F 3159 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Civil Engineering

CE 010 306—ENGINEERING GEOLOGY (CE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain weathering of rocks.
2. Define epicentre and hypocentre.
3. Write short note on hardness of minerals.
4. Define a fault.
5. How tunneling through inclined strata is done ?

(5 × 3 = 15 marks)

Part B

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

6. Describe any five types of soils in India.
7. Discuss different types of earthquake resistant structures.
8. Distinguish between igneous and metamorphic rocks on the basis of origin and textures.
9. Define unconformities and explain their classification.
10. Explain the vertical distribution of ground water.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Describe the process of rock weathering, weathering products and their significance in Civil Engineering.

Or

Turn over

12. Describe the geological work of oceans and rivers. Discuss the different land form features produced by the geological work of oceans and rivers.

13. What is an earthquake ? How are they caused ? Give an account of the effect of earthquakes. Discuss the precautionary measures to be taken while building earthquake-resistant structures in earthquake prone areas.

Or

14. What are the different layers, their composition and important features of lithosphere and asthenosphere ? Explain.

15. Define a mineral. Describe the physical properties of minerals which will help them to identify in the field with suitable examples.

Or

16. (a) Explain the properties and uses of Kaolin. (5 marks)

(b) Describe the chemical composition, physical properties, mode of occurrence and uses of limestone. (7 marks)

17. Describe, with the help of a neat labelled sketches, the different parts of a fault. Explain the different types of faults with neat sketches.

Or

18. What are folds ? How they are formed ? Illustrate with neat sketches, the different types of folds. Add a note on the effects of folding in major Civil Engineering projects.

19. Enumerate the geological factors to be considered for selecting a dam site. Discuss the geological conditions suitable and unsuitable for reservoir sites.

Or

20. Explain the origin and occurrence of groundwater highlighting the different zones. Define the terms aquifer, aquiclude and aquifuge and explain with suitable examples.

(5 × 12 = 60 marks)

F 3127 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Common to all Branches

EN 010 302—ECONOMICS AND COMMUNICATION SKILLS (AI, AN, AU, CE, CH, CS, EC, EE, EI, IC, IT, ME, MT, PE, PO, ST)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the objectives of credit control ?
2. What is WTO ? What are its objectives ?
3. State the merits of indirect taxes.
4. List the different types of inflation.
5. Distinguish between free trade and protection.

(5 × 3 = 15 marks)

Part B

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

6. What is meant by credit creation ? What are the tendencies behind credit creation ?
7. Render your comments on the disinvestment of public sector undertakings.
8. What are the differences between a tax on income and tax on a commodity ? Why is a tax on income preferred in modern times ?
9. What are the major methods of measuring national income ? Explain.
10. State and explain the various items included in the balance of payments of a country.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. What are the main functions of banks ? Explain the role played by Commercial banks in the economic development of a country.

Or

12. "Stock market can be regarded as an economic barometer." Critically examine this statement in the context of Indian economy.

13. What are the measures taken by Indian Government in the case of Globalisation, Liberalisation and Privatisation. Explain their impacts on Indian economy.

Or

14. Discuss the past, present and future prospects of Information Technology industries on Indian economy.

15. (a) Distinguish between Forward and Backward shifting of tax. Explain the impact and incidence of tax. (7 marks)

(b) Explain progressive, proportional and regressive taxes with suitable examples. (5 marks)

Or

16. (a) Explain the important problems associated with deficit financing in Indian Economy. (7 marks)

(b) Define tax evasion. Explain the reasons for the same in India. (5 marks)

17. (a) Define National Income. What are its concepts ? Explain the difficulties arising in the calculation of National Income. (7 marks)

(b) Explain the significance of national income statistics. (5 marks)

Or

18. Describe the different types of inflation and their causes. What are the steps taken by the Government to control the same ? Explain.

19. What are the different types of disequilibrium in BOP ? Explain the causes for and the methods of correcting disequilibrium in BOP.

Or

20. What are the main causes of India's adverse balance of payments ? Explain the measures that have been adopted to correct the adverse balance of payments. Critically examine India's trade policy.

[5 × 12 = 60 marks]

F 3150 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Civil Engineering

CE 010 305—SURVEYING—I (CE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What is resection ?
2. Distinguish between a level line and a horizontal line.
3. Enlist the five fundamental lines in a theodolite.
4. Write Simpson's rule for computing area.
5. Determine the radius of a curve if it is designated as a 3° curve on a 30 m. arc.

(5 × 3 = 15 marks)

Part B

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

6. A plot is in the form of a regular polygon. If one of the lines of the hexagon is along the direction N 23°56'E find the bearings of other lines of the figure.
7. Explain different types of benchmarks.
8. What is a substense bar ? Explain its use.
9. Explain the method of calculating the area of a traverse from co-ordinates.
10. Derive the elements of a clothoid.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. The bearings observed at the stations of a closed traverse are given below. Check whether the bearings are correct. If not, correct the bearings by the method of included angles :

Turn over

AB :	122°15′	BA :	302°15′
BC :	66°00′	CB :	243°45′
CD :	308°15′	DC :	133°00′
DA :	198°00′	AD :	15°30′

Or

12. What is a three point problem ? Explain two methods for the solution of three point problem.

13. The page of an old field book is shown below. Some readings are not visible. Determine these readings from the available data :

Staff station	B.S.	I.S.	F.S.	Rise	Fall	R.L.	Remarks
P	0.635					215.915	
Q					0.680		
R			0.865				BM RL 215.685
S		0.785		0.43			
T	0.935				0.320		
U						215.715	

Or

14. The following readings refer to reciprocal levelling observations between two points A and B 1000 m. apart. The reduced level of A is 193.835 m. Find the reduced level of B and the collimation error, if any, of the instrument :

Instrument near		*Staff at A*	*Staff at B*
A	...	1.279	2.918
B	...	1.110	2.739

15. Explain how the closing error of a traverse is adjusted by graphical and analytical methods.

Or

16. A traverse was run with a prismatic compass and the lengths and bearings of the lines observed are given below. Check whether or not the traverse closes. If not, balance it using Bowditch's rule :

Line		AB	BC	CD	DA
Length (m)	...	105.80	142.50	188.80	188.90
Bearing	...	N40°45′W	N51°30′E	S48°15′E	S76°45′W

17. A chain line was divided into eight sections of 12 m. each and offsets were taken from the chainline to a fence. The lengths of offsets were (in metres) : 0, 5.2, 7.4, 8.6, 7.9, 8.5, 8.2, 9.1 and 7.6. Find the area between the chain line, the first and last offsets, and the boundary :

    (i) By Trapezoidal rule ; and

    (ii) By Simpson's rule.

Or

18. A level section has a formation width of 6 m. and side slope 2 : 1. The central height is 2.5 m. The cross-section is constant over a length of 40 m. Find the volume of the earthwork.

19. A curve of radius 400 m. and deflection angle 85° was to be set from offsets from the chord produced. The chainage of the first tangent point is 1002.35 m. Calculate the first five offsets from the charts produced to set out the curve.

Or

20. Two straight roads intersect at chainage 2050 m. The angle of deflection is 40° 30′. The combined curve consists of a circular arc of radius 600 m. and two spirals 120 m. long. Find the chainages at the beginning and end of the three curves.

(5 × 12 = 60 marks)

F 3140 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Civil Engineering

CE 010 304—MECHANICS OF SOLIDS—I (CE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define shear stress.
2. What are statically indeterminate beams ?
3. Write a note on : Section modulus.
4. Differentiate between close coiled and open coiled springs.
5. List two assumptions made in theory of thick cylinders.

(5 × 3 = 15 marks)

Part B

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

6. Define and explain Poisson's ratio and Bulk modulus.
7. Differentiate between a simple support and fixed support.
8. Show that the neutral axis must pass through the centroid of a section.
9. How will you determine principal stresses in shafts under pure torsion ?
10. Distinguish between short column and long column.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. A steel bar 12 m long and of diameter 5 cm is turned over 5 cm of its length to a diameter of 2.5 cm. If an axial tensile load of 80 kN is applied, find the extension of the bar. E = 200 GN/m^2.

Or

12. Principal stress in the material of a boiler are P, P/2 and O. If E and μ are respectively Young's modulus and Poisson's ratio, find the principal strains and volumentric strain. What is the modified Young's modulus if it is based on the principal stress P and extension in the direction of P ?

13. A beam 8 cm long is simply supported at ends and carries a concentrated load of 20kN at the mid-span along with a uniformly distributed load of 30 kN/m over the left 2 m of the beam. Draw the shear force and bending moment diagrams.

Or

14. A beam OAB with OA = 1m and AB = 4 m is simply supported at A and B and carries a uniformly varying load, varying from 0 to 6 kN/m over whole of the length with zero load at end 0. Draw bending moment and shear force diagrams. Give reactions and point of contra flexure , if any. What are the maximum values of bending moment and shear force ?

15. A timber beam of 16 cm in depth and 8 cm width is reinforced with steel plates 6 mm thick along its longer sides. If the bending stresses in the composite beam are to be limited to 120 MN/m^2 in steel and 10 MN/m^2 in timber, estimate the permissible bending moment in the beam. Assume $E_s = 20\ E_t$.

Or

16. Draw the shear stress distribution for a thin circular section with mean diameter of 20 cm and a thickness of 3 mm if shear force is 90 kN.

17. A close coiled helical spring is used to connect two shafts which transmit 2 kW of power at 2400 r.p.m. Calculate the maximum normal stress and wind up angle in spring. The diameter of wire = 10 mm, the mean diameter of spring = 50 mm and the modulus of elasticity, E = 210 GPa and the number of coils = 10.

Or

18. A solid shaft 15 cm diameter transmitting a torque is to be replaced by a hollow shaft having its weight 0.75 times the weight of solid shaft. If allowable shear stress in the hollow shaft is 1. 25 times that allowed for solid shaft, find the external and internal diameters of the hollow shaft assuming same material and same length for the two shafts. Find the ratio of torsional rigidities of the two shafts.

19. A timber strut 7.5 cm × 7.5 cm in section is 3 m high. The column is fixed at the bottom end and free at the other end. The column carries an eccentric load of 1 kN at the free end with an eccentricity of 15 cm from the centre of the cross-section along one of the principal axes of the section. Find the maximum stress in the strut at the bottom of column, if ϵ = 9 GPa.

Or

20. A steel cylinder 10 cm internal radius and 15 cm external radius is subjected to an internal pressure only. Due to corrosion, internal radius is machined to a radius of 10.2 cm. Find the percentage decrease in pressure required in the second case as compared to the first, in order to develop the same loop stress in the second case as in the first case.

(5 × 12 = 60 marks)

19. (a) Using $z(n)=\frac{z}{(z-1)^2}$, show that $z(n\cos n\theta)=\frac{\left(z^3+z\right)\cos\theta-2z^2}{\left(z^2-2z\cos\theta+1\right)^2}$.

(b) Using convolution theorem, find the inverse z-transform of $\frac{8z^2}{(2z-1)(4z-1)}$.

Or

20. (a) Solve the following using z-transforms :

$$y(n)-y(n-1)=u(n)+u(n-1).$$

(b) Given $z(u_n)=\frac{2z^2+3z+4}{(z-3)^3}, |z|>3$, show that $u_1=2, u_2=21, u_3=139$.

(5 × 12 = 60 marks)

F 3125

(Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Common to all branches except CS and IT

EN 010 301 A—ENGINEERING MATHEMATICS—II
(CE, ME, EE, AU, AN, EC, AI, EI, IC, PE, PO, MT, CH AND ST)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary/ST—Regular]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Find grad ϕ if $\phi=\log\left(x^2+y^2+z^2\right)$.

2. If $\vec{f}(t)=t\,\hat{i}+\left(t^2-2t\right)\hat{j}+\left(3t^2+4t^3\right)\hat{k}$, find $\int_0^1 \vec{f}(t)\,dt$.

3. Evaluate $\Delta^2 E^3 x^2$.

4. Solve $\left(E^2+6E+9\right) y_n=0$.

5. Find the z-transform of $3^n \sin\frac{n\pi}{2}$.

(5 × 3 = 15 marks)

Part B

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

6. The position vector of a particle at time t is $\vec{r}=\cos(t-1)\,\hat{i}+\sinh(t-1)\,\hat{j}+\alpha r^3\,\hat{k}$. Find the condition imposed on α by requiring that at time $t=1$, the acceleration is normal to the position vector.

7. Find the work done when a force $\vec{F} = \left(x^2 - y^2 + x\right)\hat{i} - (2xy + y)\,\hat{j}$ moves a particle in the xy plane from $(0, 0)$ to $(1, 1)$ along the parabola $y^2 = x$.

8. Prove that $\delta = \Delta\ (1 + \Delta)^{-1/2} = \nabla\,(1 - \nabla)^{-1/2}$.

9. Solve the difference equation $y_{n+2} + 3y_{n+1} + 2y_n = \sin\dfrac{n\pi}{2}$.

10. Find the inverse z-transform of $\dfrac{4 - 8z^{-1} + 6z^{-2}}{\left(1 + z^{-1}\right)\left(1 - 2z^{-1}\right)}$.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) The temperature at a point (x, y, z) in space is given $T(x, y, z) = x^2 + y^2 - z$. A mosquito located at $(1, 1, 2)$ desires to fly in such a direction that it will get warm as soon as possible. In what direction should it fly ?

(b) Find the constants a, b, c, so that $\vec{F} = (x + 2y + az)\,\hat{i} + (bx - 3y - z)\,\hat{j} + (4x + cy + 2z)\,\hat{k}$ is irrotational.

Or

12. (a) A particle moves along the curve $\vec{r}\left(r^3 - 4t\right)\hat{i} + \left(t^2 + 4t\right)\hat{j} + \left(8t^2 - 3t^3\right)\hat{k}$ where t is the time. Find the magnitudes of acceleration along the tangent and normal at time $t = 2$.

(b) Find the directional derivative of $\nabla.\ (\nabla\,\phi)$ at the point $(1, -2, 1)$ in the direction of the normal to the surface $xy^2z = 3x + z^2$, where $\phi = 2x^3\ y^2\ z^4$.

13. (a) Evaluate the line integrals $\int_C \left\{\left(x^2 + xy\right)dx + \left(x^2 + y^2\right)dy\right\}$ where C is the square formed by the lines $y = \pm 1$ and $x = \pm 1$.

(b) Find the circulation of $\vec{F}$ round the curve C, where $\vec{F} = e^x \sin(y)\,\hat{i} + e^x \cos(y)\,\hat{j}$ C is the rectangle whose vertices are (0, 0), (1, 0), $\left(1, \dfrac{\pi}{2}\right)$ and $\left(0, \pi/2\right)$.

Or

14. Apply stoke's theorem to evaluate $\int_C \left[(x + y)\,dx + (2x - z)\,dy + (y + z)\,dz\right]$ where C is the boundary of the triangle with vertices (2, 0, 0), (0, 3, 0) and (0, 0, 6).

15. Find the interpolation the missing values in the following data :

x	:	0	5	10	15	20	25
y	:	6	10	–	17	–	31

Or

16. Use Newton's divided difference formula to find $f(7)$, if $f(3) = 24$, $f(5) = 120$, $f(8) = 502$, $f(9) = 720$, $f(12) = 1616$.

Or

17. Apply Simpson's rule to find the are a abounded by the x-axis, the lines $x = 1$, $x = 4$ and the curve through the points.

x	:	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	:	2.0	2.4	2.7	2.8	3.0	2.6	2.1

Or

18. Find the complete solution for the following :

(a) $y_{n+2} - 4y_{n+1} + 4y_n = 3n + 2^n$.

(b) $u_{x+2} - 2m\,u_{x+1} + \left(m^2 + n^2\right)u_x = m^x$.

F 3131 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Third Semester

Branch : Civil Engineering

CE 010 303—FLUID MECHANICS (CE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Differentiate between specific volume and specific weight.
2. Define pathline and streakline.
3. What are "hydraulic coefficients" ?
4. Differentiate between Laminar flow and Turbulent flow.
5. Define Mach number.

(5 × 3 = 15 marks)

Part B

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

6. Define and briefly explain Newton's law of viscosity.
7. Discuss the significance of a "flow net".
8. The head of water over an orifice of diameter 50 mm is 12m. Find the actual discharge and actual velocity of jet at vena-cantracta. Take $C_d = 0.6$ and $C_v = 0.98$.
9. Explain the principle of working of a syphon.
10. Show that ratio of inertia force to viscous force gives the Reynold's number.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) A square plate of size 1m × 1m and weighing 350 N slides down an inclined plane with a uniform velocity of 1.5 m/s. The inclined plane is laid on a slope of 5 vertical to 12 horizontal and has an oil film of 1 mm thickness. Calculate the dynamic viscosity of oil.

Or

(b) Explain why the resultant pressure on a curved submerged surface is determined by first finding horizontal and vertical forces on the curved surface ? Why is the same method not adopted for a plane inclined surface submerged in a liquid ?

12. (a) A fluid flow field is given by $v = x^2yi + y^2zj - (2xyz + yz^2)k$. Prove that it is a case of possible steady in compressible fluid flow. Calculate the velocity and acceleration at the point (2, 1, 3).

Or

(b) Discuss the analytical and experimental methods of determination of metacentric height for a floating body.

13. (a) Water is flowing through a pipe having diameters 30 cm and 15 cm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 29. 43 N/cm^2 and the pressure at the upper end is 14. 175 N/cm^2. Determine the difference in datum head if the rate of flow through pipe is 50 lit/s.

Or

(b) Derive an expression for discharge through a fully submerged orifice. State all the assumptions made.

14. (a) A pipe line of 0.6 m diameter is 1.5 km long. To increase the discharge, another line of the same diameter is introduced parallel to the first in the second half of the length. Neglecting minor losses, find the increasing in discharge if $4f = 0.04$ The head at inlet is 300 mm.

Or

(b) Determine the maximum power transmitted by a jet of water discharging freely out of nozzle fitted to a pipe = 300 m long and 100 mm diameter with coefficient of friction as 0.01. The available head at the nozzle is 90 m.

15. (a) The pressure difference Δp in a pipe of a diameter D and length l due to turbulent flow depends on the velocity V, viscosity μ, density ρ and roughness k. Using Buckingham's π-theorem, obtain an expression for Δp.

Or

(b) In a geometrically similar model of spillway the discharge per metre length is $\frac{1}{6}$ m^3/s. If the scale of the model is $\frac{1}{36}$, find the discharge per metre run of the prototype.

(5 × 12 = 60 marks)