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B.E. DEGREE EXAMINATION, 2017

(COMMON TO ALL BRANCHES)

(THIRD SEMESTER)

CLEC-301. ENGINEERING MATHEMATICS - II

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

April]   [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 differential equation by eliminating the arbitrary functions :

    $f (x + y + z, x^2 + y^2 + z^2) = 0$.   (8)

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

2. (a) Solve : $z = px + qy + p^2 q^2$.   (8)

    (b) Solve : $\left(D^2 - 2DD'' \right) z = x^2 y + e^{2x}$.   (7)

UNIT - II

3. (a) Find the Fourier series expansion of $f (x) = \dfrac{\pi - x}{2}$, $0 < x < 2\pi$ of periodicity 2π .(8)

    (b) Obtain the half range sine series for $f(x) = x$ in $(0, \pi)$.   (7)

4. Expand $f(x) = x^2$ as a Fourier series in $(-\pi , \pi)$ and hence, deduce the value of

    $$\dfrac{1}{1^4} + \dfrac{1}{2^4} + \dfrac{1}{3^4} + \ldots\ldots$$ (15)

UNIT - IV

5. A string is stretched and fastened to two points l apart. Motion is started by displacing the string into form $y = 3 (lx - x^2)$ from which it is released at time $t = 0$. Find the displacement of any point on the string at a distance of x from one end at any time t.   (15)

6. A rod, 30 cm long, has its ends A and B kept at 20°C and 80° C respectively, until steady state conditions prevail. The temperature at each end is then suddenly reduced at 0° C and kept so. Find the resulting temperature function u (x, t) taking $x = 0$ at A. (15)

UNIT - IV

7. Find the Fourier transform of f (x) given by $f\left(x\right)=\begin{cases} 1 & \text{for } |x| < a \\ 0 & \text{for } |x| > a > 0 \end{cases}$

and hence, evaluate : $\int\limits_{0}^{\infty} \frac{\sin x}{x}\, dx.$ (15)

8. Find the Fourier sine and cosine transform of e^{-2x}. Hence, find the values of : (15)

(a) $\int\limits_{0}^{\infty} \frac{dx}{\left(x^2 + 4\right)^2}$

(b) $\int\limits_{0}^{\infty} \frac{x^2\, dx}{\left(x^2 + 4\right)^2}$

UNIT - V

9. Find the z- transform of

(a) $\frac{1}{n-1}$ if N > 1. (6)

(b) $\cos n\theta$ and $\sin n\theta$. (9)

10. (a) Find : $z^{-1} = \left(\frac{z-4}{(z-1)(z-2)^2}\right)$ (7)

(b) Solve the difference equation :

y (n + 3) − 3y (n + 1) + 2y (n) = 0

given that $y(0) = +4$, $y(1) = 0$ and $y(2) = 8$. (8)

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B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(THIRD SEMESTER)

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

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

April]   [Time : 3 Hours

Maximum : 75 Marks

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

UNIT – I

1. A reinforced concrete column of size 230 mm × 400 mm has a 8 steel bars of 12 mm diameter. If the column is subjected to an axial compression of 500 kN, find the stress developed in steel and concrete. Assume modular ratio = $\frac{E_S}{E_C}$ = 18·67.

2. An unknown weight falls through a height of 10 mm on a coilar rigidly attached to the lower end of a vertical bar 5 m long and 600 mm² in section. If the maximum extension of the rod is to be 1·5 mm, what is the corresponding stress and magnitude of the unknown weight ?

UNIT – II

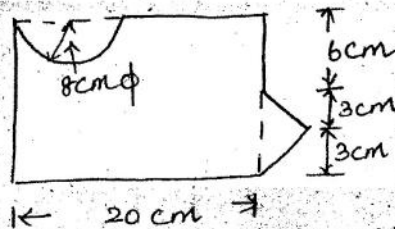3. Locate the centroid of the plane lamina as shown in figure - 1.

Figure - 1.

4. Find the moment of inertia of a Tee section about centroidal horizontal and vertical axes as shown in figure - 2.
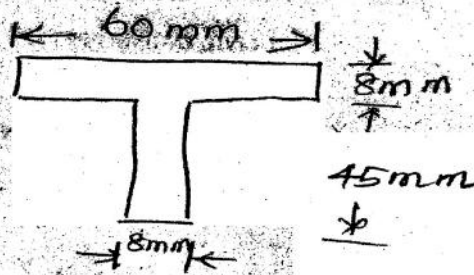

Figure - 2

UNIT - III

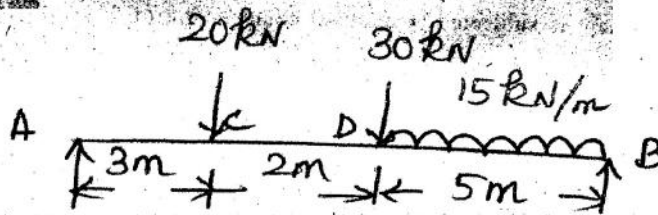5. Draw the SFD and BMD for the simply supported beam as shown in figure - 3.

Figure - 3.

6. Figure - 4 shows cross section of a beam which is subjected to a shear force of 20 kN. Draw the shear stress distribution across the depth.
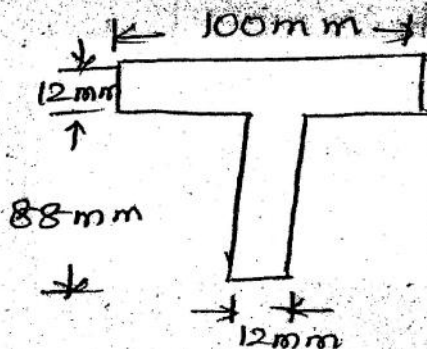

Figure - 4.

UNIT - IV

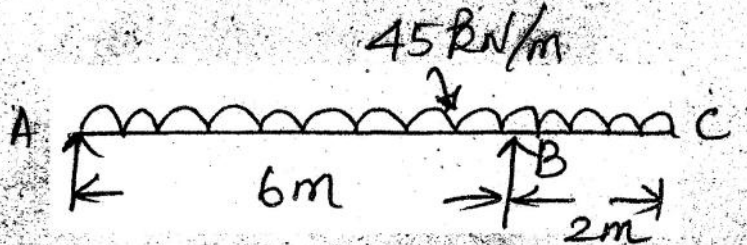7. Detrmine the deflection at the free end of the overhanging beam as shown in figure - 5.

45 kN/m

A

6m

B

2m

C

Figure - 5.

8. A girder of uniform section and constant depth is freely supported over a span of 4 m. If the point of load at the mid-span is 20 kN and $I_{XX} = 15.614 \times 10^{-6}$ m⁴, calculate :

(a) Cenrtral deflection.   (b) Slopes at the ends of the beam.

Take E = 210 GN/m².

UNIT - V

9. Calculate the maximum intensity of shear stress induced and the angle of twist produced in degrees in solid shaft of 90 mm diameter, 1·5 m long, transmitting 112·5 kN at 170 rpm. Take G = 80 kN/mm².

10. A closed coil helical spring is made with 12 mm diameter wire and is having mean diameter of 150 mm and 15 complete turns. The modulus of rigidity of the material of spring is 80 kN/mm². When a load of 450 N is applied, find :

(a) The maximum shear stress.   (b) Strain energy stored.

(c) Deflection produced.   (d) Stiffness of the spring

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B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-303 / CSEC-303 . CONSTRUCTION ENGINEERING

(Common with Civil and Structural Engineering)

April]   [Time : 3 Hours

Maximum : 75 Marks

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

UNIT – I

1. Discuss in detail about the various types of cement with their applications.   (15)

2. (a) What are the tests conducted on bricks ? Explain them.   (10)

   (b) What are the applications of lime ?   (5)

UNIT - II

3. Describe about the types of shallow foundation with neat sketches.   (15)

4. (a) Compare stone and brick masonry.   (8)

   (b) What are the functions of substructure ?   (7)

UNIT - III

5. Explain about the types of pitched roof with neat sketches.   (15)

6. (a) Explain about the method of termite proofing.   (5)

   (b) With neat sketches, discuss about the various types of damp proofing.   (10)

UNIT - IV

7. What is meant by underpinning ? Explain about it with neat sketches.   (15)

8. Discuss about the various types of scaffolding.   (15)

UNIT - V

9. (a) What are the precautions to be taken before demolishing a structure ?   (8)

   (b) What are the various causes of distress in concrete structures ?   (7)

10. Describe about the various strengthening methods available for columns.   (15)

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B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-304 / PCLEC-104 . ENGINEERING GEOLOGY

(Common with Part-Time)

April]

[Time : 3 Hours

Maximum : 75 Marks

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

UNIT – I

1. Give an account on various physical properties of important rocks., with suitable examples.

2. Explain the general properties of feldspar, mica and pyroxene.

UNIT - II

3. Explain chief formations of igneous rocks.

4. Describe the structure, texture, mineral composition, origin and uses of the following :

(i) Dolerite. (ii) Conglomerate. (iii) Basalt. (iv) Gnesis.

UNIT - III

5. What is a fault ? Describe with neat sketches the types of faults.

6. Explain with neat sketches :

(i) Various types of joints. (ii) Folds based on position of axial plane.

UNIT - IV

7. Explain with a suitable case study the various causes for landslides and measures to control them.

8. Explain about seismograph and seismogram with neat sketches.

UNIT - V

9. Explain the properties of rocks with respect to their occurrence in ground-water.

10. Explain the types of dams and their uses.

UNIT – I

1. (a) Explain the testing procedure of initial setting time of cement.   (8)

   (b) Write about chemical properties of cement and their limits.   (7)

2. (a) What do you mean by soundness of cement ? How will you test it ?   (8)

   (b) Explain the testing procedure to find the strength of cement.   (7)

UNIT - II

3. Explain in detail the various methods of testing aggregates abrasion value.   (15)

4. (a) Write in detail about the grading of aggregates.   (8)

   (b) Explain the test for determining the elongation of aggregates.   (7)

UNIT - III

5. What is bleeding of concrete ? How will you test for bleeding of concrete ?   (15)

6. Describe the testing procedure for conducting slump test in detail.   (15)

UNIT - IV

7. Discuss in detail the non-destructive methods of testing of hardened concrete.   (15)

8. (a) Write about super plastizer with its effects on fresh and hardened concrete.   (8)

   (b) Write short notes on water proofers and their effects.   (7)

UNIT - V

9. Write the step by step procedure of BIS method of mix design.   (15)

10. Illustrate the mix design of M-35 grade concrete.   (15)

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B.E. DEGREE EXAMINATION, 2017

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-306/PCLEC-103. FLUID MECHANICS

(Common with Part Time)

April]   [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each UNIT   (5 × 15= 75)

UNIT-I

1. Determine the intensity of shear of an oil having viscosity=1 poise. The oil is used for lubricating the clearance between a shaft of diameter 10 cm and its journal bearing. The clearance is 1.5mm and the shaft rotates at 150 rpm.

2. The surface tension of water in contact with air at 20°C is 0.0725N/m. The pressure inside a droplet of water is to be 0.02N/cm^2 greater than the outside pressure. Calculate the diameter of the droplet of water.

UNIT-II

3. What are the gauge pressure and absolute pressure at a point 3 m below the free surface of a liquid having a density of 1.53×10^3 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=1000kg/m^3.

4. Find the volume of the water displaced and position of centre of buoyancy for a wooden block of width 2.5m and of depth 1.5m, when it floats horizontally in water. The density of wooden block is 650kg/m^3 and its length 6 m.

UNIT-III

5. A pipe, through which water if flowing, is having diameters, 20 cm and 10 cm at the cross-section 1 and 2 respectively. The velocity of water at section 1 is given 4m/s. Find the velocity head at sections 1 and 2 and also rate of discharge.

6. A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20 cm of mercury. Determine the rate of flow. Take Cd=–0.98.

UNIT-IV

7. A horizontal pipe line is 40 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 25cm of its length from the tank, the pipe is 150 mm diameter and its diameter is suddenly enlarged to 300 mm. The height of water level in the tank is 8m above the centre of pipe. Considering all losses of head occur, determine the rate of flow. Take f=0.01.

8. A compound pipe having diameters of 150 mm, 300 mm and 250 mm and length 100 m, 200 m and 150 m respectively is used to transmit water. Determine the equivalent pipe and length of the equivalent pipe having diameter of 180 mm.

UNIT-V

9. Derive the Chezy's formula to determine the velocity of flow in open channels.

10. Explain in detail the hydraulic jump with a neat sketch.