

Register Number :

Name of the Candidate :

0 2 5 6

B.E. DEGREE EXAMINATION, 2018

(COMMON TO CIVIL / CIVIL AND STRUCTURAL / MECHANICAL / MANUFACTURING /
CHEMICAL ENGINEERING)

(FOURTH SEMESTER)

CLEC-401 / CSEC-401 / CHEC-401. ENGINEERING MATHEMATICS - III / IV

MEEC-401 / MFEC- 401. PROBABILITY AND STATISTICS

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

May]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

Use of Statistical Table is permitted.

ALL questions carry EQUAL marks..

UNIT - I

1. (a) If $P(x=x) = \frac{x}{15}$, $x = 1, 2, 3, 4, 5$, find :

(i) $P(x=1 \text{ or } x=2)$ (ii) $P\left(\frac{1}{2} < x < \frac{5}{2} / x > 1\right)$ (8)

(b) Let x be a continuous random variable with probability density function

$$\begin{aligned} f(x) &= ax; & 0 \leq x \leq 1 \\ &= a; & 1 \leq x \leq 2 \\ &= -ax + 3a; & 2 \leq x \leq 3 \\ &= 0, & \text{otherwise} \end{aligned}$$

(i) Determine the constant a . (ii) Compute $P(X \leq 1.5)$.

(iii) Find the cumulative distribution function of x . (7)

(OR)

2. (a) A random variable has the probability function $f(x) = \frac{1}{2^x}$, $x = 1, 2, 3, \dots$

Find its (i) Moment generating function. (ii) Mean. (8)

(b) Let x and y have the joint probability mass function :

		X		
		0	1	2
Y	0	0.1	0.4	0.1
	1	0.2	0.2	0

Find :

- (i) $P(x + y > 1)$
(ii) The probability mass function $p(X = x)$ of the random variable X .
(iii) $P[y = 1 / x = 1]$ (iv) $E(XY)$. (7)

UNIT - II

3. Given a random variable y with characteristic function $\phi(\omega) = E(e^{i\omega y})$ and a random process defined by $x(t) = \cos(\lambda t + y)$. Show that $\{x(t), t \in T\}$ is Wide Sense Stationary(WSS) if $\phi(1) = \phi(2) = 0$. (15)

(OR)

4. (a) Find the mean and variance of a stationary random process whose auto correlation function is given by $R_{xx}(\tau) = 18 + \frac{2}{6 + \tau^2}$. (8)

(b) Write short notes on :

- (i) Special classes of random processes. (ii) Markov process. (4 + 3)

UNIT - III

5. (a) Explain :

- (i) Large and small samples. (ii) Tests of significance.
(iii) Type-I and Type-II errors. (8)

- (b) A sample of 400 students have a mean height 171.38 cms. Can it be reasonably regarded as a sample from a large population with mean height 171.17 cms and standard deviation 3.30 cms ? (7)

(OR)

6. (a) Eight individuals are chosen at random from a population and their heights are found to be in cms :

163, 163, 164, 165, 166, 169, 170, 171.

In the light of these data, discuss the suggestion that the mean height in the universe is 165 cm. (Given $t_{0.05}$ for 7 d.o.d is 2.365). (8)

- (b) The table below gives the number of aircraft accidents that occurred during the various days of the week. Test whether the accidents are uniformly distributed over the week.

Days	Mon	Tue	Wed	Thu	Fri	Sat
Number of accidents :	14	18	12	11	15	14

(Given $\chi_{0.05}^2$ for 5 d.o.f. is 11.07).

(7)

UNIT - IV

7. Perform two-way analysis of variance for the given data :

(15)

Plots of land	Treatment			
	A	B	C	D
I	38	40	41	39
II	45	42	49	36
III	40	38	42	42

(OR)

8. Analyse the variance in the Latin square of yields in(kgs) of paddy where P, Q, R, S denote the different methods of cultivation.

S12	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(15)

UNIT - V

9. Write short notes on :

- (a) Reliability and hazard rate. (b) Weibull failure model system reliability.
(c) Parallel system. (5 + 5 + 5)

(OR)

10. A certain type of engine seal is found to have its life exponentially distributed with a constant failure rate 0.03×10^{-4} failures per hour.

- (a) What is the probability that a given seal will last beyond ten thousand hours ?
(b) What is the MTTF seal ?
(c) What is the reliability of MTTF?

(15)

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B.E. DEGREE EXAMINATION, 2018

(COMMON TO CIVIL / CIVIL AND STRUCTURAL / MECHANICAL / MANUFACTURING /
ELECTRICAL AND ELECTRONICS / ELECTRONICS AND INSTRUMENTATION /
ELECTRONICS AND COMMUNICATION ENGINEERING)

(FOURTH SEMESTER)

O1BS-401 / O2BS-401 / O3BS-401 / O4BS-401 / O5BS-401 O6BS-401 / O10BS-041

PROBABILITY, RANDOM PROCESS AND NUMERICAL METHODS

(For the candidates joined from 2016-17 batch and after)

May]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

Statistical Tables are permitted

ALL questions carry EQUAL marks.

UNIT - I

1. (a) A random variable x has the following probability distribution :

$X = x$	-2	-1	0	1	2	3
$P(x)$	0.1	K	0.2	2K	0.3	3K

Find :

(i) K. (ii) $P(X < 2)$. (iii) $P(-2 < x < 2)$.

(iv) Cumulative distribution function. (8)

- (b) For the triangular distribution

$$f(x) = x, \quad 0 < x \leq 1$$
$$= 2 - x, \quad 1 < x \leq 2$$
$$= 0, \quad \text{otherwise}$$

find the mean, variance and MGF of X. (7)

(OR)

2. The joint probability mass function of (x, y) is given by $p(x, y) = K(2x + 3y)$, $x = 0, 1, 2$, $y = 1, 2, 3$. Find the marginal probability distribution of X. Also, find the probability distribution of $(X + Y)$ and $P(X + Y > 3)$ (15)

UNIT - II

3. Consider the random process $x(t) = \cos(\omega_0 t + \theta)$, where θ is uniformly distributed in the interval $-\pi$ to π . Check whether $x(t)$ is stationary or not? Find the first and second moments of the process. (15)

(OR)

4. (a) Define autocorrelation function and prove that for a WSS process $\{x(t)\}$,
 $R_{xx}(-\tau) = R_{xx}(\tau)$ (8)
- (b) Explain the concept of cross correlation function and state any three of its properties. (7)

UNIT - III

5. (a) In a sample of 900 articles produced in a factory 81 are found to be defective. The factory claims that atleast 95 % of the article supplied are non-defective. Test the claim is true or not. (8)
- (b) Two random variables gave the following results :

$$n_1 = 10, \sum (x_i - \bar{x})^2 = 90, \quad n_2 = 12, \sum (y_i - \bar{y})^2 = 108.$$

Test whether the samples came from the populations with same variance.

(Given $F_{0.05}$ for (9,11) d.o.f. is 2.90)

(7)

(OR)

6. (a) Before increase in exercise duty on tea, 400 people out of a sample of 500 persons were found to be tea drinkers. After an increase in duty, 400 people were tea drinkers out of a sample of 600 people. Check whether there is a significant decrease in the consumption of tea. (Test at 1 % and 5 % levels of significance.) (8)
- (b) Fit a binomial distribution for the following data and also, test the goodness of fit :

x:	0	1	2	3	4	5	6	Total
f	5	18	28	12	7	6	4	80

(Given $\chi_{0.05}^2$ for 2 d.o.f. is 5.99).

(7)

UNIT - IV

7. (a) From the following table of half yearly premium for policies maturing at different ages, estimate the premium for policies maturing at age 46 and 63.

Age: x:	45	50	55	60	65
Premium: y:	114.84	96.16	83.32	74.48	68.48

(8)

(b) Simpson's one-third rule. Verify your result by actual integration. (7)

(OR)

8. (a) Find the age corresponding to the annuity value 13.6 given the table :

Age(x) :	30	35	40	45	50
Annuity value(y)	15.9	14.9	14.1	13.3	12.5

(8)

(b) The population of a certain town is given below. Find the rate of growth of the population in 1931 and 1971 :

Year x:	1931	1941	1951	1961	1971
Population in thousands:	40.62	60.8	79.95	103.56	132.65

(7)

UNIT - V

9. Solve the following system of equations by using Gauss-Seidal method.

(Correct to 3 decimal places.)

(15)

$$8x - 3y + 2z = 20.$$

$$4x + 11y - z = 33.$$

$$6x + 3y + 12z = 35.$$

(OR)

10. Using Runge-Kutta method of fourth order, find y at $x = 0.1, 0.2, 0.3$, given $y' = xy + y^2$, $y(0) = 1$. Continue your work to get $y(0.4)$ by Milne's method. (15)

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0257

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B.E. DEGREE EXAMINATION, 2018

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-402/PCLEC-102. SURVEYING-I

April/May]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit

UNIT-I

1. Explain different corrections that can be applied to chain or tape.
2. A 30m steel tape was standardized on the flat and was found to be exactly 3mm under no pull at 66°F. It was used in catena to measure a base of 5 bays the temperature during the measurement was 92°F and the pull exerted during the measurement was 10kg. The area of the cross section of the tape was 0.08 sq.cm and the specific weights of steel is 7.86 g/cc. $A = 0.0000063$ per 1°F and $e = 2.109 \times 10^{-6}$ kg/sq.cm. Find the true length of the line.

UNIT-II

3. Explain different method of plotting a compass traverse?
4. The bearing of one side of a regular pentagon was found to be N300E. Find bearings of other lines. The following angles were observed in clockwise direction in an open traverse angle ABC = 124°15', angle BCD = 156°30' angle CDE = 102°0' angle DEF = 95°15' angle EFG = 215°30' magnetic bearing of line AB was 241°30'. what would be the bearing of line FG =?

UNIT-III

5. Explain radiation method of plane tabling.
6. Calculate the volume of earthwork in an embankment of 50 m length if the heights at 10 m intervals are 3 m, 2 m, 4 m, 3 m, 2 m and 3 m and is 10 m wide with side slopes 1.5: 1

UNIT-IV

7. A railway embankment is 10m wide with side slopes 2:1. Assuming the ground to be level in a direction traverse to the centreline, calculate the volume contained in a length of 150m, the central heights at 30m intervals beings 2.5, 3.00, 4.00, 3.75, and 2.75 respectively.
8. The following reciprocal level was taken during the testing of a dumpy level.

Level at	Staff reading on	
	A	B
A	1.370	2.105
B	1.140	1.765

Is the line of collimation adjustments? Find the true readings.

UNIT-V

9. The following readings were taken on a vertical staff with a tacheometer fitted with an analytic lens and having a constant of 100.

Staff station	Bearing	Staff readings			Vertical angles
A	47°10'	0.940	1.500	2.060	8°0'
B	227°10'	0.847	2.000	3.153	-5°0'

Calculate the relative level of the ground at A and B and the gradient between A and B.

10. Two observations were taken upon a vertical staff by means of a theodolite, the reduced level of its trunnion axis being 160.95. In the case of the first, the angle of elevation was 4°36' and the staff reading 0.75. In the case of second observation, the staff reading was 3.45 and the angle of elevation 5°48'. Calculate the reduced level of the staff station and its distance from the instrument.

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B.E. DEGREE EXAMINATION, 2018

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-403. MECHANICS OF SOLIDS - II

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

May]

[Time : 3 Hours

Maximum : 75 Marks

Answer ONE FULL question from each unit

ALL questions carry EQUAL marks.

UNIT - I

- 1 Find the horizontal and vertical displacements at the free end of the frame shown in figure-1 by virtual work method.

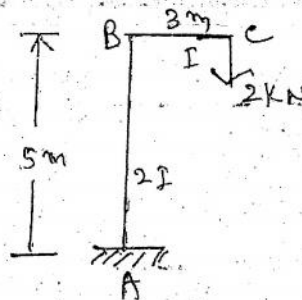


Figure - 1

2. State and prove Castiglione's first theorem.

UNIT - II

3. Derive the formula for the deflection of beams due to unsymmetrical bending of beams.
4. A curved bar is formed of a tube of 120 mm outside diameter and 7.5 mm thickness. The centre line of this is a circular arc of radius 225 mm. The bending moment of 3 kNm tending to increase curvature of the bar is applied. Calculate the maximum tensile and compressive stresses step up in the bar.

UNIT - III

5. A simply supported beam of length 4 m is subjected to a UDL of 35 kN/m run over the whole span and defects 17 mm at the centre. Determine the crippling load when this beam is used as a column with the following conditions :
 - (a) One end fixed and other end is hinged.
 - (b) Both the ends fixed.
6. Explain in detail about the wind pressure on chimneys and masonry dams.

UNIT - IV

7. A cylindrical water tank of height 25 m, inside diameter 2.0 m, having vertical axis is open at the top. The tank is made of steel having yield stress of 200 MN/mm^2 . Determine the thickness of steel used when the tank is full of water. Assume efficiency 70 % and factor of safety = 3.
8. Explain in detail about thick cylinders and thick spherical shells.

UNIT - V

9. A horizontal beam fixed at both ends and length 8 m carries a total UDL of 100 kN and a concentrated load of 40 kN at mid span. If the bending stress limited to 80 kN/mm^2 , and the deflection is not to exceed 3 mm, find the depth of the section required. Assume $E = 2 \times 10^5 \text{ N/mm}^2$.
10. A propped cantilever beam of span 6 m having the prop at the top end is subjected to two concentrated loads of 20 kN and 40 kN at one third point respectively from left fixed end support. Draw the shear force and bending moment diagram.

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0580A

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B.E. DEGREE EXAMINATION, 2018

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

PCLEC 404 ARCHITECTURE

(PART-TIME)

April/May]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE full question from each Unit

(5 × 15 = 75)

UNIT - I

1. Explain the different influences of Architecture.
2. Explain the development of modern architecture, concerned with function, strength and appearance.

UNIT - II

3. Define the term represented plan, with neat sketch. Explain the relationship between growth and volume.
4. Brief about principles of composition and explain *CONTRAST* and *BALANCE* with a neat sketch.

UNIT - III

5. Describe any four aesthetic qualities of Architecture with clean explanation and sketches.
6. Write short notes on: Egyptian and Indian Architectural elements of walls column roof and openings.

UNIT - IV

7. Draw a neat sketch showing the various features of a Hospital building with 15 beds and explain their functions.
8. Write short notes on:
 - a) Space organization and circulation.
 - b) Acoustics design of Auditoriums.

UNIT - V

9. Draw a neat sketch showing the various features of a play way education kinder garden school building and explain their functions.
10. Design a middle income group residence 1100SFT in ground floor and 700 SFT in first floor construction in a plot area of 3000 SFT (50'x60')

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B.E. DEGREE EXAMINATION, 2018

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

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

(Common with Part- Time)

May]

[Time : 3 Hours

Maximum : 75 Marks

Answer ONE FULL question from each unit.

IS-456, IS-800, SP-16 Codes and Steel Tables are permitted.

Assume suitable data wherever necessary and mention it clearly.

ALL questions carry EQUAL marks.

UNIT - I

1. Design a rectangular beam for 4 m effective span which is subjected to a dead load of 15 kN/m and a live load of 12 kN/m. Use M_{20} grade concrete and Fe_{415} grade steel. Adopt limit state method of design.
2. A T- beam floor consists of 150 mm thick RC slab monolithic with 300 mm wide beams. The beams are spaced at 3.5 m centre to centre and their effective span is 6 m. If the superimposed load on the slab is 5 kN/m^2 , design an intermediate T-beam. use M_{20} grade concrete and Fe_{415} grade steel.

UNIT - II

3. Design a simply supported roof slab for a room $8 \text{ m} \times 3.5 \text{ m}$ clear in size if the superimposed load is 5 kN/m^2 . Use M_{20} grade concrete and Fe_{415} grade steel. Carry out the check for deflection.
4. Design a dog-legged stair for a building in which the vertical distance between floors is 3.2 m. The stair case area measures $2.5 \text{ m} \times 5 \text{ m}$. The live load may be taken as 2.5 kN/m^2 . Use M_{20} grade concrete and Fe_{415} steel.

UNIT - III

5. Design a short axially loaded square column, $500 \text{ mm} \times 500 \text{ mm}$ for a service load of 2500 kN. Use M_{25} grade concrete and Fe_{415} steel.

6. Design a combined rectangular footing for two columns A and B, carrying loads of 500 kN and 800 kN respectively. Column A is 300 mm × 300 mm in size and column-B is 400 mm × 400 mm in size. The centre to centre spacing of the columns is 3.4 m. The safe bearing capacity of soil may be taken as 150 kN/m². Use M₂₀ concrete and Fe₄₁₅ steel

UNIT - IV

7. Design a double bolted lap joint for a plate of 20 mm thickness to carry its full load:
- If the bolts are bearing type bolts.
 - If the bolts are friction grip type bolts.
8. A tie member consisting of angle section 80 mm × 50 mm × 8 mm is welded to a 10 mm gusset plate. Design the weld to transmit a load equal to the full strength of the member.

UNIT - V

9. Determine the tensile strength of a channel ISLC 200 with gusset plate connected to the web by two rows of 18 mm bolts for a connection of length of 100 mm.
10. A beam is simply supported over a span of 6.5 m. It supports one iron beam at midspan exerting a force of 100 kN. Design the beam with ISWB section with flange plates. Assume the beam is not supported laterally.
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0 2 6 0

B.E. DEGREE EXAMINATION, 2018

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-405. ESTIMATION AND VALUATION

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

May]

[Time : 3 Hours

Maximum : 75 Marks

Answer ONE FULL question from each unit

ALL questions carry EQUAL marks.

UNIT - I

1. Explain in detail the Individual wall method and Centre line method of estimate.
2. Prepare a detailed estimate for supplying and laying 50 mm diameter galvanized iron plate for 300 mm length including jointing and trenching, upto a depth of 100 cm. Include all the materials and labour in the estimate.

UNIT - II

3. Work out the rate analysis for 12 cm RCC slab proportion 1:2:4 with steel reinforcement.
4. Work out the rate analysis for the following :
 - (a) Plain cement concrete proportion 1:6:12 below column footing in foundation 1 cubic meter. (8)
 - (b) Excavation for foundation in ordinary soft soil including throwing excavated earth within the lead of 30 mm and lift of 1.50 m for 10 cubic meter. (7)

UNIT - III

5. Write the specifications for plain cement concrete 1:5:10 in foundation.
6. What is the necessity of specifications ? Also, discuss the technical writing specifications.

UNIT - IV

7. Discuss on the following topics :
 - (a) Essentials of contract conditions and (b) Construction of contract conditions.
8. (a) What is arbitration ? Explain the legal requirements of arbitration. (10)
(b) Explain the formation of contracts. (5)

UNIT - V

9. Explain in detail the procedure to be followed in valuation for land and buildings.
10. Explain the valuation for tax purposes and also, for wealth tax.

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B.E. DEGREE EXAMINATION, 2018

(CIVIL ENGINEERING)

(FOURTH SEMESTER)

CLEC-405. TRANSPORTATION ENGINEERING-I

April/May]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit

UNIT-I

1. Explain in detail the general controls for horizon alignment. (15)
2. A two lane of 7m wide pavement on a national highway has a curve of 400m, determine the length of transition curve taking a design speed as 100KMPH, $e=0.07$ maximum, rate of attainment of super elevation=1 in 150, $C=80/(75+V)$. (15)

UNIT-II

3. a) Explain the general properties of bitumen. (9)
- b) Explain the penetration test for bitumen. (6)
4. Explain the construction procedure for cement concrete pavements, with neat sketches. (15)

UNIT-III

5. a) Explain the need of traffic forecasting and its uses in traffic design. (8)
- b) Discuss the parking facilities provided. (7)
6. a) With neat sketches, explain the various types of road markings commonly used. (9)
- b) Explain the common causes of accidents in a road traffic. (6)

UNIT-IV

7. a) Explain the evaluation procedure done for land consumption. (8)
- b) Write briefly about traffic planning. (7)
8. a) Discuss the simulation and computer applications in traffic engineering. (9)
- b) Explain how the traffic affects the aesthetics in brief. (6)

UNIT-V

9. Explain the various points to be considered for selection of a site for an international airport. (15)
 10. Explain the layout of an airport with neat sketch and the facilities provided. (15)
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0204

B.E. DEGREE EXAMINATION, 2018
(CIVIL ENGINEERING)
(FOURTH SEMESTER)
01PC-406: ENGINEERING GEOLOGY

April /May]

[Time : 3 Hours

Maximum : 75 Marks

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

UNIT - I

1. Describe the various working process of sea.
2. Write brief notes on:
 - (i) Origin of earth quake
 - (ii) Seismic zones in India.

UNIT - II

3. Write the various physical properties of any one mineral in quartz group and Feldspar group.
4. Discuss in detail about the various physical properties of minerals.

UNIT - III

5. Write the difference between igneous, sedimentary and metamorphic rocks.
6. Write the various engineering properties of following minerals
 - (i) Laterite
 - (ii) Slate
 - (iii) Gneiss.

UNIT - IV

7. Discuss in detail about the various faults and joints with neat sketch.
8. Explain in detail about the seismic method of Geo exploration.

UNIT - V

9. Briefly discuss about the design and construction of tunnels with necessary geological condition.
10. Write brief notes on:
 - (i) Coastal protection structure
 - (ii) Land slide production methods.

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