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B.E. DEGREE EXAMINATION, 2015

(COMMON TO ALL BRANCHES)

(THIRD SEMESTER)

CLEC-301. ENGINEERING MATHEMATICS - II

(For the candidates of 2011-2012 batch and later)

May] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT – I

1. (a) Form the partial difference equation by eliminating the arbitrary constants a and b from : $\log_e z = a \log_e x + \sqrt{1-a^2} \log_e y + b$. (5)

   (b) Solve : $9(p^2 z + q^2) = 4$. (5)

   (c) Find the complete integral of the differential equation :
   $$p^2 + x^2 y^2 q^2 = x^2 z^2.$$ (5)

(OR)

2. (a) Solve : $(3z - 4y)p + (4x - 2z)q = 2y - 3x$. (7)

   (b) Solve : $(D^2 - DD' - 20D'^2)\, z = e^{5x+y} + \sin(4x - y)$. (8)

UNIT - II

3. (a) Obtain the Fourier series for e^{-ax} in $(-\pi, \pi)$. Hence derive the series for $\frac{\pi}{\sin h\, \pi}$. (8)

   (b) Find the complex form of Fourier series for
   $$\left.\begin{array}{l} f(x) = x, \quad -2 < x < 0 \\ \qquad x^2, \quad 0 < x < 2 \end{array}\right\}.$$ (7)

(OR)

4. (a) Expand $f(x) = x(2l - x)$ in $(0, 2l)$ as a Fourier series of period $2l$. (10)

(b) Obtain the cosine series for

$$\left.\begin{array}{l} f(x) = \cos x, \text{in } 0 < x < \dfrac{\pi}{2} \\ 0, \text{ in } \dfrac{\pi}{2} < x < \pi \end{array}\right\}. \qquad (5)$$

UNIT - III

5. An elastic string is stretched between two fixed points at a distance π apart. Initially each point of the string is executed a velocity v in the form $v = (\sin x - \sin^3 x)$. Obtain the vertical displacement of the string at any distance x at any time t from one fixed end. (15)

(OR)

6. A rod of length 20 cm has its ends A and B kept at 30°C and 90° C respectively until steady state condition prevail.. If the temperature at each end is then suddenly reduced to 0°C and maintained so, determine the subsequent temperature at any distance x at any time t from one end of the rod. (15)

UNIT - IV

7. (a) Find the Fourier transform of $e^{-a|x|}$, $a > 0$. Hence, determine Fourier transform of $xe^{-a|x|}$. (8)

(b) Show that Fourier sine transform of $\dfrac{x}{x^2 + a^2}$ is $\sqrt{\dfrac{\pi}{2}}\, e^{-as}$. (7)

(OR)

8. (a) Using Fourier integral formula show that

$$e^{-x} \cos x = \frac{2}{\pi} \int_0^\infty \frac{\lambda^2 + 2}{\lambda^4 + 4} \cos \lambda x \, d\lambda . \qquad (8)$$

(b) Evaluate : $\displaystyle\int_0^\infty \frac{dx}{\left(x^2+4\right)\left(x^2+9\right)}$ using Fourier transform techniques. (7)

UNIT - V

9. (a) Find the $z\left[\frac{1}{n(n-1)}\right]$. (5)

(b) Verify the initial value theorem for $f(n) = \frac{2^{n+1}}{\lfloor n}$. (5)

(c) Find $z^{-1}\left[\frac{z^2+z}{[z-1]^3}\right]$ by long division method. (5)

(OR)

10. (a) Find $z^{-1}\left[\frac{8z^2}{[2z-1][4z-1]}\right]$ using Convolution theorem. (6)

(b) Solve :

$u_{n+2} - 2u_{n+1} + u_n = 3n + 5$ with assuming $u_0 = k$, $u_1 = l$. (9)

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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(THIRD SEMESTER)

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

(Common with Structural Engineering)

(For the candidates of 2011-12 batch and later)

May] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT – I

1. A bar of 30 mm diameter is subjected to a pull of 60 kN. The measured extension on gauge length of 200 mm is 0·1 mm and change in diameter is 0·004 mm. Calculate :

   (a) Young's Modulus. (b) Poission's ratio and (c) Bulk Modulus.

(OR)

2. An elemental cube is subjected to tensile stresses of 30 N/mm^2 and 10 N/mm^2 acting on two mutually perpendicular planes and a shear stress of 10 N/mm^2 on these planes. Draw the Mohr's circle of stresses and hence, or otherwise, determine the magnitudes and directions of principal stresses and also, the greatest shear stress.

UNIT - II

3. Find the centre of gravity of the I-section shown in figure -1.

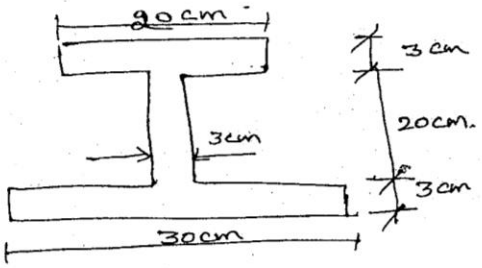

Figure-1

(OR)

4. .Find the moment of intertia of the section as shown in figure-2.

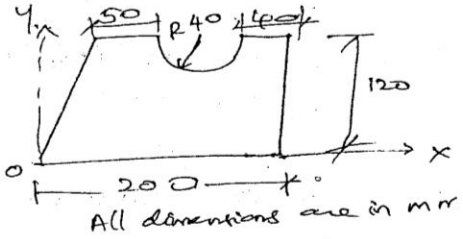

Figure-2

UNIT - III

5. A simply supported beam AB of length 6 m is hinged at A and B. It is subjected to a clockwise couple of 26 kNm at a distance of 2 m from the left end A. Draw the SF and BM diagrams.

(OR)

6. A wooden beam 100 mm wide and 150 mm deep is simply supported over a span of 5 metres. If the shear force at a section of the beam is 5500 N, find the shear stress at a distance of 25 mm above the neutral axis.

UNIT - IV

7. A beam 3 m long, simply supported at its ends, is carrying a point load W at the centre. If the slope at the ends of the beam should not exceed 2°, find the deflection at the centre of the beam.

(OR)

8. An overhanging beam ABC is loaded as shown in figure-3. Find the slopes over each support and at the right end. Find also, the maximum upward deflection between the supports and the deflection at the right end. Take $E = 2 \times 10^5$ N / mm^2. and $I = 5 \times 10^8$ mm^4.

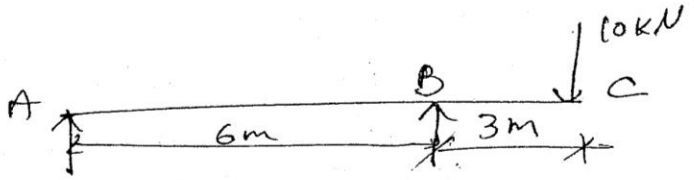

Figure-3

UNIT - V

9. In a hollow circular shaft of outer and inner diameters of 20 cm and 10 cm respectively, the shear stress is not to exceed 40 N/mm^2. Determine the maximum torque which the shaft can safely transmit.

(OR)

10. A closely coiled helical spring made of 10 mm diameter steel wire has 15 coils of 100 mm diameter. The spring is subjected to an axial load of 100 N. Calculate :

    (a) The maximum shear stress induced. (b) The deflection and

    (c) Stiffness of the spring.

    Take modulus of rigidity $C = 8{\cdot}16 \times 10^4$ N/mm^2.

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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-303 / CSEC-303. CONSTRUCTION ENGINEERING

(For the candidates of 2011-2012 batch and later)

May] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT – I

1. Explain the essential qualities of a good building stone and important uses of stones. (15)

(OR)

2. What are the qualities of good bricks? Explain. (15)

UNIT - II

3. Explain the types of soil and also, brief about bearing capacity of soil. (15)

(OR)

4. State the different types of brick masonry and explain any two in detail. (15)

UNIT - III

5. How do you classify doors based on working operation? Explain them with neat sketches. (15)

(OR)

6. State the different types of roof and explain any two in detail. (15)

UNIT - IV

7. (a) What is meant by pointing? Write its purpose. (7)
   (b) What is meant by scaffolding? Discuss any one method of it. (8)

(OR)

8. Define the term underpointing. Explain any one method of it,s giving its purpose. (15)

UNIT - V

9. How concrete distress is caused and explain the various repairing techniques. (15)

(OR)

10. Explain briefly the causes of deterioration and methods to rectify them. (15)

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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-304 / PCLEC-104. ENGINEERING GEOLOGY

(For the candidates of 2011-2012 batch and later)

May] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT – I

1. (a) What is a rock forming mineral? (3)

   (b) Discuss the processes of formation of minerals in nature. Which group of minerals is most common in occurence? Briefly mention its salient features. (12)

(OR)

2. Explain in detail, the various physical properties considered in the study of minerals. (15)

UNIT - II

3. Explain in detail, the modes of formation of sedimentary rocks. (15)

(OR)

4. Explain in detail the following :

   (a) Factors of metamorphism. (b) Kinds of metamorphism. (15)

UNIT - III

5. Briefly explain unconformity. (15)

(OR)

6. With neat sketch, briefly explain the causes of folding. (15)

UNIT - IV

7. Explain in detail, the various causes of mass movement of surface (landslides). (15)

(OR)

8. Write short notes on the following : (15)

   (a) Quake resistant buildings. (b) Quake resistant dams.

UNIT - V

9. Briefly explain the geological character for investigation in the selection of site for a dam. (15)

(OR)

10. Write short notes on the following : (15)

    (a) Traffic tunnels. (b) Hydropower tunnel.

    (c) Public utility tunnels.

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B.E. DEGREE EXAMINATION, 2015

(CIVIL CIVIL AND STRUCTURAL ENGINEERING)

(THIRD SEMESTER)

CLEC-305 / CSEC-306. CONCRETE TECHNOLOGY

(For the candidates of 2011-2012 batch and later)

May] [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.
IS : 10262 - 2009 Code is permitted.
ALL questions carry EQUAL marks.

UNIT – I

1. Explain the test procedure to determine the standard consistency test, initial and final setting time. (15)

(OR)

2. Write short notes on :
   (a) Hydration of cement. (b) Fineness of cement. (7½+7½)

UNIT - II

3. What are the factors considered to obtain highly workable concrete? (15)

(OR)

4. Explain in detail the soundness test on aggregate and grading of aggregate. (15)

UNIT - III

5. Briefly explain the following terms: (15)
   (a) Segregation. (b) Bleeding. (c) Shrinkage of fresh concrete.

(OR)

6. What are the various methods employed for concrete curing? Explain in detail any three. (15)

UNIT - IV

7. Briefly explain the properties of hardened concrete. (15)

(OR)

8. Explain in detail the causes of concrete deterioration. (15)

UNIT - V

9. Write down the step-by-step procedure of IS method of mix-design. (15)

(OR)

10. Briefly explain about the concept of concrete mix-design. (15)

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B.E. DEGREE EXAMINATION, 2015

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-306 / PCLEC-103. FLUID MECHANICS

(For the candidates of 2011-12 batch and leter)

May] [Time : 3 Hours

Maximum : 75 Marks

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

UNIT – I

1. (a) Calculate the dynamic viscosity of an oil, which is used for lubrication between a square plate of size 0·8 m × 0·8 m and an inclined plane with an angle of inclination 30° as shown in figure-1. The weight of the square plate is 300 N and it slides down the inclined plane with a uniform velocity of 0·3 m/s. The thickness of oil film is 1·5 mm. (10)

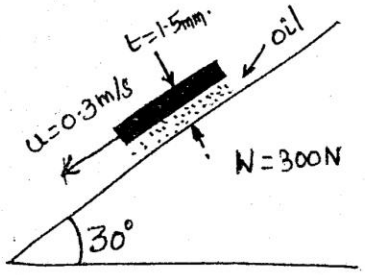

Figure-1

(b) The dynamic viscosity of an oil, used for lubrication between a shaft and sleeve is 6 Poise. The shaft is of diameter 0·4 m and rotates at 190 *rpm*. Calculate the power lost in the bearing for a sleeve length of 90 mm. The thickness of the oil film is 1·5 mm. (5)

(OR)

2. (a) A plate 0·025 mm distant from a fixed plate, moves at 60 cm/s and requires a force of 2 N per unit area i.e. 2 N/m^2 to maintain this speed. Determine the fluid viscosity between the plates. (10)

(b) An oil of viscosity 5 Poise is used for lubrication between a shaft and sleeve. The diameter of the shaft is 0·5 m and it rotates at 200 rpm. Calculate the power lost in oil for a sleeve length of 100 mm. The thickness of oil film is 1·0 mm. (5)

UNIT - II

3. (a) What are the gauge pressure and absolute pressure at a point 3 m below the free surface of a liquid having a density of $1{\cdot}53 \times 10^3$ kg/m^3 if the atmospheric pressure is equivalent to 750 mm of mercury? The specific gravity of mercury is 13·6 and density of water = 1000 kg/m^3. (5)

(b) A U-tube manometer is used to measure the pressure of water in a pipe line, which is in excess of atmospheric pressure. The right limb of the manometer contains mercury and is open to atmosphere. The contact between water and mercury is in the left limb. Determine the pressure of water in the main line, if the difference in level of mercury in the limbs of U-tube is 10 cm and the free surface of mercury is in level with the centre of the pipe. If the pressure of water in pipe line is reduced to 9810 N/m^2, calculate the new difference in the level of mercury. Sketch the arrangements in both cases. (10)

(OR)

4. A Caisson for closing the entrance to a dry dock is of trapezoidal form 16 m wide at the top and 10 m wide at the bottom and 6 m deep. Find the total pressure and centre of pressure on the Caisson if the water on the outside is just level with the top and dock is empty. (15)

UNIT - III

5. A point P(0·5, 1) is situated in the flow fluid of a doublet of strength 5 m^2/s. Calculate the velocity at this point and also, the value of the stream function. (15)

(OR)

6. A pipeline carrying oil of specific gravity 0·87, changes in diameter from 200 mm diameter at a position-A to 500 mm diameter at a position-B which is 4 metres at a higher level. If the pressure at A and B are 9·81 N/cm^2 and 5·886 N/cm^2 respectively and the discharge is 200 litres/s, determine the loss of head and direction of flow. (15)

UNIT - IV

7. When a sudden contraction is introduced in a horizontal pipeline form 50 cm to 25 cm, the pressure changes from 10,500 kg/m^2 (103004 N/m^2) to 6900 kg/m^2 (67689 N/m^2). Calculate the rate of flow. Assume co-efficient of contraction of jet to be 0·65. Following this if there is a sudden enlargement from 25 cm to 50 cm and if the pressure at the 25 cm section is 6900 kg/m^2 (67689 N/m^2), What is the pressure at the 50 cm enlarged section? (15)

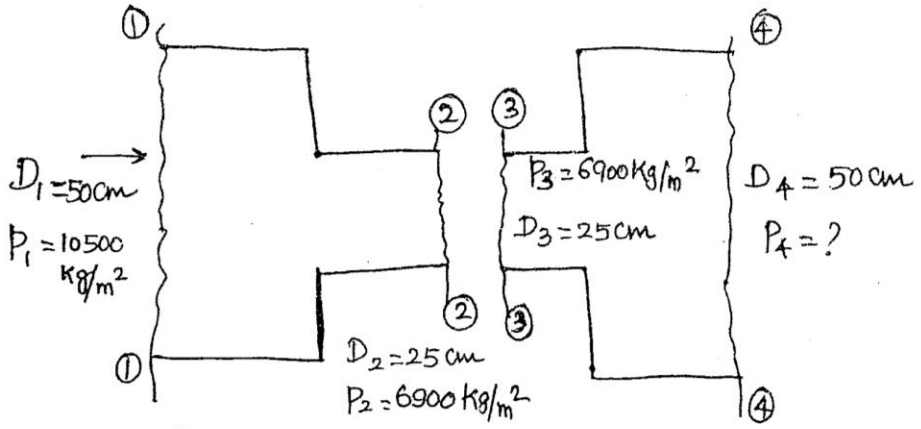

Figure -2

(OR)

8. A pipeline of length 2000 m is used for power transmission. if 110·3625 kW power is to be transmitted through pipe in which water having a pressure of 490·5 N/cm^2 at inlet is flowing. Find :

   (a) The diameter of the pipe corresponding to maximum efficiency of transmission.

   (b) The diameter of the pipe corresponding to 90% efficiency of transmission. (15)

UNIT - V

9. Derive the expression for discharge over a triangular notch. (15)

(OR)

10. (a) The discharge of water through a rectangular channel of width 8 m is 15 m^3/s when depth of flow of water is 1·2 m. Calculate :

   (i) Specific energy of the flowing water.

   (ii) Critical depth and critical velocity.

   (iii) Value of minimum specific energy. (10)

   (b) What is specific energy curve? Draw specific energy curve. (5)