

F 3072

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Civil Engineering

CE 010 504—GEOTECHNICAL ENGINEERING I (CE)

(Regular—New Scheme)

Time : Three Hours

Maximum : 100 Marks

*Graph/Semi log sheets to be supplied.
Missing data if any, may be suitably assumed.*

Part A

*Answer all questions.
Each question carries 3 marks.*

1. With the help of 3-phase diagram, explain :
 - (i) Partially saturated soil.
 - (ii) Saturated soil.
2. Define critical hydraulic gradient.
3. Explain thixotropic property of soil.
4. Define control of compaction.
5. Explain preconsolidation pressure.

(5 × 3 = 15 marks)

Part B

*Answer all questions.
Each question carries 5 marks.*

6. Explain Gydromatic analysis.
7. Define soil-water system.
8. Explain triaxial shear test.
9. Explain the significance of stability charts.
10. Explain height of solids method.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each question carries 12 marks.

11. (i) With the aid of sketches distinguish between Principal clay minerals Kaolinite and montmorillonite. (6 marks)
- (ii) What is consistency of soil? List and explain consistency limits. (6 marks)

Or

12. (i) Explain the terms Liquid limit, Plastic limit, Plasticity index of a soil and show their relationships. (6 marks)
- (ii) Following are the results of sieve analysis on a soil of weight 650 gm.

Sieve size (mm) :	4.75	2.00	1.00	0.60	0.425	
Weight of soil returned (gm) :	10	30	52	80	141	(6 marks)
Sieve size (mm) :	0.250	0.150	0.075	prn.		
Weight of soil returned (gm) :	96	105	85	51		

Draw the grain-size distribution curve and determine the effective size, uniformity coefficient, coefficient of curvature. (6 marks)

13. (i) Discuss on factors affecting permeability. (6 marks)
- (ii) The coefficient of permeability of a soil at a void ratio of 0.7 is 4×10^{-4} cm/sec. Estimate its value at a void ratio of 0.50. (6 marks)

Or

14. (i) In a falling head permeameter if the time intervals for drop in levels from h_1 to h_2 and h_2 to h_3 are equal. Prove that $h_2 = \sqrt{h_1 \times h_3}$. (6 marks)
- (ii) What are the limitations of the Darcy's law. (6 marks)
15. (i) Explain different drainage conditions of shear strength test. (6 marks)
- (ii) A sample of dry Cohesionless soil was tested to in a triaxial machine. If the angle of shearing resistance was 36° and the continuing pressure, 100 kN/m^2 , determine the deviator stress at which sample failed. (6 marks)

Or

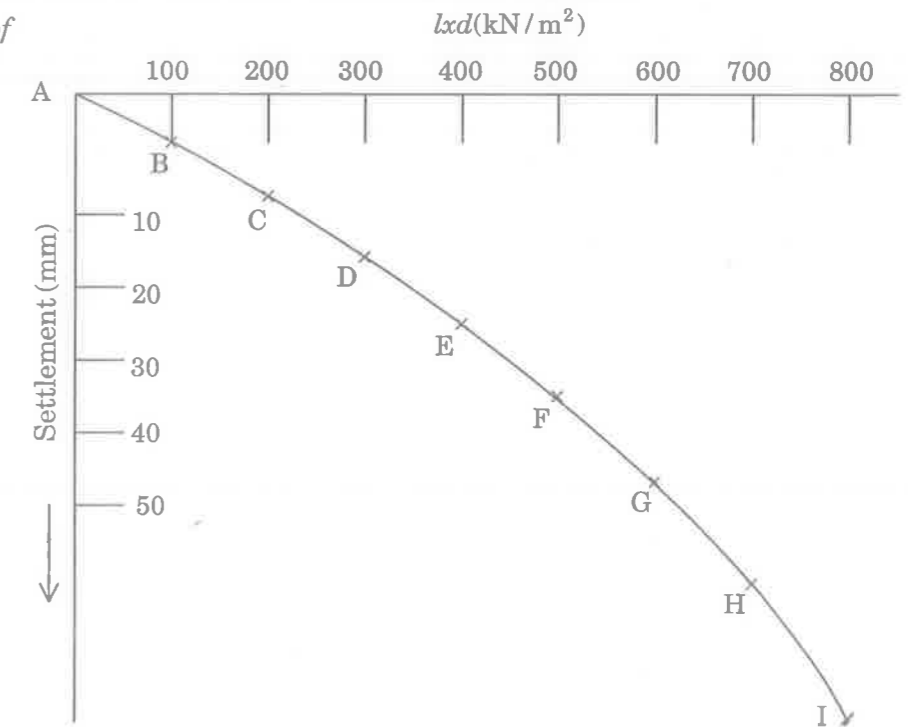
16. (i) A shear vane 7.5 cm dia and 11.25 cm long, was pressed into soft clay at the bottom of borehole. Find the shear strength of the clay if the torque required for failure was 45 N-m. (6 marks)
- (ii) Explain Mohr Columns strength theory. (6 marks)
17. (i) Discuss effect of compaction on soil properties. (6 marks)
- (ii) Explain Swedish circle method. (6 marks)
- Or
18. (i) Explain the objects of compaction. (6 marks)
- (ii) A cut of depth 10 m is made in a Cohesive soil deposit ($C = 30 \text{ kN/m}^2$, $\phi = 0$ and $\gamma = 19 \text{ kN/m}^3$). There is a hard stratum under the cohesive soil and is at a depth of 13 m below the original ground surface. If the required factor of safety is 1.50, determine the site slope. (6 marks)
19. (i) Distinguish among normally, under and over consolidated soils. (6 marks)
- (ii) A 3 m thick clay layer beneath a building is overlain by a permeable stratum and is underlain by an impervious rock. The coefficient of consolidation of the clay was found to be $0.025 \text{ cm}^2/\text{minute}$. The final expected settlement for the layer is 8 cm. How much time will it take for 80 % of the total settlement to take place? (6 marks)

Or

20. (i) Explain immediate settlement of cohesionless soils. (6 marks)
- (ii) Figure shows the load-settlement curve obtained from a plate load test conducted on a sandy soil. The size of plate used was $0.3 \text{ m} \times 0.3 \text{ m}$. Determine the size of a square column footing to carry a net load of 3500 kN with maximum settlement of 25 mm. (6 marks)

Co-ordinates of

A	(0, 0)
B	(100, 3)
C	(200, 5)
D	(300, 8)
E	(400, 14)
F	(500, 18)
G	(600, 26)
H	(700, 35)
I	(800, 50)



(6 marks)

[5 × 12 = 60 marks]

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Civil Engineering

CE 010 503—DESIGN OF CONCRETE STRUCTURES-I (CE)

(Regular—New Scheme)

Time : Three Hours

Maximum : 100 Marks

*Missing data if any, may be suitably assumed and stated.
IS 456 and SP 16 are allowed.*

Part A

*Answer all questions.
Each question carries 3 marks.*

1. Differentiate between under reinforced and over-reinforced sections in working stress method.
2. Explain, why IS 456 has assumed the compressive strength of concrete as 0.67 times the characteristic strength, for design purpose ?
3. What is the purpose of the corner reinforcement in a torsionally restrained two-way slab ?
4. What are the functions of lateral ties in a R.C. column ?
5. Briefly explain the behaviour of an isolated column footing in single shear and two way shear.

(5 × 3 = 15 marks)

Part B

*Answer all questions.
Each question carries 5 marks.*

6. A reinforced concrete beam of rectangular cross-section 300 mm wide and 550 mm effective depth. It is singly reinforced and contains 4, 25 mm dia. bars as longitudinal tension reinforcement. Assuming M_{20} grade concrete and Fe 415 steel find the moment of resistance of the section. (Use working stress method).
7. A rectangular R.C. beam section of width 300 mm and effective depth 600 mm is reinforced with 5 Nos. of 25 mm dia. bars. M_{20} grade concrete and HYSD are used. Design the shear reinforcement for a factored shear force of 240 kN.
8. Distinguish between the structural actions of one-way and two-way slabs.
9. Design the longitudinal reinforcements for a circular column of diameter 300 mm with helical reinforcement to support a factored load of 1500 kN. The unsupported length of the column is 3 m and is braced against sides way. M_{20} grade concrete and HYSD bars are used.
10. Explain the design procedure for a combined footing.

(5 × 5 = 25 marks)

Turn over

Part C

Answer all questions.

Each full question carries 12 marks.

11. A rectangular cross-section of a beam has width 300 mm and effective depth 655 mm. The beam carries a uniformly distributed service load (including self weight) 35 kN/m on a simply supported span of 7 m. Assuming M_{20} concrete and Fe 415 steel compute the stresses developed in concrete and steel at applied service loads.

Or

12. A doubly reinforced rectangular beam cross-section is having a width of 250 mm and overall depth 400 mm. The tension steel is 3, 28 mm dia. bars and compression steel is 3, 22 mm dia. bars. The clear cover on both sides is 30 mm. Concrete is of grade M_{20} and steel HYSD bars. Determine the ultimate moment of resistance of the beam.
13. Determine the cross-section, tension and shear reinforcements for a simply supported beam of span 5 m, to carry a superimposed load of 25 kN/m, using limit state method.

Or

14. A cantiliver beam has an inverted T section, with following details.
 $b_f = 1300$ mm, $b_w = 350$ mm, $D_f = 100$ mm, $D = 550$ mm. The cantiliver has a clear span of 4 m, and carries a total distributed load of 25 kN/m including self weight, and a concentrated load of 50 kN at the free end. Design and detail the tension reinforcement. The beam is supported from a 600 mm wide column.

15. Design a two-way slab for a residential building with the following details :

Size of the roof : 4.5 m by 6 m

Edge conditions : simply supported on all four sides on load bearing walls 300 mm thick without any provision for tension at corners.

Or

16. Design a one-way slab with a clear span of 5 m, simply supported on 230 mm thick masonry walls and subjected to a live load of 3 kN/m² and a surface finish load of 1 kN/m². Assume that the slab is subjected to :

(a) Mild exposure ; and

(b) Very severe exposure and compare the results.

17. Design the reinforcement in a column of size 400 mm × 600 mm subject to a factored axial force of 2500 kN. The column has an unsupported length of 3 m and is braced against sidesway in both directions. Use M_{20} concrete and Fe 415 steel.

Or

18. A column of effective length 6.7 m is rectangular in cross-section with dimensions 530 mm by 450 mm. The factored load on the column is 1600 kN. Factored moment about major axis is 45 kNm at top and 30 kNm at bottom. Factored moment about minor axis is 35 kNm at top and 20 kNm at bottom. Column is restrained against sidesway. Use M_{25} concrete and Fe 500 steel.

19. Design a Trapezoidal footing for the two columns A and B transmitting service loads of 800 kN and 1600 kN respectively. The Column A is 400 mm square and Column B is 600 mm square in size and they are spaced at 5 m c/c. The property line is 300 mm beyond the face of Column A. The safe bearing capacity of soil at site is 150 kN/m². Adopt M_{20} grade concrete and Fe 415 steel.

Or

20. Design a dog-legged staircase in a public building to be located in a stair case room 6 m long and 3 m wide. Height between floors is 3.60 m. Live load is 4 kN/m². The stairs are supported on beams over walls and sides of steps are built into the wall by 120 mm. Adopt M_{20} grade concrete and Fe 415 steel.

(5 × 12 = 60 marks)

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Civil Engineering

CE 010 502 – COMPUTER PROGRAMMING (CE)

(Regular - New Scheme)

Time : Three Hours

Maximum : 100 Marks

Write neat and efficient C programs wherever needed.

Part A

Answer all questions briefly.

Each question carries 3 marks.

1. Write any three types of constant and give one example each.
2. How a function declaration is different from a function definition?
3. What is the null character and what is it used for, in the context of strings?
4. What are the differences between malloc and calloc functions?
5. For what kinds of applications are unformatted data files well-suited? Give an example.

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. What are the purposes of comma operator? Within which control statement does the comma operator usually appear?
7. Write a C program, using while structure; to accept a string and an integer, and print the string as many times as the value of the integer.
8. Explain the following string functions with example. (i) Strcpy () (ii) Strcat ().
9. How can structure variable be declared? How do structure variable declarations differ from structure type declaration? Give an example.
10. Explain the following functions : (i) foef ; (ii) fread ; (iii) fseek ; (iv) fopen ; and (v) remove ().

(5 × 5 = 25 marks)

Turn over

Part C

Answer any **one** full question from each module.

Each full question carries 12 marks.

MODULE I

11. How the data types in C are classified? Explain with examples. Also explain how memory size is allotted to each type?

Or

12. Explain all the operator types used in C with suitable examples. Give their precedence and associativity.

MODULE II

13. Write a C program to read a given string and display it in reverse order. Also print the vowels if any, in it.

Or

14. Write a C program which rewrites "when everything fails try patience" using recursion so that it terminates after 21 calls. Your program should consist of a single main () function which calls itself recursively.

MODULE III

15. Write a C program which reads in the Register Number, Name and Marks scored by them in 8 subjects. Prepare ranklist and also obtain separate lists of students with first class, second class, failed.

Or

16. Read the Permanent Employee number, Name and Salary of the Employees in a firm into a C program and prepare the payroll in the descending order of the salaries.

MODULE IV

17. Write a C program that reads names and addresses of the people in a village and their property tax. Rearrange the names into alphabetical order using structure variation within the program.

Or

18. Write a C program to create a linear linked list of nodes containing roll number and interactively print out the list and total number of items in the list.

MODULE V

19. Write a complete C program to read a sentence from one file and write the reversed sentence to output file.

Or

20. (a) What is the purpose of a buffer area when working with a stream - oriented data file? How is a buffer area defined? (5 marks)

- (b) Write a C program to create a formatted file of real numbers. Then access each file record sequentially for calculating and displaying the sine of each record entry. (7 marks)

[5 × 12 = 60 marks]

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B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Common to all Branches Except CS and IT

EN 010 501 A—ENGINEERING MATHEMATICS—IV

(Regular—New Scheme)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.

Each question carries 3 marks.

1. For the conformal transformation $w = z^2$, find the coefficient of magnification at $z = (1 + i)$.
2. Expand $\cos z$ in a Taylor's series about $z = \pi/4$.
3. Using bisection method, find the negative root of $x^3 - x + 11 = 0$.

4. Solve $\frac{dy}{dx} = y - \frac{2x}{y}$, $y(0) = 1$ in the range $0 \leq x \leq 0.2$ using Euler's method.

5. Obtain the dual of :

$$\text{Minimize } Z = 8x_1 + 3x_2 + 15x_3$$

$$\text{subject to } 2x_1 + 4x_2 + 3x_3 \geq 28$$

$$3x_1 + 5x_2 + 6x_3 \geq 30$$

$$x_1, x_2, x_3 \geq 0.$$

(5 × 3 = 15 marks)

Part B

Answer all questions.

Each question carries 5 marks.

6. Prove that the function $\sinh z$ is analytic and find its derivative.
7. Find the sum of the residues of the function $f(z) = \frac{\sin z}{z \cos z}$ at its poles inside the circle $|z| = 2$.
8. Find the real root of $x^4 - x - 9 = 0$ using Newton-Raphson method, correct to three decimal places.
9. Using Runge-Kutta method, find y when $x = 1.2$ in steps of 0.1, if $\frac{dy}{dx} = x^2 + y^2$ and $y(1) = 1.5$.

Turn over

10. By graphical method or otherwise,

$$\text{Maximise } Z = x_1 + \frac{3}{5}x_2$$

$$\text{subject to } 5x_1 + 3x_2 \leq 15$$

$$3x_1 + 4x_2 \leq 12$$

$$x_1, x_2 \geq 0.$$

(5 × 5 = 25 marks)

Part C

Answer any one full question from each module.
Each full question carries 12 marks.

Module 1

11. (a) Show that the function $u = e^{-2xy} \sin(x^2 - y^2)$ is harmonic. Find the conjugate function v and express $u + iV$ as an analytic function of z .

(7 marks)

(b) Determine the analytic function whose real part is $e^{2x}(x \cos 2y - y \sin 2y)$.

(5 marks)

Or

12. (a) Under the transformation $w = \frac{z-i}{1-iz}$, find the map of the circle $|z| = 1$ in the w -plane.

(6 marks)

(b) Find the bilinear transformation which maps the points $z = 1, -i, -1$ into the points $w = i, 0, -i$.

(6 marks)

Module 2

13. (a) Evaluate by contour integration $\int_0^{2\pi} \frac{\cos 2\theta d\theta}{1-2p \cos \theta + p^2}, 0 < p < 1$.

(7 marks)

(b) Obtain the Laurent's series expansion of $f(z) = \frac{1}{(z-1)(z-2)}$ valid in the region $|z-1| < 1$.

(5 marks)

Or

14. (a) Evaluate $\int_0^{2+i} (\bar{z})^2 dz$ along

(i) the real axis to 2 and then vertically to $2+i$.

(ii) along the line $2y = x$.

(9 marks)

(b) Evaluate $\oint_C \frac{(2z-1)}{z(z+1)(z-3)} dz$, where C is the circle $|z| = 2$. (3 marks)

Module 3

15. Find the real root of:

(a) $xe^x = 3$ and

(b) $x^6 - x^4 - x^3 - 1 = 0$

by Regular-Falsi method, correct to three decimal places.

Or

16. Solve the following system of linear equations by Gauss-Seidel iterative method

$$9x + 2y + 4z = 20$$

$$x + 10y + 4z = 6$$

$$2x - 4y + 10z = -15.$$

Module 4

17. Using Runge-Kutta method of fourth order solve for $y(0.1)$, $y(0.2)$ and $y(0.3)$ if $y' = xy + y^2$, $y(0) = 1$.

Or

18. Solve by Milne's predictor-corrector method, $\frac{dy}{dx} = y - x^2$ with starting values : $y(0) = 1$, $y(0.2) = 1.12186$, $y(0.4) = 1.4682$, $y(0.6) = 1.7379$ and find the value of y when $x = 0.8$.

Module 5

19. Using Big M method, solve the LPP :

$$\text{Minimize } Z = 10x_1 + 3x_2$$

$$\text{subject to } x_1 + 2x_2 \geq 3$$

$$x_1 + 4x_2 \geq 4$$

$$x_1, x_2 \geq 0.$$

Or

20. Goods have to be transported from sources S_1, S_2 and S_3 to destinations D_1, D_2 and D_3 . The TP cost per unit capacities of the sources and requirements of the destinations are given in the following table. Determine a TP schedule so that the cost is minimized.

	D_1	D_2	D_3	Capacity
S_1	8	5	6	120
S_2	15	10	12	80
S_3	3	9	10	80
Requirement	150	80	50	

(5 × 12 = 60 marks)

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Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, DECEMBER 2012

Fifth Semester

Branch : Civil Engineering

CE 010 505—QUANTITY SURVEYING AND VALUATION (CE)

(Regular—New Scheme)

Time : Three Hours

Maximum : 100 Marks

Assume any missing data suitably.

1. (a) The Figure 1 shows the plan and sectional elevation of a residential building. Estimate the following items of work.

- (i) Earth work excavation for foundation.
- (ii) Plastering with CM 1 : 5 for inside of walls.
- (iii) R.C.C. for lintels (assuming lintel 6 and throughout)
- (v) Masonry in CM 1 : 6 for superstructure.

(4 × 10 = 40 marks)

- (b) (i) Masonry in CM 1 : 8 for footing and plinth.
- (ii) Outside painting with snowcem.
- (iii) Plastering with CM 1 : 4 for ceiling.
- (iv) Mosaic flooring excluding bath and W.C.

(4 × 10 = 40 marks)

II. (a) Write detailed specification for the following items of work :—

- (i) Painting on new wood work.
- (ii) Brick work in CM 1 : 6 in superstructure.
- (iii) R.C.C. 1 : 1½ : 3 for roof slab.
- (iv) Terrazzo flooring.

(4 × 5 = 20 marks)

Or

- (b) (i) Earth work excavation in ordinary soil foundation
- (ii) R.C.C for lintels.
- (iii) R.R. in CM 1 : 8 for foundation and basement.
- (iv) Mosaic flooring over 1 : 4 : 8 C.C. bed.

(4 × 5 = 20 marks)

Turn over

III. Work out the rates of the following items of work using local prevailing rates :—

- (a) (i) Distemping two coats over primary coat.
- (ii) Cement concrete 1 : 4 : 8 with grade stone ballast 40 mm in foundation.

Or

(2 × 10 = 20 marks)

- (b) (i) Mangalore tile roofing.
- (ii) First class brick work in CM 1 : 4 in superstructure, ground floor.

(2 × 10 = 20 marks)

IV. (a) A person has invested thirty lakh rupees in land and building expecting 7% return. The plot of land costs ten lakh rupees. Assuming the cost of annual repairs to be Rs. 40,000, management charges Rs. 50,000 per annum and other outgoings at 20% of gross rent, calculate the reasonable monthly rent if the annual sinking fund coefficient is 0.01.

(10 marks)

Or

(b) The cost of a new building is Rs. 32,50,000 work out the depreciated cost of the building after 12 years, by straight line method and constant percentage method if scrap value is Rs. 3,00,000 assuming the life of building is 60 years.

(10 marks)

V. (a) A leasehold property is to produce a net annual income of Rs. 1,50,000 for the next 30 years. The owner expects a return of 8% on his capital and also sets apart a sinking fund instalment to accumulate at 6% annually to replace the capital. Determine the value of the property.

(10 marks)

Or

(b) The owner of a building gets a net annual rent of Rs. 90,000. The future life of the building is estimated as 15 years. But it recommended repairs are carried out immediately at an estimated cost of Rs. 9,00,000, it is expected that the building will be serviceable for at least 30 years. Assuming the rate of interest 9%, determine whether it is economical to carry out the recommended repairs.

(10 marks)

