Register Number:

**3183**

Name of the Candidate:

# B.E. DEGREE EXAMINATION, 2013

**(COMMON TO ALL)**

**(THIRD SEMESTER)**

**301. ENGINEERING MATHEMATICS – II**

**(For the candidates joined 2010-11 and before)**

November]

[Time: 3 Hours

Maximum: 60 Marks

***Answer any FIVE questions choosing ONE from each Unit***
***All questions carry equal marks***

## UNIT – I

1. a) Form the partial differential equation by eliminating the arbitrary function f from $f(z^2\text{-}xy, \frac{x}{z}) = 0$. (6)

   b) Solve: (i) $p + q = pq$ (3)

   (ii) $yp = 2xy + \log_e q$. (3)

2. a) Solve: $\left(\frac{b-c}{a}\right)yzp + \left(\frac{c-a}{b}\right)xyp = \left(\frac{a-b}{c}\right)xy$. (6)

   b) Solve: $(D^2 - D'^2)\, y = e^{x-y} \sin(2x+3y)$. (6)

## UNIT – II

3. a) Find the Fourier series to represent the function f(x), given by

   $f(x) = x$, for $0 < x < \pi$

   $= 2\pi - x$, for $\pi < x \leq 2\pi$ (6)

   Also deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\ldots = \pi^2/8$.

   b) Find the complex form of Fourier series $f(x) = e^{-x}$ in $-1<x<1$. (6)

4. a) Find the half-range Cosine series for $f(x) = x(\pi - x)$, in $0<x<\pi$.

   Deduce that $\frac{1}{1^4} + \frac{1}{2^4} + \frac{1}{3^4} + \ldots\ldots = \frac{\pi^4}{96}$. (6)

   b) Expand $f(x) = x - x^2$ as a Fourier series in $-1<x<1$. (6)

## UNIT – III

5. A slightly stretched string with fixed ends $x = 0$ and $x = l$ is initially in a position given by $y(x, 0) = y_0 \sin^3\left(\frac{\pi x}{l}\right)$. If it is released (from rest) from this position, find the displacement y at any distance x from one end at any time t. (12)

6. Find the temperature distribution of a homogenius bar of length $\pi$ which is insulated laterally, if the ends are kept at zero temperature and if, initially, the temperature at the centre of the bar is K°c and falls uniformly to 0°c at the ends. (12)

## UNIT – IV

7. a) Express $f(x) = \begin{cases} 1 & \text{for } 0 \le x < \pi \\ 0 & \text{for } x > \pi \end{cases}$ as a Fourier integral and (6)

hence evaluate $\int_0^\infty \frac{1-\cos\pi\lambda}{\lambda}\sin\lambda\, d\lambda$.

b) Using Parseval's identity evaluate $\int_0^\infty \frac{x^2}{(a^2+x^2)^2}dx$. (6)

8. a) Find the Fourier sine transform of $\frac{e^{-ax}}{x}$, a>0. (6)

b) Find the Fourier transform of f(x) if $f(x) = \begin{cases} 1-|x|, & |x|<1 \\ 0, & |x|>1 \end{cases}$ (6)

and hence deduce that $\int_0^\infty \left(\frac{\sin t}{t}\right)^4 dt = \pi/3$.

## UNIT – V

9. a) State and prove linear property of z – transform. (4)

b) Solve $y_{n+2} + 4y_{n+1} - 5y_n = 24n - 8$ given that $y_0 = 3$, $y_1 = -5$. (8)

10. a) Find the z-transform of $\sin^3\left(\frac{n\pi}{4}\right)$ (3)

b) Find $z^{-1}\left[\bar{f}(z)\right]$ if $\bar{f}(z) = \frac{z^2+2z}{z^2+2z+4}$ by long division method. (3)

c) Find $z^{-1}\left[\frac{z^3}{(z-2)^2(z-3)}\right]$ by using convolution theorem. (6)

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# B.E. DEGREE EXAMINATION, 2013

**( CIVIL ENGINEERING )**

**( THIRD SEMESTER )**

## CLEC-303 / CSEC-303.
## CONSTRUCTION ENGINEERING

November ] [ Time : 3 Hours

Maximum : 75 Marks

*( Maximum 60 Marks for the students who joined before 2011-12)*

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

### UNIT – I

1. Explain the different types of building stones and point out their suitability in building and paving works. (15)

(OR)

**Turn Over**

2. Explain the types of cement available in market, stating its salient characteristics and usage. (15)

## UNIT - II

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

(OR)

4. With neat sketches, explain the types of shallow foundations. (15)

## UNIT - III

5. Based working operation, how doors are classified? Explain them with neat sketches. (15)

(OR)

6. With neat sketches, explain the types of pitched roof. (15)

## UNIT - IV

7. Explain with neat sketch, the framework for roof and walls. (15)

(OR)

8. Define underpinning and explain with neat sketch the methods of underpinning. (15)

## UNIT - V

9. Explain the demolition techniques used in Civil Engineering. (15)

(OR)

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

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# B.E. DEGREE EXAMINATION, 2013

**( CIVIL ENGINEERING )**

**( THIRD SEMESTER )**

## CLEC-304 / PCLEC-104.
## ENGINEERING GEOLOGY

November ] [ Time : 3 Hours

Maximum : 75 Marks

*( Maximum 60 Marks for the students who joined before 2011-12)*

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

### UNIT – I

1. Briefly explain the various optical properties of minerals. (15)

(OR)

2. Explain the properties of carbonate minerals. (15)

**Turn Over**

## UNIT - II

3. Explain the classification of igneous rock in detail. (15)

(OR)

4. Explain the importance of metamorphic rocks in detail. (15)

## UNIT - III

5. Explain the classification of faults in detail. (15)

(OR)

6. Explain the types of unconformity and explain how it is detected. (15)

## UNIT - IV

7. Explain in detail how the earthquake is recorded. (15)

(OR)

8. What are the causes of landslides and how it can be prevented? (15)

## UNIT - V

9. Explain the important geological considerations in the construction of dams and reservoirs. (15)

(OR)

10. Explain the hydrological cycle and types of acquifier briefly. (15)

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# B.E. DEGREE EXAMINATION, 2013

**( CIVIL ENGINEERING )**

**( THIRD SEMESTER )**

## CLEC-306 / PCLEC -103.
## FLUID MECHANICS

November ] [ Time : 3 Hours

Maximum : 75 Marks

*( Maximum 60 Marks for the students who joined before 2011-12)*

*Answer any ONE FULL question from each unit. EACH FULL question carries FIFTEEN marks.*

## UNIT – I

1. (a) Distinguish between compressible and incompressible fluids, Newtonian and non-Newtonian fluids. (5)

(b) Define Surface Tension. Derive an expression for the pressure difference caused by surface tension on a doubly curved surface. If the pressure difference between the inside and outside of a soap bubble of 2·5 mm dia is 17·6 $N/m^2$, determine the value of surface tension of the soap solution. (10)

(OR)

2. (a) Define "Compressibility" and "Bulk Modulus". Derive an expression for compressibility of fluids. (5)

(b) Define density, specific volume, weight density and specific gravity. Differentiate between adhesion and cohesion, ideal and real fluid. (15)

## UNIT - II

3. (a) Show that the centre of pressure lies below the centre of gravity for an inclined plane surface submerged in a static fluid. (5)

(b) The force due to water on a circular gate of 2 m dia provided on the vertical surface of a water tank is 12,376 N. Determine the level of water above the gate. Also, determine the depth of the centre of pressure from the centre of the gate. (10)

(OR)

4. (a) Explain the basic principle involved in measuring pressure and pressure difference using manometers. Indicate when the use of manometers is advantageous. (5)

(b) A soild cube of sides 0·5 m is made of a material of relative density 0·5. The cube floats in a liquid of relative density 0·95 with two of its faces horizontal. Examine its stability. (10)

## UNIT - III

5. (a) Prove that the stream function and potential function lead to orthogonality of stream lines and equipotential flow lines. (5)

(b) Given that $u = x^2 - y^2$ and $v = -2xy$, determine the stream function and potential function for the flow. (10)

(OR)

6. (a) A tall cylinder of 1 m dia is filled with a fluid to a depth of 0·5 m and rotated at a speed such that the height at the centre is zero. Determine the speed of rotation. (5)

(b) A liquid of specific gravity 1·3 flows in a pipe at a rate of 800 l/s, from point-1 to point-2 which is 1 m above point-1. The diameters at section-1 and 2 are 0·6 m and 0·3 m respectively. If the pressure at section-1 is 10 bar, determine the pressure at section-2. (10)

## UNIT - IV

7. Derive Hagen-Poiseuille equation for Laminar flow through circular pipes. (15)

(OR)

8. Two reserviors with a difference in elevation of 15 m are connected by the three pipes in series. The pipes are 300 m long of diameter 30 cm, 150 m long of 20 cm diameter, and 200 m long of 25 cm diameter respectively. The friction factors (f) for the three pipes are respectively 0·018, 0·020, 0·019, and which account for friction and all losses. Further, the contractions and expansions are sudden. Determine the flow rate. The co-efficient of contraction for sudden contraction from dia.30 to 20 cm = 0·68. (15)

## UNIT - V

9. A trapezoidal channel has a bed width of 3 m and side slopes 1 : 1. The bottom slope of the channel is 0·0036. If a discharge is 15 $m^3/s$ passes in the channel at a depth of 1·25 m, estimate the value of Chezy co-efficient C. (15)

(OR)

10. (a) Determine the flow rate of water in a rectangular channel of 3 m width when the depth of flow is 1m. The bed slope is 1 in 2,500. Friction factor $f$ = 0·038. (5)

(b) Determine the economical cross-section for an open channel of trapezoidal section with side slopes of 1 vertical to 2 horizontal, to carry 10 $m^3/s$, the bed slope being 1 / 2,000. Assume Manning co-efficient as 0·022. (10)

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# B.E. DEGREE EXAMINATION, 2013

**(CIVIL ENGINEERING)**

( THIRD SEMESTER )

## CLEC-504 / PCLEC-302. SOIL MECHANICS

November ] [ Time : 3 Hours

Maximum : 75 Marks

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

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

### UNIT – I

1. A cube dried clay having sides 50 mm long has a mass of 120 gm. The same cube of soil, when saturated at unchanged volume has mass of 145 gm. Draw the soil elements showing the volumes and weights of the constituents and determine the specific gravity of solids and void ratio. (15)

(OR)

**Turn Over**

2. (a) Define liquid limit and plastic limit.(5)

   (b) What are the factors affecting compaction? (10)

## UNIT - II

3. (a) What are the principles of a flow net? What are its uses? (5)

   (b) Explain the falling head method of determination of co-efficient of permeability. (10)

(OR)

4. Determine the average co-efficient of permeability in directions parallel and bedding planes of stratified deposit of soil consisting of three layers of total thickness 2·75 m, the top and bottom layers are each 0·75 m thick. The co-efficient of permeability of the top, bottom layers are

   $2 \times 10^{-4}$ cm/s,

   $3 \times 10^{3}$ cm/s,

   and $1 \times 10^{-2}$ cm/s. respectively. Assume the layer to be isotropic. (15)

## UNIT - III

5. Explain the Terzahi's one dimension consolidation theory. (15)

(OR)

6. (a) Differentiate between total settlement and differential settlement. (5)

   (b) A circular footing of 2·5 m radius transmits a uniform pressure of 95 $kN/m^2$. Calculate the vertical stress at point 2·0 m directly beneath its centre. (10)

## UNIT - IV

7. Explain direct shear test. What are the advantages of this test? What are its limitations? (15)

(OR)

8. A sample of dry cohesionless soil was tested in a triaxial machine. If the angle of shearing resistance was 38° and the confining pressure 120 $kN/m^2$, determine the deviator stress at which the sample failed. (15)

## UNIT - V

9. Derive the equal for stability of infinite slope of cohesive soil and cohesionless soil. (15)

(OR)

10. (a) Explain Swedish circle method. (5)

(b) Write briefly about friction circle method. (10)