefly the methods of controlling sulphate attack. **(06 Marks)**

PART – B

5   a. What is RMC? Explain briefly advantages of RMC. **(06 Marks)**
    b. Explain shot crete and under water concreting. **(06 Marks)**
    c. What are the advantages of self compacting concrete? What are different test methods for determining the rheology of self compacting concrete? **(08 Marks)**

6   a.   What are the different types of fibres used in concrete?   (06 Marks)
    b.   What are the factors effecting properties of fibre reinforced concrete.   (08 Marks)
    c.   What is ferro-cement? List the various applications of Ferro cement.   (06 Marks)

7   a.   Write short notes on :
         (i)   Light weight concrete
         (ii) High density concrete   (06 Marks)
    b.   What is 'High performance concrete [HPC]'? What are the applications of high performance
         concrete?   (06 Marks)
    c.   Discuss in brief the properties of High performance concrete in fresh and hardened state.
                                                                                           (08 Marks)

8   Explain the following :
    a.   Tests on hardened concrete   (08 Marks)
    b.   Rebound Hammer Test (NDT)   (06 Marks)
    c.   Pulse Velocity Test (NDT)   (06 Marks)

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USN

Eighth Semester B.E. Degree Examination, June/July 2018
Design and Drawing of Steel Structures

Time: 4 hrs.   Max. Marks:100

Note: *1. Answer any ONE full question from each part.*
2. Use of IS-800-2007 and Steel table are permitted.

PART – A

1 a. A secondary beam ISMB 300@44.2 kg/m is to be connected to the main beam
       ISMB 400@61.6 kg/m, two angles ISA 100 × 100 × 6 mm are used to connect the webs of
       beams. Three bolts of 20 mm diameter are used to connect angles to web of secondary beam.
       Six bolts of 20 mm diameter are used to connect to angles to the web of main beam. The top
       flanges of both beams are at the same level.
       Draw to a suitable scale
       (i)   Sectional elevation
       (ii) Side view showing all details.   (15 Marks)

   b. An un-stiffened seated connection for beam ISLB 500@75 kg/m to the flange of a column
       ISHB 400@82.2 kg/m is done using 2 rows of 2-16mm diameter bolts with an angle ISA
       110×110×10 mm. Top cleat angle is ISA 100×100×8 mm with 2-16 mm diameter bolts on
       each leg. Draw to suitable scale
       (i)   Front view
       (ii) Side view.   (15 Marks)

2 a. An upper storey column ISHB 300@ 577 N/m is to be spliced with a lower storey column
       ISHB 400@ 758.5 N/m. The two columns are coaxial. Provide 50 mm thick bearing plate
       and 6 mm thick flange splice plate. Use 10 bolts of 20 mm diameter on each side of the joint
       in two lines of 5 bolts each for connecting flanges of the columns to flange splice plate.
       Draw to a suitable case
       (i)   Sectional elevation
       (ii) Side view with details.   (15 Marks)

   b. Draw to a suitable scale sectional plan, front elevation and side view of a column with slab
       base using following data :
       Column   → ISHB 350 @ 710.2 N/m
       Base plate → 650mm × 500mm × 35mm
       Cleat angle → ISA 130 × 130 × 8 mm of length 500 mm
       Concrete pedestal → 1.20m × 1.00m × 0.70m
       Anchor bolts → 4 – 16 mm diameter
       4 – 20 mm diameter bolts on each side of flange to connect cleat angles to the column and
       same number of counter sunk bolts to connect angles to the base plate.
       Web cleat angle → ISA 75 × 75 × 8 mm with 4mm weld all around.   (15 Marks)

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PART – B

3 Design a simply supported gantry girder to support an electrically operated crane, for the following data:
   i) Span of crane girder = 25 m
   ii) Span of gantry girder = 8 m
   iii) Capacity of crane = 200 kN
   iv) Self weight of crane = 150 kN [Excluding crab]
   v) Weight of crab = 75 kN
   vi) Wheel base distance = 3.5 m
   vii) Minimum hook approach = 1.00 m
   viii) Self weight of rail = 0.30 kN/m
   ix) Height of rail = 75 mm   **(40 Marks)**
   Draw to suitable scale
   a. The c/s of gantry girder and its attachment to supporting column of the bracket
   b. Plan details
   c. Side elevation   **(30 Marks)**

4 The centre line of a roof truss is as shown in the Fig.Q4. The magnitude and nature of forces under service conditions are
   Top chord members → 120 kN compression
   Bottom tie members → 100 kN Tension
   Interior members → 60 kN Tension and 50 kN compression.
   For all the interior members use similar single angle section. Design the members using 16 mm diameter of grade 4.6. Also design a bearing plate and anchor bolts, four in numbers for pull of 60 kN to connect the truss to an RCC column 300 × 300mm of M20 grade concrete.   **(40 Marks)**
   Draw to a suitable scale:
   (i) Elevation of truss greater than half space   (ii) Elevation of joint 'C'   (iii) Elevation of support 'A'.   **(30 Marks)**
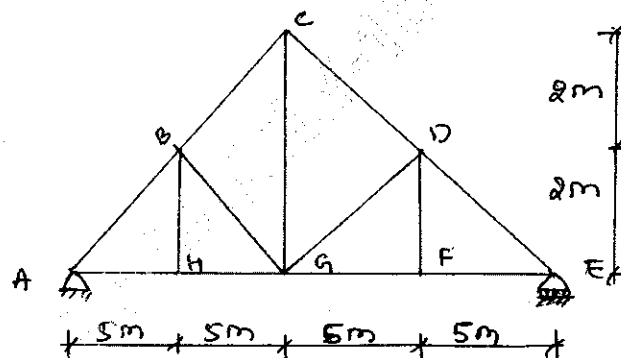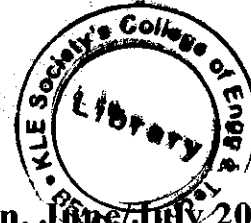

Fig.Q4

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10CV833

Eighth Semester B.E. Degree Examination, June/July 2018
Pavement Design

Time: 3 hrs.
Max. Marks: 100

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

PART – A

1 a. What are the different layers of flexible pavements? Explain the functions of each. **(08 Marks)**
   b. Bring out the points of difference between highway and airfield pavements. **(06 Marks)**
   c. List the various factors to be considered for the selection of type of pavement. Also list the factors affecting pavement performance. **(06 Marks)**

2 a. Explain Frost action. What are the measures adopted to reduce it's effects. **(06 Marks)**
   b. State the assumptions and limitations of Elastic Single layer theory and Burmister's two layer theory. **(06 Marks)**
   c. The plate bearing tests were conducted with 30 cm plate diameter on soil subgrade and over 45 cm base course. The pressure yielded at 0.5 cm deflection are 1.25 kg/cm^2 and 8 kg/cm^2 respectively. Design the pavement section for 5100 kg wheel load with tyre pressure of 7 kg/cm^2 for an allowable deflection of 0.5 cm using Burmister's approach. (Refer chart given for Burmister's two layer deflection factors in Fig. Q2 (c)) **(08 Marks)**
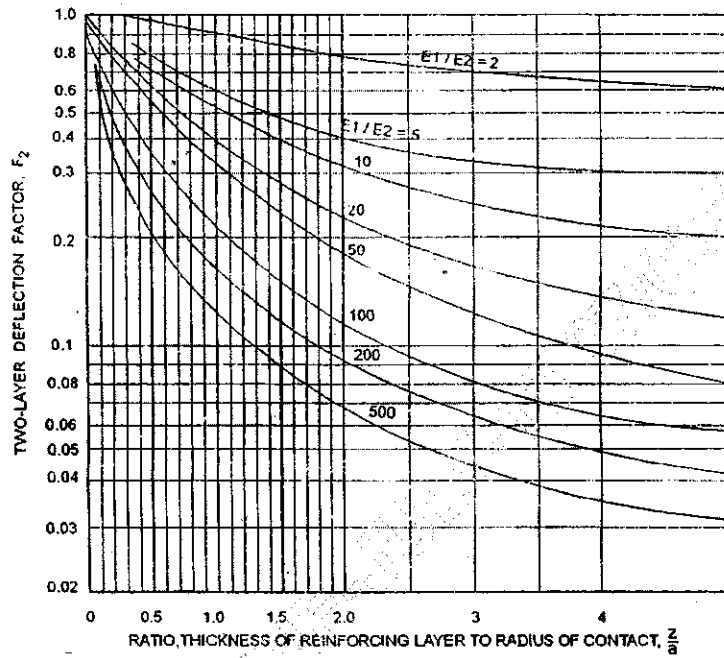

Burmister's two-layer deflection factors

Fig. Q2 (c)

3 a. Calculate the ESWL of a dual wheel assembly carrying 2044 kg each for pavement thickness of 15 cm, 20 cm and 25 cm. Centre to centre tyre spacing is 27 cm and distance between the walls of the tyre is 11 cms (Use Graphical Method). **(10 Marks)**
   b. Calculate the design repetitions for 20 year period for various wheel loads equivalent to 22.68 kN wheel load using the following data on a four lane road. **(10 Marks)**

Load in KN	22.68	27.22	31.75	40.82	45.36	49.90	54.43
Volume per day	30	25	20	15	10	5	1
EWLF	1	2	4	8	16	32	64

4 a. Design the pavement section by triaxial-Kansas method using the following data:
Wheel load – 41 KN
E value of base course = 40 N/mm^2
E value of subgrade soil = 10 N/mm^2
E value of wearing course = 100 N/mm^2
Radius of contact area = 150 mm
Design deflection = 2.5 mm
Sketch the pavement section. **(10 Marks)**

   b. Briefly explain the procedure of CSA method for the flexible pavement, design as per IRC-37-2001. **(10 Marks)**

PART – B

5 a. Define modulus of subgrade reaction and radius of relative stiffness. **(06 Marks)**

   b. Write the commonly used equations for the theoretical computation of wheel load stress by Westergaard's analysis of Interior; Edge and corner loadings. **(06 Marks)**

   c. Calculate the stresses at interior, Edge and corner regions of a cement concrete pavement using Westergaard's stress equation. Use the following data:
Wheel load = 5100 kg ; E = 3×10^5 kg/cm^2 ; $\mu = 0.15$; Pavement thickness = 18 cm
Modulus of subgrade reaction = 6 kg/cm^3; Radius of contact area = 15 cm **(08 Marks)**

6 a. List the various requirements of joints in cement concrete slabs. Explain in detail with sketches: (i) Expansion joints. (ii) Contraction joints. **(10 Marks)**

   b. A CC pavement has thickness of 18 cm and has two lanes of 7.2 mts with a longitudinal joint along the centre. Design the dimensions and spacings of the tie bar. The other data are –
allowable working stress in tension – 1400 kg/m^2
Unit weight of concrete – 2400 kg/m^3
Coefficient of friction – 1.5
Allowable bond stress in deformed bars in concrete – 24.6 kg/m^2. **(10 Marks)**

7 a. Benkelman beam deflection studies were carried out on 15 selected points on a stretch of flexible pavement during summer season using a dual wheel load of 4085 kg at 5 kg/cm^2 pressure. The deflection values obtained in mm after making the necessary lag corrections are given below. If the present traffic consists of 750 commercial vehicles per day, determine the thickness of bituminous over lay required. If the pavement temperature during the test was 39°C and the correction factor for subsequent increase in subgrade moisture content is 1.3. Assume annual rate of growth of traffic as 7.5%. Adopt IRC guideline. 1.40, 1.32, 1.25, 1.35, 1.48, 1.60, 1.65, 1.55, 1.45, 1.40, 1.36, 1.46, 1.50, 1.52, 1.45 mm **(14 Marks)**

   b. What are the causes of formation of waves and corrugations in flexible pavements? Suggest remedial measures. **(06 Marks)**

8 a. Explain various types of rigid pavement failures with neat sketches. **(10 Marks)**

   b. Explain briefly the pavement evaluation. **(10 Marks)**

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Eighth Semester B.E. Degree Examination, June/July 2018
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 an earthquake? Explain the earth and its interior. (06 Marks)
   b. Explain the concept of elastic rebound theory with a neat sketch. (06 Marks)
   c. Describe the direct and indirect effects of an earthquake. (08 Marks)

2 a. How are earthquakes classified based on different aspects? (06 Marks)
   b. Explain tripartite plot of response spectrum and significance of spectral regions. (08 Marks)
   c. Explain the different ground motion characteristics. (06 Marks)

3 a. Explain different code-based methods for seismic design. (06 Marks)
   b. Explain response spectrum method and equivalent static analysis. (08 Marks)
   c. Explain in brief the different seismic retrofitting techniques. (06 Marks)

4 a. What are the major aspects involved in seismo resistant building constructions and explain lateral load resisting systems. (08 Marks)
   b. What are the possible structural irregularities which effects on seismic performance of RC buildings. (07 Marks)
   c. What are the special provisions of design of buildings with soft storeys? (05 Marks)

PART – B

5 a. Explain the philosophy of seismic design. (04 Marks)
   b. Compute the seismic forces for each storeys of a building situated in zone-IV by equivalent lateral force method as per IS1893-2002 with the following details.
      Type of building : Special moment resisting frame residential building foundation on hard soil.
      No. of storeys : 3
      Height of first storey : 4 m
      Height of second storey : 3.2 m
      Height of third storey : 3.2 m
      Seismic weighs :
      First storey = 1079.1 kN ;   Second storey = 1863.9 kN ; Third storey = 294.3 kN (16 Marks)

6 For the RC building, special moment resisting frame with importance factor = 1 is as shown in Fig.Q6. Founded on soft soil and situated in zone-V. Determine the seismic forces by dynamic analysis procedure for the following free vibration results of the building.

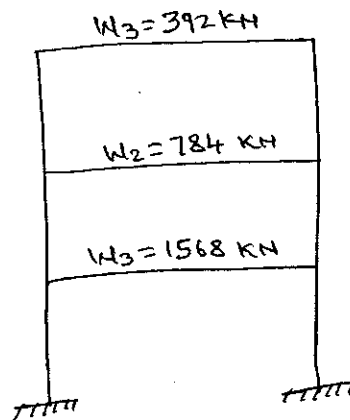| Natural Period (Seconds)	Mode – I	Mode – II	Mode – III
	0.883	0.404	0.302
Roof	1.000	1.000	1.000
Second floor	0.791	0.000	- 0.791
First floor	0.250	- 1.000	0.250

(20 Marks)

Fig.Q6

7 a. What is ductility? Discuss different factors which are helpful in ductility of RC structures. (10 Marks)

b. What are the different load combinations as per IS1893-2002 to be used for seismic analysis of RCC buildings? (10 Marks)

8 a. What is slenderness of masonary wall? What are the measures to improve the slenderness of masonary walls? (10 Marks)

b. Discuss the behaviour of masonary buildings during earthquakes representing failure patterns. (10 Marks)
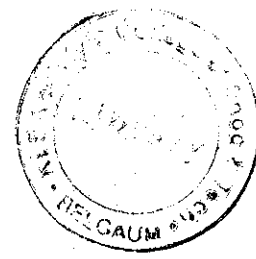
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10CV835

Eighth Semester B.E. Degree Examination, June/July 2018
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. Differentiate between Domestic and Industrial waste water.   **(06 Marks)**
   b. Discuss the factors to be considered in stream sampling.   **(08 Marks)**
   c. Explain the terms Effluent standards, Stream standards and Stream classification.
                                                                                    (06 Marks)

2 a. Explain in detail Streeter – Phelps formulation of mathematical analysis.   **(10 Marks)**
   b. Obtain the DO, Deficit profile for 100km given the city discharge is 20000 m^3/day of sewage and river discharge is 0.7m^3/sec.   **(10 Marks)**
      Data given :

Parameter	River	Sewage effluent from STP
DO	8.2 mg/L	2.0 mg/L
Temperature	23^0C	26^0C
BOD 5d, 40^0C	3.4 mg/L	45mg/L

3 a. Explain the necessicity and process of volume reduction as a strategy in industrial waste water treatment.   **(10 Marks)**
   b. Discuss the terms Neutralization, Equalization, Proportioning and By – product recovery.
                                                                                    (10 Marks)

4 a. Explain the unit operations adopted for removal of suspended solids and inorganic solids.
                                                                                    (10 Marks)
   b. Explain with a neat sketch, suspended growth biological process.   **(10 Marks)**

PART – B

5 a. Combined treatment in common effluent treatment facility is very effective for industrial estates. Discuss the reasons and consequences.   **(10 Marks)**
   b. Explain the effects of discharging treated and partially treated waste water into rivers.
                                                                                    (10 Marks)

6 a. Draw a neat flow diagram to show the points of generation of wastes in a cotton textile mill and explain.   **(10 Marks)**
   b. How does Tannery waste affect the water bodies? Explain the production and treatment of waste water with a flow diagram.   **(10 Marks)**

7 a. Discuss the effects of dairy waste on streams and propose a treatment strategy for prevention of effects on a river.   **(10 Marks)**
   b. How is ecology of estuaries affected by establishing cannery for fish export industry? Explain.   **(05 Marks)**

c. Give the sources of effluents from a cement manufacturing process. **(05 Marks)**

8 a. Draw a neat flow diagram for the manufacture of paper and pulp and give a treatment strategy for the combined waste. **(10 Marks)**

b. Give the strategy of treating using bacteria for antibiotic waste from a pharmaceutical industry. **(05 Marks)**

c. Effective maintenance of food to micro – organism ratio is essential for treating industrial wastes. Explain. **(05 Marks)**

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10CV843

Eighth Semester B.E. Degree Examination, June/July 2018
Urban Transport Planning

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a. Define "System Approach". Explain with flow diagram, system approach to Transport Planning. **(10 Marks)**
    b. Explain briefly the various stages involved in Transportation Planning Process. **(10 Marks)**

2   a. Define "Zone". Mention the different factors considered in dividing the whole area into zones. **(10 Marks)**
    b. Explain the inventory of Transportation Facilities. **(05 Marks)**
    c. Explain with sketch, about the basic movements in transportation survey. **(05 Marks)**

3   a. Explain Home – Based and Non – Home Based trip. **(05 Marks)**
    b. Explain the assumptions made in categories analysis. **(06 Marks)**
    c. Let the trip rate of zone is explained by the household size done from the field survey. It was found that the household size are 1,2, 3 and 4. The trip rates of the corresponding household is shown in the table below. Fit a linear equation relating trip rate and household size. **(09 Marks)**

House Hold Size (x)

	1	2	3	4
Trips	1	2	4	6
Per	2	4	5	7
Day (y)	2	3	3	4
$\in(y)$	5	9	12	17

4   Write a short note on :
    a. Study area.
    b. Expansion of Data from samples.
    c. Trip distribution.
    d. Home interview surveys. **(20 Marks)**

PART – B

5   a. Explain Average growth factor methods in Trip distribution. **(05 Marks)**
    b. Explain Fratar method in trip distribution. **(05 Marks)**
    c. The base year trip matrix for a study area consisting of three zones is given below.

	1	2	3	O_i
1	20	30	28	78
2	36	32	24	92
3	22	34	26	82
d_i	88	96	78	252

The productions from the zone 1, 2, and 3 for the horizon year is expected to grow to 98, 106 and 122 respectively. The attractions from these zones are expected to increase to 102, 118, 106 respectively. Compute the matrix for the horizon year using doubly constrained growth factor model using Furness method. **(10 Marks)**

6 a. Define Modal split and explain in brief the factors affecting modal split. **(10 Marks)**
   b. Explain advantages and disadvantages of Pre – distribution modal split. **(05 Marks)**
   c. Draw the flow diagram for Modal split carried out after trip distribution. **(05 Marks)**

7 a. Explain the application of the traffic assignment. **(05 Marks)**
   b. Write a flow chart of fundamental structure of Lowry Model. **(05 Marks)**
   c. List the various assignment techniques and explain any two methods. **(10 Marks)**

8 Write short notes on :
   a. Difficulties in transport planning for small and medium cities.
   b. Quick response techniques.
   c. Grain – Lowry model.
   d. Furness method. **(20 Marks)**

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10CV847

Eighth Semester B.E. Degree Examination, June/July 2018
Environmental Impact Assessment

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　Max. Marks:100

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

PART – A

1　a. Define EIA and with the help of flow chart, explain relationship between EIA, EIS and FONSI. **(10 Marks)**
　b. Explain the need of EIA studies. **(05 Marks)**
　c. Explain the major components of Baseline Information. **(05 Marks)**

2　a. With the help of neat flow chart, explain the step – by – step procedure for conducting EIA. **(12 Marks)**
　b. Explain the various limitations of EIA. **(08 Marks)**

3　a. Describe the frame work of environmental impact assessment with the help of flow chart. **(10 Marks)**
　b. Explain in detail the check list and Network methodologies of EIA. **(10 Marks)**

4　a. Explain the basic step for Prediction and Assessment of impact on water. **(10 Marks)**
　b. Discuss the various steps involved in Assessment and prediction of impact on socio – Economic Environment. **(10 Marks)**

PART – B

5　a. Outline the MoEF guidelines for developmental projects. **(10 Marks)**
　b. Explain REIA, CEIA, DEIS and FEIS. **(10 Marks)**

6　a. Define Public participation. What are the advantages and disadvantages of public participation? **(10 Marks)**
　b. Explain the practical considerations in writing impact statements. **(10 Marks)**

7　a. Outline the salient features of the project activity and environmental parameters relationship. **(10 Marks)**
　b. Briefly explain the Leopold matrix. **(10 Marks)**

8　List the Environmental impacts of :
　a. Water resource development project. **(05 Marks)**
　b. Mining project. **(05 Marks)**
　c. Highway project. **(05 Marks)**
　d. Infrastructure construction activities. **(05 Marks)**

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