Register Number :

Name of the Candidate :

0 1 6 5

B.E. DEGREE EXAMINATION, 2014

(CIVIL, CIVIL AND STRUCTURAL, MECHNICAL, MANUFACTURING AND CHEMICAL ENGINEERING)

(FOURTH SEMESTER)

CLEC / CSEC / MEEC / MFEC / CHEC- 401.
ENGINEERING MATHEMATICS - III -
PROBABILITY AND STATISTICS

May] [Time : 3 Hours

Maximum : 75 Marks

(Maximum 60 Marks for those who joined before 2011-12)

Answer any ONE FULL question from each unit.
Use of Statistical Tables permitted.
ALL questions carry EQUAL marks.

UNIT – I

1. (a) For the triangular distribution $f_x(x) = \begin{cases} x, & 0 < x \le 1. \\ 2-x, & 1 \le x \le 1. \\ 0, & \text{otherwise.} \end{cases}$

Find the mean, variance and the moment generating function of the random variable x. (6)

(b) If x and y are independent random variables with probability density functions $f(x) = e^{-x}$, $x \ge 0$; $f(y) = e^{-y}$, $y \ge 0$ respectively, find the density functions of U and V where $U = \frac{x}{x+y}$ and $V = x + y$. (9)

(OR)

Turn Over

2. (a) If the probability mass function of a random variable x is given by

$P(x = r) = kr^3$, $r = 1, 2, 3, 4$. Find :

(i) The value of k. (ii) $P\left[\frac{1}{2} < x < \frac{5}{2} \mid x > 1\right]$

and moment generating function of x. (8)

(b) Find the marginal density functions and conditional density functions given that the joint density functions of x and y as

$$f_{xy}(x, y) = \begin{cases} \frac{x\left(1+y^2\right)}{4}, & 0 < x, 2, 0 < y < 1. \\ 0, & \text{otherwise.} \end{cases}$$

Are x and y independent? Find also, $P\left[\frac{1}{4} < x < \frac{1}{2} \mid y\ \frac{1}{3}\right]$. (7)

UNIT - II

3 (a) Show that the random process $x(t) = A \cos(\omega t + \theta)$ is wide sense stationary, where A and ω are constants and θ is uniformly distributed in $(0, 2\pi)$. (8)

(b) Consider the random process $x(t) = y \cos \omega t$, $t \geq 0$ where ω is a constant and y is a uniform random variable over (0, 1). Find the auto-correlation and auto-covariance of the process x(t). (7)

(OR)

4. (a) Prove that a first order stationary random proce has a constant mean. (5)

(b) If $x(t) = A \cos(\omega t + \theta)$ and $y(t) = B \sin(\omega t + \theta)$ where θ is uniformly distributed in $(0, 2\pi)$ and A and B are constants, prove that x(t) and y(t) are jointly wide sense stationary. (10)

UNIT - III

5. (a) An automatic machine fills tea in sealed tins with mean weight of tea 1 kg and standard deviation 1 gram. A random sample of 50 tins was examined and it was found that their mean weight was 999·50 gms. Is the machine working properly? (8)

(b) Samples of two types of electric bulbs were tested for length of life and the following data were obtained :

	Type-I	Type-II
No. of samples	8	7
Mean of the samples (in hours)	1134	1024
S.D.of samples (in hours)	35	40

Test at 1% level, whether the difference in the sample mean is significant. (7)

(OR)

6. (a) A company produces a product of four sizes - small, medium, large and extra-large. In the past, the demand for those sizes has been fairly constant at 20% for small, 45% for medium, 25% for large and 10% for extralarge. A random sample of 400 recent sales included 66 small, 172 medium, 109 large and 53 extra-large. Test whether there is any evidence of significant change in the demand for the different sizes. (9)

(b) A random sample of 500 oranges was taken from a large consignment and 65 of them were found to be bad. Show that the standard error of bad ones in a sample of this size is 0·015 and deduce that the percentage of bad oranges in the consignment almost certainly lies between 8·5 and 17·5. (6)

UNIT - IV

7. The following data represent the number of units of production per day turned out by different workers using four different types of machines:

Machine Type

Workers	A	B	C	D
1	44	38	47	36
2	46	40	52	43
3	34	36	44	32
4	43	38	46	33
5	38	42	49	39

Test whether the five men differ with respect to mean productivity and test whether the mean productivity is the same for the four different machines (use coding method, subtract 35 from the given numbers). (15)

(OR)

8. Analyse the variance in Latin square of yields in kilograms of paddy, where P, Q, R, S deonte the different methods of cultivation :

S122	P121	R123	Q122
Q124	R123	P122	S125
P120	Q119	S120	R121
R122	S123	Q121	P122

Examine whether the different methods of cultivation have given significantly different yields. (Use the method of coding by subtracting 120 from each of the values). (15)

UNIT - V

9. (a) The density function of the time to failure, in years of the gizmos manufactured by a certain company is given by $f(t) = \frac{200}{(t+10)^3}$, $t \geq 0$.

(i) Derive the reliability function and determine the reliability for the first year of operation.

(ii) Compute the MTTF (Mean Time To Failure).

(iii) What is the design life for a reliability 0·95? (8)

(b) The parallel, identical and independent components have constant failure rate. If it is desired that R_s (1000) = 0·95, find the component and system MTTF. (7)

(OR)

10. (a) A turbine blade has demonstrated a Weibull failure pattern with a decreasing failure rate characterised by a shape parameter 0·6 and a scale parameter of 800 hours.

(i) Compute the reliability for a 100 hour mission.

(ii) If there is a 200 hour burn-in of the blades, what is the reliability for a 100 hour mission? (8)

(b) A signal processor has a reliability of 0·90. Because of lower reliability a redundant signal processor is to be added. However, a signal splitter must be added before the processors and a comparator must be added after the signal processors. Each of the new components has a reliability of 0·95. Does adding a reduntant signal processor increase the system reliability? (7)

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Register Number:

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B.E. DEGREE EXAMINATION, 201~~3~~4

(PART-TIME)

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

PCLEC-402. MANAGEMENT SCIENCE

~~November~~ May

Maximum : 75 Marks [Time : 3 Hours

Answer any ONE full Question from each unit ***(5 × 15 = 75)***

Use of Normal distribution Probability chart is permitted

UNIT-I

1. a) Discuss the functions of Management with reference to construction industry. (8)

   b) Describe with illustrations the use of arrow diagram method of CPM. (7)

(OR)

2. Find the critical path by constructing a logic network for the following project: (Time durations are in days)

Activity	Optimistic Time	Most Likely Time	Pessimistic Time	Activity	Optimistic Time	Most likely Time	Pessimistic Time
1-2	2	4	7	6-8	7	10	13
2-3	1	1	2	7-9	4	6	10
2-4	2	4	5	8-10	4	7	9
3-5	1	2	3	9-10	5	7	10
4-6	1	2	3	10-11	1	1	2
5-7	3	5	6	11-12	2	2	4

Also calculate the probability of meeting the schedule for the last event, if the schedule time is 26 days and 34 days. (15)

UNIT-II

3. a) Explain the term marketing management and its functions. (7)

   b) Write short notes on: (4)

      i) Market segmentation ii) Market positioning (4)

(OR)

4. a) What is the rationale for the NPV rule? (3)

   b) Nataraja city Developer is evaluating a project, whose expected cash flows are as follows:

Year	Cash Flows (₹)
0	–10,00,000
1	1,00,000
2	2,00,000
3	3,00,000
4	4,00,000
5	2,00,000
6	3,00,000

What is the NPV of the project, if the discount rate is 12% for the year 1 and rises every year by 1%. (12)

UNIT-III

5. a) Bring out the importance and objects of materials management. (7)

   b) List and briefly discuss the major difficulties that may be encountered in making a valid 'buy or lease' cost analysis. (8)

(OR)

6. What is inventory control? What are the different methods of material classification based on inventory control? Explain them with examples. (15)

UNIT-IV

7. a) What is meant by 'Manpower Planning'? Describe the various factors affecting it. (8)

   b) Comment on the statement "safety promotes productivity". (7)

(OR)

8. a) Prepare a suitable plan for the selection and training of Graduate Engineers for a large construction concern. (9)

   b) What is 'human-relation' in construction? Explain how these can be improved? (6)

UNIT-V

9. Illustrate the functions, components, structure and framework of project information management system. (15)

(OR)

10. a) Discuss the problems in information system management in construction. (8)

    b) Bring out the benefits of computerized project information system. (7)

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-402. SURVEYING - I

April] [Time : 3 Hours

Maximum : 75 Marks

(Maximum 60 marks for those who joined before 2011-12)

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

UNIT – I

1. (a) Describe how would you range a line between two points which are not intervisible. (8)

   (b) Describe the procedure for setting out angle using chain. (7)

(OR)

2. Give a brief description of the optical square and the method of using it.

UNIT – II

3. (a) What is local attraction? How is it detected and how the observed bearings are connected for the same? (8)

   (b) Explain the various types of meridians used in compass survey. (7)

(OR)

4. Convert the following whole circle bearings to reduced bearings;

   $67^\circ 30'$, $278^\circ 45'$, $123^\circ 55'$, $270^\circ 00'$, $326^\circ 30'$ and $180^\circ 00'$. (15)

Turn Over

UNIT – III

5. Explain the three point problem and different methods of solving it. (15)

(OR)

6. Draw a neat sketch of contour lines around a natural water course showing the direction of flow.

UNIT – IV

7. Explain the differences between the heights of collimation method and the rise and fall method of reduction of levels.

(OR)

8. Show that errors due to curvature and refraction as well as any collimation errors are eliminated by reciprocal levelling.

UNIT – V

9. Discuss the various types of theodolites and the main parts of a transit theodolite.

(OR)

10. Briefly describe the coordinate systems used to locate celestial bodies with neat sketches.

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CSEC-403 / PCSEC-105. SURVEYING

May] [Time : 3 Hours

Maximum : 75 Marks

(Maximum 60 marks for those who joined before 2011-12)

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

UNIT – I

1. The following are the bearings taken on a closed compass traverse: (15)

Line	F.B	B.B
AB	80°10′	259°0′
BC	120°20′	310°50′
CD	170°50′	350°50′
DE	230°10′	49°30′
EA	310°20′	130°15′

Compute the interior angles and correct them for observational errors. Assuming the observed bearing of the line CD to be correct, adjust the bearing of the remaining sides.

(OR)

Turn Over

2. Explain the radiation method and intersection method of plane tabling. (15)

UNIT – II

3. The following readings were observed successively with a level, the instrument having been moved after the second, fifth and eighth readings:

   0·675, 1·230, 0·750, 2·565, 2·225, 1·935, 1·835, 3·220, 3·115, and 2·875

   The first staff reading was taken with the staff held on a bench mark of reduced level 100.00. Enter the readings in the level book form and find the reduced levels of all points by the method of Heights of Instrument; Check the correctness of reduction. (15)

(OR)

4. What are contours? List the characteristics of contours. (15)

UNIT – III

5. The lengths and bearings of a closed traverse PQRS are as follows:

Line	Length, *m*	RB	
		0	*1*
PQ	255	S 39	18 E
QR	656	N 35	00 E
RS	120	N 21	18 W
SP	-	-	-

   Calculate the length and Bearings of the line SP. (15)

(OR)

6. Explain in detail the temporary adjustment of a theodolite. (15)

UNIT – IV

7. A Tacheometer has an additive constant of 0·40 and a multiplying constant of 100. The instrument is set on station O and the following observations are taken and the staff was kept vertical. Calculate the horizontal distance between stations O and C and the reduced level of staff station C. (15)

Instrument Station	Staff Station	Vertical Angle	Hair Readings	Remarks
O	BM	-5° 30′00′	1·925, 2·200, 2·475	RL of BM = 250·000
	C	-11° 30′00′	1·700, 1·850, 2·000	

(OR)

8. Explain in detail about movable hair tacheometry. (15)

UNIT – V

9. Write briefly about signals and towers and what are the different types of signals available? (15)

(OR)

10. A and B are triangulation stations which are 50 km apart and have elevations 250 m and 290 m respectively. The intervening ground has a uniform elevation of 220 m. Find the minimum height of signal required at B so that the line of sight may not pass near the ground than 3 metres. (15)

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-403. MECHANICS OF SOLIDS - II

May]

[Time : 3 Hours

Maximum : 75 Marks

(Maximum 60 marks for those who joined before 2011-12)

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

UNIT – I

1. Determine the forces in the frame shown in Figure - 1.

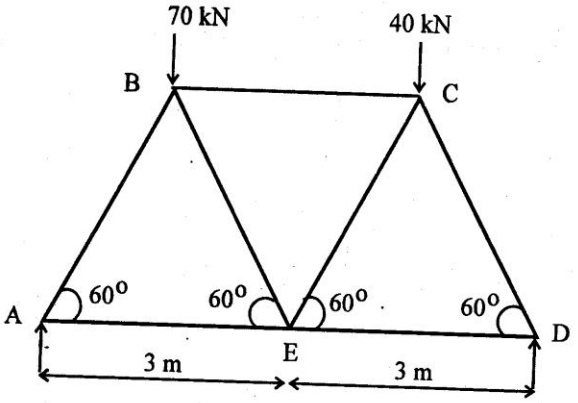

Figure - 1

(OR)

Turn Over

2. (a) State and prove Castigliano's theorem.

   (b) Determine the magnitudes and nature of forces in all members of the frame given in figure - 2 by unit load method.

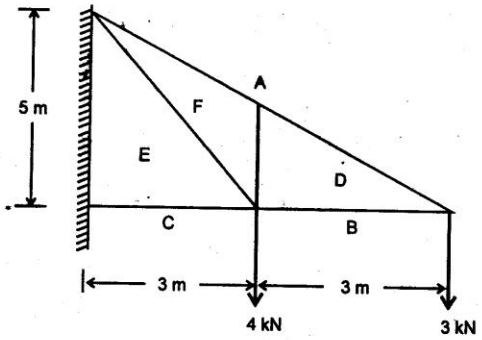

Figure - 2

UNIT – II

3. A beam of Tee section (flange 100 mm × 20 mm, web 150 mm × 10 mm) is 2·5 m long and is simply supported at the ends. It carries a load of 3·2 kN inclined at 20° to the vertical and passing through the centroid of the section. It E = 200 GPa, calculate the maximum tensile stress, maximum compressive stress and deflection due to the load.

(OR)

4. An 80 mm × 80 mm × 10 mm angle section is used a simply supported beam over a span of 2·4 m. It carries a load of 400 N along the vertical axis passing through the centroid of the section. Determine the resulting bending stress on the outer corners of the section along the middle section of the beam.

UNIT – III

5. (a) A rectangular strut is 200 mm wide and 150 mm thick. It carries a load of 60 kN at the eccentricity of 20 mm in a plane bisecting the thickness. Find the maximum and minimum intensities of stress.

(b) A mild steel shaft 120 mm diameter is subjected to maximum torque of 20 kN and a maximum bending moment of 12 kN m at a particular section. Find the factor of safety according to maximum shear stress theory, if the elastic limit in tension is 220 MPa.

(OR)

6. A 1·5 m long cast iron column has circular cross section of 50 mm diameter. One end of the column is fixed in direction and the other is free. Taking a factor of safety as 3, calculate the safe load using Rankine's formula and Euler's formula. Yield stress = 560 MPa, Rankine's constant a = 1/1600, E = 120 GPa.

UNIT – IV

7. A boiler shell is to be made of 15 mm thick plate having tensile stress of 120 MPa. If the efficiencies of the longitudinal and circumferential joints are 70% and 30% respectively, determine the maximum permissible diameter of the shell for an internal pressure of 2MPa and permissible intensity of internal pressure when the shell diameter is 1·5 m.

(OR)

8. A pipe of 200 mm internal diameter and 50 mm thickness carries a fluid at a pressure of 10 MPa. Calculate the maximum and minimum intensities of circumferential stresses across the section. Sketch the radial pressure distribution and circumferential stress distribution across the section.

UNIT – V

9. A cantilever AB of span 6 m is fixed at the end A propped at the end B. It carries a point load of 50 kN at the mid span. Determine the reaction at the prop and draw the bending moment diagram and shear force diagram.

(OR)

10. A fixed beam of 6 m span is loaded with point loads of 100 kN and 75 kN at distances of 2 m from each support. Determine the fixing moments at the ends, and reactions at the supports. Also, draw the BMD and SFD.

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-404 / PCLEC-204. STRUCTURAL ENGINEERING - I

May] [Time : 3 Hours

Maximum : 75 Marks

(Maximum 60 marks for those who joined before 2011-12)

IS-456, IS-800 and SP 16 codes are permitted. Assume suitable data wherever necessary.
Answer any ONE FULL question from each unit.
ALL questions carry EQUAL marks.

UNIT – I

1. Find the limiting moment carrying capacity of a RC rectangular section of size 200 mm × 425 mm effective and the area of steel required. The concrete used is of grade M20 and steel is of grade Fe415.

(OR)

2. Design a Tee beam section with flange width of 1250 mm, flange depth of 100 mm, web width of 250 mm and an effective depth of 500 mm subjected to a factored moment of 560 kNm. Adopt M20 concrete and Fe415 steel.

UNIT – II

3. A hall has clear dimensions 3 m × 9 m with wall thickness 230 mm. The live load on the slab is 3 kN/m^2 and finishing load is 1 kN/m^2 Using M20 concrete and Fe415 steel, design the slab.

(OR)

Turn Over

4. Design a slab for a room of clear internal dimensions 3 m × 5 m supported on walls of 300 mm thickness, with corners held down. Two adjacent edges of the slab are continuous and the other two discontinuous. Live load on the slab is 3 kN/m^2 Assume floor finish of 1 kN/m^2. Adopt M20 concrete and Fe415 steel.

UNIT – III

5. A column of size 300 mm × 400 mm has effective length of 3·6 m and is subjected to 1100 kN factored load and 150 kNm factored moment about the major axis. Design the column using M25 concrete and Fe415 steel. Assume the cover as 40 mm.

(OR)

6. A rectangular column 400 mm × 600 mm carries a live load of 2000 kN. The safe bearing capacity of the soil is 150 kN/m^2. Using M20 concrete and Fe415 steel, design a rectangular footing to support the column.

UNIT – IV

7. A bridge truss diagonal carries an axial pull of 300 kN. Two plates of 200 mm × 10 mm and 200 × 18 mm of the diagonal member are required to be joined together. Design a suitable splice. Adopt 20 mm diameter bolts.

(OR)

8. ISA 100 × 100 × 10 mm angle is to be welded in shop to 12 mm gusset plate. The angle carries an ultimate pull of 300 kN applied along its centroidal axis which is 28·4 mm from the back of the angle. Determine the length of side fillet weld required at the heel and toe of the angle.

UNIT – V

9. A tension member consists of 2 ISA 90 × 90 × 8 mm bolted to 10 mm gusset plate one on each side using single row of bolts and tack bolted. Determine the maximum load the member can carry. Take the gauge distance as 50 mm and area of angle as 1379 mm^2.

(OR)

10. Design a built up column carrying a factored axial load of 1800 kN. The length of column is 8 m. It is effectively held in position at both ends and restrained against rotation at one end.

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-405. ESTIMATION AND VALUATION

May] [Time : 3 Hours

Maximum : 75 Marks

(Maximum 60 marks for those who joined before 2011-12)

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

UNIT – I

1. Differentiate between

   (a) Detailed estimate and complete estimate.

   (b) Supplementary estimate and sub-estimate.

   (c) Repair estimate and maintenance estimate. (15)

(OR)

2. Explain the step-by-step procedure of preparing a detailed estimate for the construction of a building. (15)

UNIT – II

3. Explain how deductions are made for the openings in a masonry work. (15)

(OR)

4. Explain the two systems adopted in taking quantities. Discuss the merits and demerits of each system. (15)

Turn Over

UNIT – III

5. What is the use of standard specification? Specify any two standards which are usually referred to in the specifications. (15)

(OR)

6. Write a detailed procedure for the preparation of tender documents. (15)

UNIT – IV

7. Explain the essential requirement of contract conditions and estimate the methods to prepare contract documents. (15)

(OR)

8. Discuss the role of arbitration in construction industry and mention the methods to solve the problem. (15)

UNIT – V

9. Explain any three methods of valuation for land and buildings. (15)

(OR)

10. Explain in detail to work out standard rent for a government building. (15)

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B.E. DEGREE EXAMINATION, 2014

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-406. TRANSPORTATION ENGINEERING

April] [Time : 3 Hours

Maximum : 75 Marks

(Maximum 60 marks for those who joined before 2011-12)

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

UNIT – I

1. (a) State the factors controlling the alignment of highway. (10)

   (b) Explain the objective of highway planning. (5)

(OR)

2. A horizontal highway curve of radius 480 m on a mixed traffic road has a design speed of 90 kmph. Design the super-elevation. (15)

UNIT – II

3. Explain any four tests for evaluating the suitability of aggregates for highway construction. (15)

(OR)

4. Describe the construction procedure of cement concrete pavements. (15)

Turn Over

UNIT – III

5. Show various types of traffic signs with neat sketches. (15)

(OR)

6. Indicate the maximum dimensions and weights of vehicles specified by Indian Road Congress. (15)

UNIT – IV

7. Explain the nature of traffic problems in cities and state the measures to meet out the problem. (15)

(OR)

8. Describe the role of computers in traffic planning. (15)

UNIT – V

9. Explain various surveys conducted and data collected for an airport site selection. (15)

(OR)

10. Enumerate preliminary information required for a runway orientation. (15)