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B.E. DEGREE EXAMINATION, 2015

(THIRD SEMESTER)

CLEC-301. ENGINEERING MATHEMATICS - II

(Common To ALL Branches)

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT – I

1. (a) Eliminate the arbitrary function *f* from $z = f\left(\frac{xy}{z}\right)$ and form the partial differential equation. (5)

   (b) Find the singular integral of the partial differential equation

   $z = px + qy + p^2 - q^2$. (5)

   (c) Solve : $p - q = \log_e (x + y)$. (5)

(OR)

2. (a) Solve : $z^2 (p^2 + q^2) = x^2 + y^2$. (7)

   (b) Solve : $\left(2D^2 - 5DD' + 2D'^2\right) Z = 3e^{2x+y} + 5 \sin (2x + y)$. (8)

UNIT - II

3. (a) Find the Fourier transform of $f(x) = -\pi, -\pi < x\ 0.$

   $= x, 0 < x < \pi.$

   Deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\ldots\ldots = \frac{\pi^2}{8}$. (10)

   (b) Find the complex form of Fourier series for f (x) = cos ax in (0, 2*l*), where *a* is not an integer. (5)

(OR)

4. (a) Obtain the Fourier series for $f(x) = e^x$ in $0 < x < 2$. (5)

(b) Find the half-range cosine series for $f(x) = x(\pi - x), 0 < x < \pi$.

Deduce that $\frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \ldots = \frac{\pi^4}{96}$. (10)

UNIT - III

5. An elastic string is stretched between two fixed points at a distance π -apart. In its initial position the string is in the shape of the curve $f(x) = K(\sin x - \sin^3 x)$. Obtain the veritical displacement $y(x, t)$ if y satisfies the equation $\frac{\partial^2 y}{\partial t^2} = \frac{\partial^2 y}{\partial x^2}$. (15)

(OR)

6. A rod 30 cm long has its ends A and B kept at 25°C and 75°C respectively until steady state conditions prevail. The temperature at each end is then suddenly reduced to 0°C and kept so. Find the resulting temperature $u(x, t)$ taking $x = 0$ at A. (15)

UNIT - IV

7. (a) Find the Fourier cosine transform of $e^{-a^2x^2}$ and hence evaluate Fourier sine transform of $xe^{-a^2x^2}$. (9)

(b) Solve the integral equation : $\int_0^\infty f(x) \sin tx \, dx \begin{cases} = 1, & 0 \le t \le 1 \\ = 2, & 1 \le t \le 2 \\ = 0, & t \ge 2 \end{cases}$. (6)

(OR)

8. (a) Find the Fourier transform of : $f(x) = a - |x|$ for $|x| \le a$.
$= 0$ for $|x| > a$.

and deduce the value of $\int_0^\infty \left(\frac{\sin t}{t}\right)^2 dt$. (10)

(b) Find the Fourier cosine transform of $\frac{e^{-ax}}{x}$. (5)

UNIT - V

9. (a) Find the z-transform of : $\frac{2n+3}{(n+1)(n+2)}$. (6)

(b) If $F(z) = \frac{z}{z-1} + \frac{z}{z^2+1}$, where $F(z) = z[f(n)]$, then find $f(0)$ and $f(1)$. (4)

(c) Find the inverse z transform of $\frac{z}{(z+1)^2}$ by long division method. (5)

(OR)

10. (a) Using convolution theorem, evaluate $z^{-1}\left[\frac{z^2}{(z-1)(z-3)}\right]$. (5)

(b) Solve : $y_{n+2} + 4y_{n+1} - 5y_n = 24n - 8$. Given that $y_0 = 3$, $y_1 = -5$. (10)

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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-302 / CSEC-302 / PCSEC-102. MECHANICS OF SOILDS - I

(Common with Civil and Structual Engineering and Part - Time)

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT – I

1. The ultimate stress, for a hollow steel column which carries an axial load of 1·8 MN is 450 N/mm^2. If the external diameter of the column is 230 mm, determine the internal diameter. Assume factor of safety as 5.

(OR)

2. A bar of 12 mm diameter gets stretched by 3 mm under a steady load of 7000 N. What stress would be produced in the same bar by a weight of 800 N, which falls vertically through a distance of 9 cm on to a regid collar attached at its end? The bar is initially unstressed. Take E = 2·1 × 10^5 N/mm^2.

UNIT - II

3. Determine the mass moment of inertia of a thin rod of length 100 cm and mass 6 kg about an axis through one end of the rod and perpendicular to the rod.

(OR)

4. Find the position of the centre of gravity of the L section as shown in figure-1. Also, find its MI about *xx* passing through the centre of gravity. All dimensions are in mm.

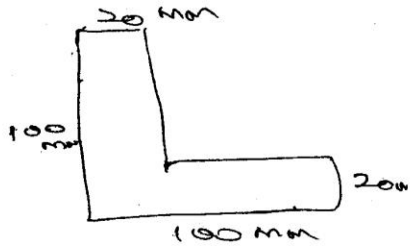

Figure-1

UNIT - III

5. A cantilever of length 5 m is loaded as shown in figure-2. Draw the SF and BM diagrams for the cantilever.

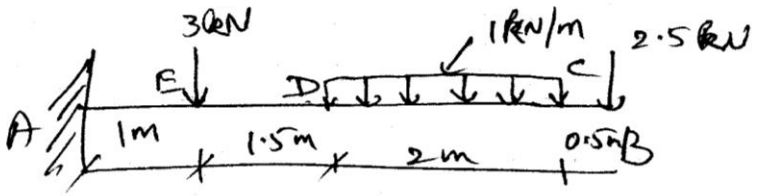

Figure-2

(OR)

6. A steel plate of width 120 mm and of thickness 20 mm is bent into a circular arc of radius 10 m. Determine the maximum stress induced and the bending moment which will produce the maximum stress. Take $E = 2 \times 10^5$ N/mm^2.

UNIT - IV

7. A cantilever of length 3 m is carrying a point load of 25 kN at the free end. If the moment of inertia of the beam is 10^8 mm^4 and value of $E = 2 \times 10^5$ N/mm^2, determine
   (a) Slope of the cantliver at the free end.
   (b) Deflection at the free end.

(OR)

8. A beam 5 m long, supply supported at its end carried a point load W at its centre. If the slope at the ends of the beam is not to exceed 2°, determine the deflection at the centre of the beam.

UNIT - V

9. A hollow circular shaft 20 mm thick transmits 300 kW power at 200 *rpm*. Determine the external diameter of the shaft if the shear strain due to transfer is not exceed 0·00086. Take modulus of rigidity $= 0{\cdot}8 \times 10^5$ N/mm^2.

(OR)

10. Two close-coiled concentric helical springs of the same length are wound out of the same wire, circular in cross-section and supports a compressive load 'P'. The inner spring consists of 20 turns of mean diameter 16 cm and the outer spring has 18 turns of mean diameter 20 cm. Calculate the maximum stress produced in each spring if the diameter of wire = 1cm and P = 1000 N.

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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-303 / CSEC-303. CONSTRUCTION ENGINEERING

(Common with Civil and Structural Engineering)

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

UNIT – I

1. (a) Discuss about the various tests conducted on stones. (10)
   (b) What are the uses of stones? (5)

(OR)

2. (a) What are the defects found in timber? Explain in detail. (10)
   (b) Explain about the various forms of steel used in construction. (5)

UNIT - II

3. Explain about the various types of pile foundation with neat sketches. (15)

(OR)

4. Discuss about the various types of stone masonry with neat sketches. (15)

UNIT - III

5. (a) What are the requirements of good stair? (5)
   (b) With neat sketches, draw the various types of stairs and write its application. (10)

(OR)

6. (a) Compare merits and demerits of flat and pitched roofs. (5)
   (b) Explain any method of providing water-proof terracing on R.C.C. roof slab. (15)

UNIT - IV

7. (a) Explain the various types of plaster finishes. (10)
   (b) What are the requirements of good plaster. (5)

(OR)

8. Write short notes on the following : (15)
   (a) Needle scaffolding. (b) Flying shores.

UNIT - V

9. Explain about various demolition techniques adopted for multi-storied buildings. (15)

(OR)

10. Discuss about various types of strengthening methods for concrete structures. (15)

3011

B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-304 / PCLEC-104. ENGINEERING GEOLOGY

(Common with Part-Time)

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.
ALL questions carry EQUAL marks.

UNIT – I

1. Write short notes on the following : (15)
   (a) Clevage. (b) Streak. (c) Mohr's scale of hardness. (d) Birefringence.
   (e) Optical sign.

(OR)

2. List out the various methods available for determining specific gravity of minerals. Explain in detail with a neat sketch, the Jolly's balance. (15)

UNIT - II

3. How would you differentiate between a igneous rock, a sedimentary rock, a metamorphic rock on the basis of texture and structure in hand specimens? Give your answer in tabular form. (15)

(OR)

4. Write short notes on the following : (15)
   (a) Sandstone. (b) Limestone. (c) Gnesis.

UNIT - III

5. With a neat sketch, explain the classification of folds. (15)

(OR)

6. With a neat sketch, explain the effect of faulting. (15)

UNIT - IV

7. Briefly explain the following : (15)
   (a) The tectonic earth-quake. (b) Reservoir associated earth-quakes.

(OR)

8. Briefly explain the classification of mass movement of earth (landslides). (15)

UNIT - V

9. Briefly explain the geological consideration in tunneling. (15)

(OR)

10. Briefly explain the geological investigation to be carried out for the selection of site for a reservoir. (15)

3012

B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-305 / CSEC-306. CONCRETE TECHNOLOGY

(Common with Civil and Structural Engineering)

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.
Relevant IS Code may be permitted.
ALL questions carry EQUAL marks.

UNIT – I

1. Explain the role of major compounds in the hydration of cement.

(OR)

2. Write short notes on the following with their applications :
   (a) Rapid hardening cement. (b) Sulphate resisting cement.

UNIT - II

3. Explain the characteristics of aggregates which affect the workability and strength of concrete.

(OR)

4. Describe the test procedure for determining impact value and abrasion resistance of aggregate.

UNIT - III

5. What are the various factors which affect the workability of concrete? Explain.

(OR)

6. Discuss in detail about the segregation and bleeding of concrete.

UNIT - IV

7. What is alkali aggregate reaction? Discuss in detail, about the reaction mechanism and various methods of controlling it.

(OR)

8. Write short notes on the following :
   (a) Water reducing agents. (b) Accelerators.

UNIT - V

9. Explain the step by step procedure for the design of concrete mixes by IS code method.

(OR)

10. Design a concrete mix for M-30 grade of reinforced concrete to be used near sea-shore, with OPC 53 grade cement, using IS code method. Assume other suitable data.

3013

B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-306 / PCLEC-103. FLUID MECHANICS

(Common with Part-Time)

November] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

UNIT – I

1. The velocity distribution for flow over a flat plate is given by $u = \frac{3}{2}y - y^{\frac{3}{2}}$, where u is the point velocity in metre per second at a distance of y metre above the plate. Determine the shear stress at y = 9 cm. Assume dynamic viscosity as 8 Poise.

(OR)

2. If the velocity distrbution of a fluid over a plate is given by $u = \left(\frac{3}{4}\right)y - y^2$, where u is the velocity in metre per second at a distance of y metres abvoe the plate. Determine the shear stress at y = 0·15 metre. Take dynamic viscosity of the fluid as $8{\cdot}5 \times 10^{-5}$ kg.sec / m^2.

UNIT - II

3. A simple manometer is used to measure the pressure of oil (sp.gr. = 0·8) flowing in a pipeline. Its right limb is open to atmosphere and left limb is connected to the pipe; The centre of the pipe is 9 cm below the level of mercury (sp.gr = 13·6) in the right limb. If the difference of mercury level in the two limbs is 15 cm, determine the absolute pressure of the oil in the pipe in N/ cm^2.

(OR)

4. A rectangular sluice gate is situated on the vertical wall of a lock. The vertical side of the slice is 6 m in length and depth of the centroid of area is 8 m below the water surface. Prove that the depth of centre of pressure is given by 8·475 m.

UNIT - III

5. Derive, from first principles, the condition for irrational flow. Prove that, for potential flow, both the stream function and velocity potential function satisfy the Laplace equation.

(OR)

6. A pipe of diameter 30 cm carries water at a velocity of 20 cm/sec. The pressure at the points A and B are given as 34·335 N/cm^2 and 29·43 N/cm^2 respectively, while the datum head at A and B are 25 m and 28 m. Find the loss of head between A and B.

UNIT - IV

7. Find the head loss due to friction in a pipe of diameter 250 mm and length 60 m through which water is flowing at a velocity of 3·0 m/s using

   (a) Darcy formula. (b) Chezy's formula

   for which C = 56. Take ν (kinematic viscosity) for water = 0·01 Stroke.

(OR)

8. Two sharp ended pipes of diameters 60 mm and 100 mm respectively, each of length 150 m are connected in parallel between two reservoirs which have a difference of level of 15 m. If co-efficient of friction for each pipe is 0·08, calculate the rate of flow for each pipe and also, the diameter of a single pipe 150 m long which would give same discharge if it were substituted for the original two pipes.

UNIT - V

9. By applying momentum equation to open channel flow, show that the consequent depth and flow rate are related by $\frac{2q^2}{g} = y_1 y_2 (y_1 + y_2)$. State the assumptions made in the derivation.

(OR)

10. Find the discharge through a circular pipe of diameter 4·0 m, if the depth of water in the pipe is 1·33 m and pipe is laid at a slope of 1 in 1500. Take the value of Chezy's constant = 60.