B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(THIRD SEMESTER)

PCLEC-301: STATISTICS AND NUMERICAL METHODS

November]   [Time : 3 Hours

Maximum : 75 Marks

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

Answer One Full Question from each Unit.

UNIT – I

1. (a) The contents of three boxes 1,2,3 are as follows:

Balls / Boxes	White	Red	Black
1	1	2	3
2	2	3	1
3	3	1	2

   A box is chosen at random and from it two balls are drawn at random. The two balls are one red and one white. What is the probability that they come from the second box? (7)

   (b) If x_1 and x_2 be two independent random variables with mean 5 and 10 and standard deviations 2 and 3 respectively. Obtain the correlation co-efficient of the random variables U and V where $U = 3x_1 + 4x_2$ and $V = 3x_1 - x_2$. (8)

(OR)

2. (a) A continuous random variable x has the density function

   $$f_x(x) = \frac{k}{a^2 + x^2}, -\infty < x < \infty.$$ Find the value of k. Also determine the distribution function. (5)

   (b) Compute mean, median, mode, standard deviation and co-efficient of variation from the following data:

Size:	4-8	8-12	12-16	16-20	20-24	24-28	28-32	32-36	36-40
Frequency:	7	10	18	32	15	12	10	6	2

(10)

UNIT – II

3. (a) The probability of a component's failure is 0.05. Out of 14 components, what is the probability that (i) exactly 3 will fail, (ii) at most 3 will fail and (iii) at least 3 will fail. (7)

   (b) In the following data which shows the experience of machine operators and their performance ratings (as given by the number of good parts turned out per 100 pieces)

   Operator's experience x: 16 12 18 4 3 10 5 12
   Performance ratings   y: 87 88 89 68 78 80 75 83

   Calculate the regression lines (i) y on x (ii) x on y and (iii) estimate the performance if an operator has 7 years experience. (8)

(OR)

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

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

(Common with Structural Engineering)

November]   [Time : 3 Hours

Maximum : 75 Marks

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

UNIT – I

1. A rectangular block of material is subjected to a tensile stress of 110 N/mm^2 on one plane and a tensile stress of 47 N/mm^2 on the plane at right angles to the former as shown in figure- 1. Each of the above stresses is accompanied by a shear stress of 63 N/mm^2 and that associated with the former tensile stress tends to rotate the block anticlockwise. Find :

    (a) The direction and magnitude of each of the principal stress and

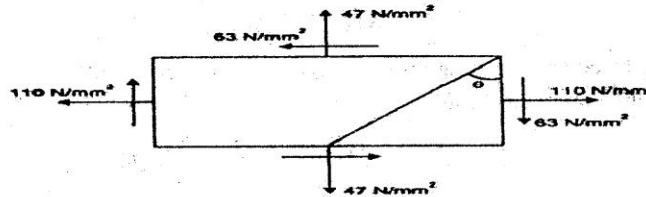   (b) Magnitude of the greatest shear stress.   (15)

Figure-1

(OR)

2. A bar shown in figure-2 is subjected to a tensile force of 200 kN et each end. Find :

    (a) the diameter of the middle portion, if the stress in the middle portion is limited to 150 N/mm^2 and

    (b) the length of the individual portions, if the total elongation of the bar is limited to 0·30 mm. Take E = 200 kN/mm^2.   (15)
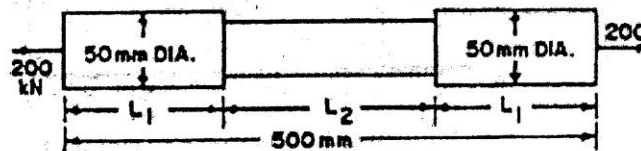

Figure-2

UNIT - II

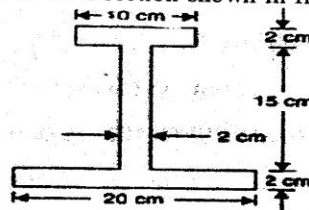3. (a) Find the centre of gravity of the I-section shown in figure-3. (8)

Figure-3

(b) Figure-4 shows a plane area. Determine the product moment of inertia. All dimensions are in mm. (7)
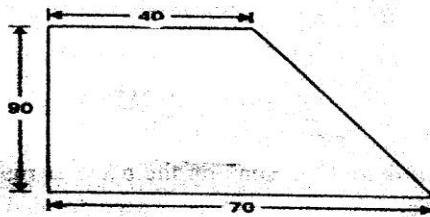
Figure-4

(OR)

4. Derive the Mass moment of inertia of a circular plate. (15)

UNIT - III

5. Draw the shear force and bending moment diagrams for the beam shown in figure-5. Mark the position of the maximum bending moment and determine its value. (15)
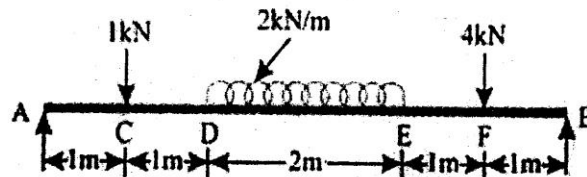
Figure-5

(OR)

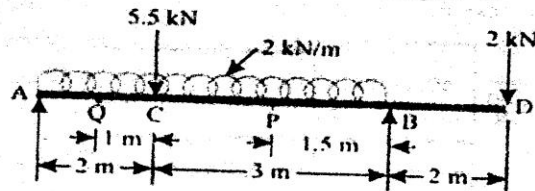6. Draw the SFD and BMD for the loaded beam shown in figure -6. (15

Figure-6

UNIT - IV

7. A steel girder of uniform section, shown in figure-7 is 14 metres long and simply supported at its ends. It carries concentrated loads of 90 kN and 60 kN at two points 3 metres and 4·5 metres from the two ends respectively. $E = 210 \times 10^{-6}$ kN/m^2, $I = 64 \times 10^{-4}$m^4. Using McCaulay's method, calculate :

   (a) The deflection of the girder at the points under the two loads.
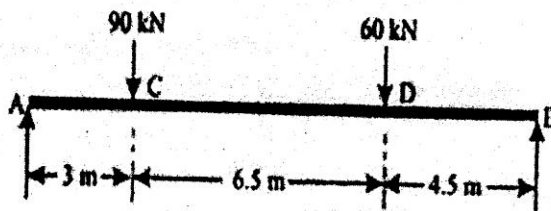
   (b) The maximum deflection. (15)

Figure - 7.

(OR)

8. (a) A cantilever 150 mm wide and 200 mm deep projects 2 m out of a wall, and is carrying a point load of 40 kN at the free end. Determine the slope and deflection of the cantilever at the free end. Take $E = 2·1 \times 10^5$ MN/m^2. (8)

   (b) A steel cantilever projecting 3 metres from a wall is loaded with a UDL of 20 kN/m run. Find the slope and deflection of the beam, if the moment of inertia of the beam section is 7550 cm^4. (7)

UNIT - V

9. A hollow shaft of external diameter 120 mm transmits 300 kW power at 200 rpm. Determine the maximum internal diameter if the maximum stress in the shaft is not to exceed 60 N/mm^2. (15)

(OR)

10. A closely coiled helical spring of round steel wire 10 mm in diameter having ten complete turns with a mean diameter of 12 cm is subjected to an axial load of 200 N. Determine :

   (a) The deflection of the spring.   (b) Maximum shear stress in the wire.

   (c) Stiffness of the spring.

   Take $C = 8 \times 10^4$ N/mm^2. (15)

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-303 / CSEC-303. CONSTRUCTION ENGINEERING

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

November]   [Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

UNIT – I

1. Write in detail about the different types of steel and their properties so as to use them as building materials. (15)

(OR)

2. (a) Distinguish between fat lime and hydraulic lime. (5)

   (b) Discuss the properties and uses of cement. (10)

UNIT - II

3. What is shallow foundation? Explain different types of shallow foundations. (15)

(OR)

4. Classify various types of masonry. Draw typical sketches to illustrate the same. (15)

UNIT - III

5. (a) Name the various materials used as roof covering and their relative merits. (8)

   (b) Mention the requirements of an ideal materials for damp proofing. (7)

(OR)

6. What are the types of stairs? Draw neat sketches. (15)

UNIT - IV

7. (a) Explain the different stages of plastering. (7)

   (b) What are the factors that affect the choice of flooring? (8)

(OR)

8. Define the term shoring. Write the purpose and explain any one method of it. (15)

UNIT - V

9. Discuss briefly the demolition techniques used in civil engineering. (15)

(OR)

10. Explain the causes of corrosion in concrete structures and its remedial measures. (15)

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC-304 / PCLEC-104. ENGINEERING GEOLOGY

(New Regulations)

November]   [Time : 3 Hours

Maximum : 75 Marks

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

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

UNIT – I

1. (a) Describe the tests you would perform in trying to identify a mineral in the field.

(10)

   (b) What are symmetry elements in crystals ?   (5)

(OR)

2. (a) Compare and contrast the minerals of Pyroxene group to that of Amphibole group. (10)

   (b) Distinguish   Muscovite and Talc.   (5)

UNIT - II

3. What are sedimentry rocks and how are they formed ? Enumerate the important sedimentary rocks and briefly discuss their identification. (15)

(OR)

4. Describe the mineralogical composition of :

   (a)   Limestone   (b)   Laterite.   (c)Shale.   (15)

UNIT - III

5. Write short notes on the following :

   (a)   Strike   (b)   Folds.   (c)   Faults.   (15)

(OR)

6. Enumerate the chief forms of igneous bodies. (15)

UNIT - IV

7. Briefly discuss the causes and effects of earth-quake. (15)

(OR)

8. (a) Explain the stability of slopes and soil erosion due to landslide. (8)

(b) List out the measures for prevention of landslide. (7)

UNIT - V

9. Write short notes on the underground circulations and artisan wells. (15)

(OR)

10. Gvie a brief account on geological considerations necessary for construction of a reservoir.

(15)

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B.E. DEGREE EXAMINATION, 2014

(CIVIL AND STRUCTURAL ENGINEERING)

(THIRD SEMESTER)

CLEC-305 / CSEC-306. CONCRETE TECHNOLOGY

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

November]   [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. List and explain the testing of cements.   (15)

(OR)

2. Explain in detail the composition and manufacture of portland cement.   (15)

UNIT - II

3. Write down the procedures of the aggregate crushing value and abrasion values.   (15)

(OR)

4. Briefly explain the specific surface and surface index of the aggregates.   (15)

UNIT - III

5. Explain in detail the process of manufacture of concrete.   (15)

(OR)

6. Write short notes on workability and compaction. Explain in detail the method that can be employed at both lab and site.   (15)

UNIT - IV

7. Explain any two non-destructive testing methods of concrete.   (15)

(OR)

8. Briefly explain the properties of fresh concrete.   (15)

UNIT - V

9. Describe the step-by-step procedure of ACI method of mix design.   (15)

(OR)

10. Design M-20 grade of concrete with OPC cement using IS code method of mix design. Assume other suitable data.   (15)

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(THIRD SEMESTER)

CLEC – 306 / PCLEC – 103. FLUID MECHANICS

November]   [Time: 3 Hours

Maximum: 75 Marks

Answer any ONE question from each unit

UNIT - I

1. The velocity profile of a fluid over a plate is parabolic with the vertex 20cm from   (15)
    the plate, where the velocity is 120cm/sec. Calculate the velocity gradients and
    shear stresses at a distance of 0, 10 and 20cm from the plate, if the viscosity of the
    fluid is 8.5 poise.

(OR)

2. A vertical gap 2.2cm wide of infinite extent contains a fluid of viscosity $2.0 \ Ns/m^2$ (15)
    and specific gravity 0.9. A metallic plate 1.2m x 1.2m x 0.2cm is to be lifted up
    with a constant velocity of 0.15m/sec, through the gap. If the plate is in the middle
    of the gap, find the force required. The weight of the plate is 40N.

UNIT – II

3. A pressure gauge consists of two cylindrical bulbs B and C each of 10sq.cm   (15)
    cross-sectional area, which are connected by a U-tube with vertical limbs each of
    0.25sq.cm cross-sectional area. A red liquid of specific gravity 0.9 is filled into
    C and clear water is filled into B, the surface of separation being in the limb
    attached to C. Find the displacement of the surface of separation when the pressure
    on the surface in C is greater than that in B by an amount equal to 1cm head of
    water.

(OR)

4. A trapezoidal channel 2m wide at the bottom and 1m deep has side slopes 1:1.   (15)
    Determine:

    i) The total pressure, and

    ii) The centre of pressure on the vertical gate closing the channel when it is full
        of water.

UNIT – III

5. The velocity components in a two dimensional flow field for an incompressible   (15)
    fluid are as follows:

$$u = \frac{y^3}{3} + 2x - x^2y \ \text{and} \ v = xy^2 - 2y - \frac{x^3}{3}$$

obtain an expression for the stream function ψ.

(OR)

6. A cylindrical vessel 12cm in diameter and 30cm deep is filled with water upto the (15) top. The vessel is open at the top. Find the quantity of liquid left in the vessel, when it is rotated above its vertical axis with a speed of (a) 3000 r.p.m., and (b) 600 r.p.m.

UNIT – IV

7. A 150mm diameter pipe reduces in diameter abruptly to 100mm diameter. If the (15) pipe carries water at 30 litres per second, calculate the pressure loss across the contraction. Take the co-efficient of contraction as 0.6.

(OR)

8. Explain power transmission through nozzle and power transmission through pipes. (15)

UNIT – V

9. Explain pitot tube with neat sketch. (15)

(15)

10. a) Explain Hydraulic jump or standing wave. (5)

b) A sluice gate discharges water into a horizontal rectangular channel with a (10) velocity of 6m/s and depth of flow is 0.4m. The width of the channel is 8m. Determine whether a hydraulic jump will occur, and if so, find its height and loss of energy per kg of water. Also determine the power lost in the hydraulic jump.

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