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14MAT11

**First Semester B.E. Degree Examination, Dec.2014/Jan.2015**  
**Engineering Mathematics – I**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, selecting ONE full question from each part.**

**PART – 1**

- 1 a. If  $Y = \cos(m \log x)$ , prove that  $x^2 y_{n+2} + (2n+1)xy_{n+1} + (m^2 + n^2)y_n = 0$ . (07 Marks)
- b. Find the angle of intersection between the curves  $r = a \log \theta$  and  $r = \frac{a}{\log \theta}$ . (06 Marks)
- c. Derive an expression to find radius of curvature in Cartesian form. (07 Marks)
- 2 a. If  $\sin^{-1} y = 2 \log(x+1)$  prove that  $(x^2 + 1)y_{n+2} + (2n+1)(x+1)y_{n+1} + (n^2 + 4)y_n = 0$ . (07 Marks)
- b. Find the pedal equation  $r^n = \operatorname{sech} n\theta$ . (06 Marks)
- c. Show that the radius of curvature of the curve  $x^3 + y^3 = 3xy$  at  $\left(\frac{3}{2}, \frac{3}{2}\right)$  is  $\frac{-3}{8\sqrt{2}}$ . (07 Marks)

**PART – 2**

- 3 a. Find the first four non zero terms in the expansion of  $f(x) = \frac{x}{e^{x-1}}$ . (07 Marks)
- b. If  $\cos u = \frac{x+y}{\sqrt{x} + \sqrt{y}}$  show that  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = -\frac{\cot u}{2}$ . (06 Marks)
- c. Find  $\frac{\partial(u, v, w)}{\partial(x, y, z)}$  where  $u = x^2 + y^2 + z^2$ ,  $v = xy + yz + zx$  and  $w = x + y + z$ . Hence interpret the result. (07 Marks)
- 4 a. If  $w = f(x, y)$ ,  $x = r \cos \theta$ ,  $y = r \sin \theta$  show that  $\left(\frac{\partial w}{\partial x}\right)^2 + \left(\frac{\partial w}{\partial y}\right)^2 - \left(\frac{\partial w}{\partial r}\right)^2 = \frac{1}{r^2} \left(\frac{\partial w}{\partial \theta}\right)^2$ . (07 Marks)
- b. Evaluate  $\lim_{x \rightarrow 0} \left(\frac{\sin x}{x}\right)^{\frac{1}{x}}$ . (06 Marks)
- c. Examine the function  $f(x, y) = 1 + \sin(x^2 + y^2)$  for extremum. (07 Marks)

**PART – 3**

- 5 a. A particle moves along the curve  $x = 2t^2$ ,  $y = t^2 - 4t$ ,  $z = 3t - 5$ . Find the components of velocity and acceleration at  $t = 1$  in the direction  $\hat{i} - 2\hat{j} + 2\hat{k}$ . (07 Marks)
- b. Using differentiation under integral sign, evaluate  $\int_0^{\infty} \frac{e^{-ax} \sin x}{x} dx$ . (07 Marks)
- c. Use general rules to trace the curve  $y^2(a-x) = x^3$ ,  $a > 0$  (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 6 a. If  $\vec{v} = \vec{w} \times \vec{r}$ , prove that  $\text{curl} \vec{v} = 2\vec{w}$  where  $\vec{w}$  is a constant vector. (07 Marks)
- b. Show that  $\text{div}(\text{curl} A) = 0$ . (06 Marks)
- c. If  $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$  and  $\left| \frac{\vec{r}}{r} \right| = r$ . Find  $\text{grad} \text{div} \left( \frac{\vec{r}}{r} \right)$ . (07 Marks)

**PART - 4**

- 7 a. Obtain the reduction formula for  $\int_0^{\frac{\pi}{2}} \cos^n x dx$ . (07 Marks)
- b. Solve  $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$ . (06 Marks)
- c. Show that the orthogonal trajectories of the family of cardioids  $r = a \cos^2 \left( \frac{\theta}{2} \right)$  is another family of cardioids  $r = b \sin^2 \left( \frac{\theta}{2} \right)$ . (07 Marks)
- 8 a. Evaluate  $\int_0^{\pi} x \sin^2 x \cos^4 x dx$ . (07 Marks)
- b. Solve  $\frac{dy}{dx} - y \tan x = y^2 \sec x$ . (06 Marks)
- c. If the temperature of the air is  $30^\circ\text{C}$  and the substance cools from  $100^\circ\text{C}$  to  $70^\circ\text{C}$  in 15 minutes, find when the temperature will be  $40^\circ\text{C}$ . (07 Marks)

**PART - 5**

- 9 a. Solve  $3x - y + 2z = 12$ ,  $x + 2y + 3z = 11$ ,  $2x - 2y - z = 2$  by Gauss elimination method. (06 Marks)
- b. Diagonalize the matrix,  $A = \begin{bmatrix} -1 & 1 & 2 \\ 0 & -2 & -1 \\ 0 & 0 & -3 \end{bmatrix}$ . (07 Marks)
- c. Determine the largest eigen value and the corresponding eigen vector of  $A = \begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$ . Starting with  $[0, 0, 1]^T$  as the initial eigenvector. Perform 5 iterations. (07 Marks)
- 10 a. Show that the transformation  $y_1 = x_1 + 2x_2 + 5x_3$ ,  $y_2 = 2x_1 + 4x_2 + 11x_3$ ,  $y_3 = -x_2 + 2x_3$  is regular and find the inverse transformation. (06 Marks)
- b. Solve by LU decomposition method  $2x + y + 4z = 12$ ,  $8x - 3y + 2z = 20$ ,  $4x + 11y - z = 33$ . (07 Marks)
- c. Reduce the quadratic form  $2x^2 + 2y^2 - 2xy - 2yz - 2zx$  into canonical form. Hence indicate its nature, rank, index and signature. (07 Marks)

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14CHE12

First Semester B.E. Degree Examination, Dec.2014/Jan.2015

**Engineering Chemistry**

Time: 3 hrs.

Max. Marks:100

**Note:** Answer any FIVE full questions, selecting atleast ONE question from each part.**PART – 1**

- 1
  - a. Derive Nernst's equation for single electrode potential. (05 Marks)
  - b. Describe the construction and working of calomel electrode. (05 Marks)
  - c. What are batteries? Explain the following battery characteristics :
    - i) Capacity
    - ii) Cycle life. (05 Marks)
  - d. Describe the construction and working of nickel metal hydride battery. (05 Marks)
- 2
  - a. What are Reference electrodes? Explain the determination of electrode potential of an unknown electrode using calomel electrode. (05 Marks)
  - b. What are concentration cells? The emf of the cell  $\text{Ag} | \text{AgNO}_3 (0.0083\text{M}) || \text{AgNO}_3 (x \text{M}) | \text{Ag}$  was found to be 0.074V at 298K. Calculate the value of x and write cell reaction. (05 Marks)
  - c. Define fuel cell. Explain the construction and working of methanol oxygen fuel cell. (05 Marks)
  - d. Explain the construction and working of lithium ion battery. (05 Marks)

**PART – 2**

- 3
  - a. Explain the electrochemical theory of corrosion by taking iron as an example. (05 Marks)
  - b. What is Corrosion? Explain the following factors affecting the rate of corrosion :
    - i) Nature of corrosion product
    - ii) Anodic and Cathodic areas . (05 Marks)
  - c. What is Electro less plating? Write the difference between electroplating and electroless plating. (05 Marks)
  - d. Discuss the electroplating of gold using Acidic Cyanide bath. (05 Marks)
- 4
  - a. What is Anodising? Explain the anodizing of aluminium. (05 Marks)
  - b. What is Cathodic protection? Explain sacrificial anodic method and impressed current method. (05 Marks)
  - c. Explain the effect of any two factors on the nature of electro deposit. (05 Marks)
  - d. Explain the process of electroless plating of copper with relevant reactions. (05 Marks)

**PART – 3**

- 5
  - a. What is Cracking? Explain the fluidized catalytic cracking process. (05 Marks)
  - b. On burning  $0.76 \times 10^{-3}$  kg of a solid fuel in a bomb calorimeter, the temperature of 2.5kg of water is increased from 25°C to 28°C. The water equivalent of calorimeter and latent heat of steam are 0.486kg and 2457 kJ/kg respectively. Calculate its GCV and NCV. Given Sp. Heat = 4.187 kJ / kg / °C and % of H<sub>2</sub> is 2.5. (05 Marks)
  - c. Discuss the production of solar grade silicon by Union – Carbide process. (05 Marks)
  - d. What are the advantages and disadvantages of PV – cells? (05 Marks)

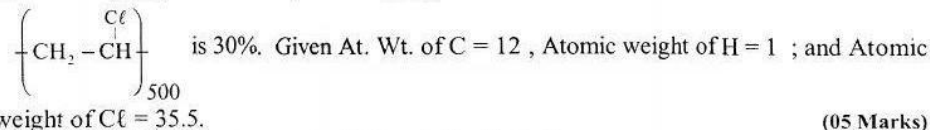
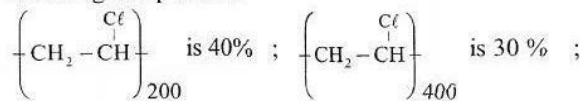
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- 6 a. Explain the determination of calorific value of a solid fuel using bomb calorimeter. (05 Marks)
- b. Define the following terms :  
 i) Chemical fuel      ii) Calorific value      iii) Biodiesel      iv) Octane number  
 v) Reforming of petrol. (05 Marks)
- c. Discuss the construction and working of a PV – cell. (05 Marks)
- d. What is doping? Discuss the purification of silicon of zone - refining. (05 Marks)

**PART - 4**

- 7 a. Explain the free radical mechanism of addition polymerization by taking Vinyl chloride as a monomer. (05 Marks)
- b. What are adhesives? Explain the synthesis and applications of epoxy resin. (05 Marks)
- c. Write the synthesis and applications of the following polymers :  
 i) Polymethyl methacrylate      ii) Teflon. (05 Marks)
- d. What are polymer composites? Explain the preparation and uses of Kevlar fiber. (05 Marks)

- 8 a. Calculate the number average and weight average molecular mass of a polymer with the following composition :



- b. What is glass transition temperature? How is it affected by  
 i) Intermolecular forces      ii) Flexibility. (05 Marks)
- c. What is Conducting polymer? Explain the mechanism of conduction in polyaniline (05 Marks)
- d. Give the synthesis and uses of the following polymers :  
 i) Silicon rubber      ii) polycarbonates. (05 Marks)

**PART - 5**

- 9 a. What is boiler feed water? Explain the scale and sludge formation in boiler. Mention their ill effects. (05 Marks)
- b. What is desalination? Explain the desalination of saline water by electro dialysis. (05 Marks)
- c. What are nano materials? Explain the synthesis of nano material by Sol – gel method. (05 Marks)
- d. Write a note on carbon nano tubes. (05 Marks)
- 10 a. Define COD. Calculate the COD of the effluent sample when  $25\text{cm}^3$  of the effluent sample requires  $8.5\text{cm}^3$  of  $0.001\text{N K}_2\text{Cr}_2\text{O}_7$  solution for complete oxidation. (05 Marks)
- b. Discuss in detail the softening of water by ion – exchange process. (05 Marks)
- c. Explain the synthesis of nanomaterials by hydro thermal process. (05 Marks)
- d. What are Fullerenes? Explain the synthesis and uses of fullerenes. (05 Marks)

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14PHY12

**First Semester B.E. Degree Examination, Dec.2014/Jan.2015**  
**Engineering Physics**

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer any FIVE full questions, selecting atleast ONE full question from each Part.**  
**2. Physical constants: Velocity of light,  $C = 3 \times 10^8$  m/s.**  
**Planck's constant,  $h = 6.625 \times 10^{-34}$  J.S; Mass of electrons,  $m = 9.1 \times 10^{-31}$  kg; Boltzmann's constant,  $K = 1.38 \times 10^{-23}$  J/K.**  
**Avagadro number,  $N_A = 6.02 \times 10^{26}$  /K mole.**

**PART - 1**

1.
  - a. Explain blackbody radiation spectrum on the basis of Planck's radiation law. (06 Marks)
  - b. Obtain the solution of Schrodinger's time-independent wave equation when applied to a potential box of infinite height. (07 Marks)
  - c. What is Compton effect? Explain its physical significance. (03 Marks)
  - d. The position and momentum of an electron with energy 0.5 keV are determined. What is the minimum percentage uncertainty in its momentum if the uncertainty in the measurement of its position is  $0.5\text{\AA}$ . (04 Marks)
2.
  - a. What is phase velocity and group velocity in wave motion? Obtain a relation between them. (06 Marks)
  - b. Set up time independent Schrodinger wave equation for free particle in one dimension. (06 Marks)
  - c. Using Heisenberg's uncertainty principle, prove that electrons cannot exist in a nucleus. (04 Marks)
  - d. Calculate the wavelength associated with an electron having K.E. 100 eV. (04 Marks)

**PART - 2**

3.
  - a. What are the assumptions made in quantum free electron theory? Explain the success of this theory. (06 Marks)
  - b. What is Fermi level? Describe the variation of Fermi factor with temperatures. (04 Marks)
  - c. Explain Meissner effect and the different types of superconductors. (06 Marks)
  - d. The electron concentration in an n-type semiconductor is  $5 \times 10^{17}/\text{m}^3$ . Neglecting the hole current, calculate the conductivity of the material if the drift velocity of the electrons is 350 m/s in an electric field of 1000 V/m. (04 Marks)
4.
  - a. What is superconductivity? Explain superconductivity on the basis of BCS theory. (06 Marks)
  - b. Explain the law of mass action and derive the conductivity expression of a semi conductor. (06 Marks)
  - c. What is Fermi-Dirac statistics? Explain. (04 Marks)
  - d. The Fermi level in silver is 5.5 eV. Find the velocity of conduction electrons in silver. (04 Marks)

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## PART – 3

- 5 a. Mention the conditions for laser action. Explain the working of a semi conductor laser. (08 Marks)
- b. Discuss the various loss factors in optical fibre communication. (04 Marks)
- c. Derive the condition for propagation of light through an optical fibre. (04 Marks)
- d. The average power of a laser beam of wavelength  $6328\text{\AA}$  is  $5\text{mW}$ . Find the number of photons emitted per second by the laser source. (04 Marks)
- 6 a. What is Laser? Give the construction and working of carbon dioxide laser device. (10 Marks)
- b. What are the different types of optical fibers? Explain. (06 Marks)
- c. The attenuation in an optical fibre is  $3.6\text{ dB/km}$ . What fraction of its initial intensity remains after  $3\text{km}$ ? (04 Marks)

## PART – 4

- 7 a. What are Miller indices? Explain how axial intercepts in a crystal plane are converted into miller indices. (04 Marks)
- b. Give the working principle of liquid crystal display. (06 Marks)
- c. Find the atomic packing factor for SC, FCC and BCC structures. (06 Marks)
- d. Determine the interplanar spacing for (110) planes for copper which has FCC structure and atomic radius  $0.1278\text{nm}$ . (04 Marks)
- 8 a. Obtain an expression for the interplanar distance in a cubic crystal in terms of Miller indices. (05 Marks)
- b. Sketch and explain the structure of diamond crystal. (05 Marks)
- c. Explain how Bragg's law is verified using Bragg's X-ray spectrometer. (06 Marks)
- d. Draw the crystal planes  $(2\ \bar{1}\ 0)$  and  $(1\ 0\ \bar{1})$  in a cubic crystal. (04 Marks)

## PART – 5

- 9 a. What are Shock waves? Explain the experimental method of producing shock waves and measuring its Mach number using Reddy's shock tube. (08 Marks)
- b. Give the graphical representation of density of states with equation for 0D, 1D, 2D and 3D structures. (08 Marks)
- c. What are the properties of carbon nanotubes? (04 Marks)
- 10 a. What are the ultrasonic and supersonic waves? Describe in brief how the normal shock relationships are arrived. (08 Marks)
- b. Explain the working of SEM and its applications. (08 Marks)
- c. Describe the arc discharge method of producing carbon nanotubes. (04 Marks)

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14PCD13

**First Semester B.E. Degree Examination, Dec.2014/Jan.2015**  
**Programming in 'C' and Data Structures**

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, selecting  
atleast ONE questions from each part.*

**PART – 1**

- 1 a. What is pseudocode? Explain with an example. (04 Marks)
- b. Explain the structure of C program with an example. (06 Marks)
- c. Explain any five operators used in C language. (10 Marks)
- 2 a. What is type conversion? Explain two types of type conversions with examples. (06 Marks)
- b. Write a program in C to find the area and perimeter of a rectangle. (06 Marks)
- c. Define : i) Variable ii) Constant iii) Associativity iv) Precedence. (08 Marks)

**PART – 2**

- 3 a. What is two way selection statement? Explain if, if-else, nested if-else and cascaded if-else with examples and syntax. (10 Marks)
- b. Write a program that takes three coefficients (a, b, and c) of a quadratic equation :  $(ax^2 + bx + c)$  as input and compute all possible roots and print them with appropriate messages. (10 Marks)
- 4 a. Explain switch statement with an example. (06 Marks)
- b. What is a loop? Explain the different loops in C language. (10 Marks)
- c. Show how break and continue statements are used in a C program, with example. (04 Marks)

**PART – 3**

- 5 a. What is an array? How is a single dimension array is declared and initialized? (06 Marks)
- b. Write a C program to evaluate the polynomial  $f(x) = a_4x^4 + a_3x^3 + a_2x^2 + a_1x + a_0$ , for a given value of x and its coefficients using Horner's method. (06 Marks)
- c. Explain string manipulation functions, with examples. (08 Marks)
- 6 a. What is a function? Write a function to find the sum of two numbers. (06 Marks)
- b. Explain the two categories of argument passing techniques, with examples. (06 Marks)
- c. Write a C function isprime(num) that accepts an integer argument and returns 1 if the argument is a prime or a 0 otherwise. Write a program that invokes this function to generate prime numbers between the given ranges. (08 Marks)

**PART – 4**

- 7 a. What is structure data type? Explain. (04 Marks)
- b. Show how a structure variable is passed as a parameter to a function, with an example (06 Marks)
- c. Explain the concept of array of structures, with a suitable C program. (10 Marks)
- 8 a. What is a file? Explain fopen( ), fclose( ) functions. (04 Marks)
- b. Explain how the input is accepted from a file and displayed. (06 Marks)
- c. Given two text documentary files "Ramayana.in" and "Mahabharatha.in". Write a C program to create a new file "Karnataka.in" that appends the content of the file "Ramayana.in" to the file "Mahabharatha.in". Also calculate the number of words and new lines in the output file. (10 Marks)

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PART – 5

- 9 a. What is a pointer? Write a program in C to find the sum and mean of all elements in an array. Use pointer technology. (08 Marks)
- b. What is preprocessor directive? Explain #define and #include preprocessor directives. (08 Marks)
- c. Explain : (04 Marks)
- i) Dynamic memory allocation
  - ii) Malloc function.
- 10 a. What are primitive and non primitive datatypes? Explain. (06 Marks)
- b. Define queue. Explain it along with its application. (08 Marks)
- c. Explain : (06 Marks)
- i) Abstract data type
  - ii) Stack
  - iii) Linked list.

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**First Semester B.E. Degree Examination, Dec.2014/Jan.2015**

**Elements of Civil Engineering and Engineering Mechanics**

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least ONE question from each part.

**PART - 1**

- 1 a. Briefly explain the role of civil engineers in the infrastructural development. (10 Marks)
- b. In the triangle ABC, a force at 'A' produces a clockwise moment of 90 kN-m at B and an anticlockwise moment of 45 kN-m at C. Find the magnitude and direction of the force. (06 Marks)

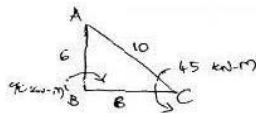


Fig. Q1 (b)

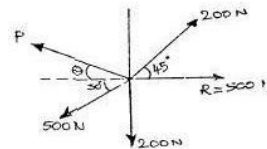


Fig. Q3 (a)

- c. Define force and its characteristics. (04 Marks)
- 2 a. Explain the following with neat sketches: i) Principle of superposition of forces. (10 Marks)
- ii) Principle of transmissibility of forces. iii) Couple and its characteristics. (10 Marks)
- b. Draw typical cross section of a road and explain the parts. (10 Marks)

**PART - 2**

- 3 a. Four co-planar forces acting at a point are shown in Fig. Q3 (a). One of the forces is unknown and its magnitude is shown by 'P'. The resultant has a magnitude of 500 N and is acting along the x-axis. Determine the unknown force 'P' and its inclination with x-axis. (08 Marks)
- b. State and prove Varignon's theorem of moments. (06 Marks)
- c. State and prove parallelogram law of forces. (06 Marks)
- 4 a. Determine the magnitude, direction of the resultant force for the force system as shown in Fig. Q4 (a). Locate the resultant force with respect to point D. (08 Marks)

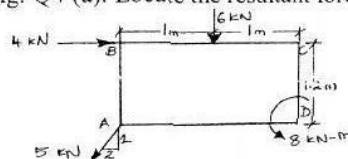


Fig. Q4 (a)

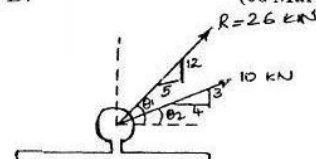


Fig. Q4 (b)

- b. 26 kN force is the resultant of the two forces, one of which is as shown in Fig. Q4 (b). Determine the other force. (08 Marks)
- c. Explain the principle of resolved parts. (04 Marks)

**PART - 3**

- 5 a. Determine the reactions at contact points for spheres A, B and C as shown in Fig. Q5 (a). It is given that  $W_A = W_B = 4 \text{ kN}$ ,  $W_C = 6 \text{ kN}$ ,  $d_A = d_B = 500 \text{ mm}$ ,  $d_C = 800 \text{ mm}$  (12 Marks)

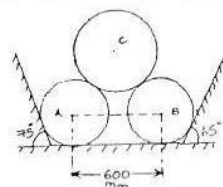


Fig. Q5 (a)

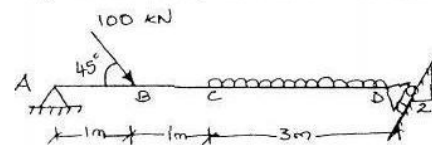


Fig. Q5 (b)

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- b. For the beam with loading shown in Fig. Q5 (b), determine the reactions at the supports. (08 Marks)
- 6 a. State and prove Lami's theorem. (08 Marks)
- b. The ladder shown in Fig. Q6 (b) is 4 m long and is supported by a horizontal floor and vertical wall. The co-efficient of friction at the wall is 0.25 and at the floor is 0.50. The weight of the ladder is 200 N, considered concentrated at 'G'. The ladder supports a vertical load of 1000 N at 'C'. Determine the reactions 'A' and 'B' and compute the least value of ' $\alpha$ ' at which, the ladder may be placed without slipping. (08 Marks)

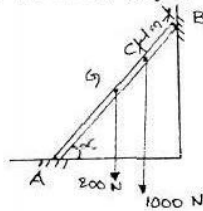


Fig. Q6 (b)

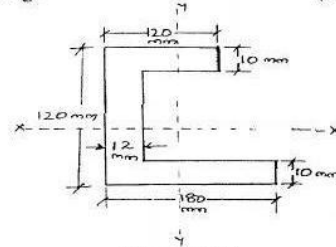


Fig. Q7 (b)

- c. State laws of friction. (04 Marks)
- PART - 4**
- 7 a. Determine the centroid of a semi-circular lamina of radius 'R' by method of integration. (08 Marks)
- b. Determine the moment of inertia of the section shown in Fig. Q7 (b) about its centroidal axes. Calculate the least radius of gyration for the section as well. (12 Marks)
- 8 a. State and prove parallel axis theorem. (06 Marks)
- b. Locate the centroid of the shaded area as shown in Fig. Q8 (b). (08 Marks)

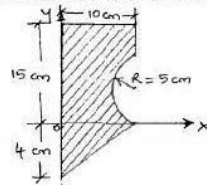


Fig. Q8 (b)

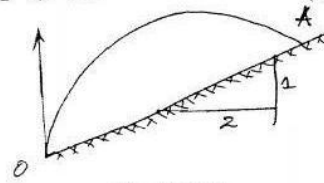


Fig. Q9 (b)

- c. Derive an expression for moment of inertia of a triangle with respect to horizontal centroidal axis. (06 Marks)
- PART - 5**
- 9 a. What is centrifugal force? What is super elevation? (04 Marks)
- b. Determine the position at which the ball is thrown up the plane will strike the inclined plane as shown in Fig. Q9 (b). The initial velocity is 30 m/s and angle of projection is  $\tan^{-1}\left(\frac{4}{3}\right)$  with horizontal. (08 Marks)
- c. A stone is dropped from the top of the tower 50 m high. At the same time another stone is thrown up from the tower with a velocity of 25 m/s. At what distance from the top and after how much time the two stones cross each other? (08 Marks)
- 10 a. What is a projectile? Define the following terms briefly: i) Angle of projection ii) Horizontal range iii) Vertical height iv) Time of flight. (10 Marks)
- b. A burglar's car starts at an acceleration of  $2 \text{ m/s}^2$ . A police vigilant party came after 5 s and continued to chase the burglar's car with a uniform velocity of 20 m/s. Find the time taken in which the police van will overtake the car. (10 Marks)

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14EME14

**First Semester B.E. Degree Examination, Dec.2014/Jan.2015**  
**Elements of Mechanical Engineering**

Time: 3 hrs.

Max. Marks:100

*Note: Answer any FIVE full questions, selecting  
ONE question from each part.*

**PART – 1**

- |          |  |            |
|----------|--|------------|
| <b>1</b> | a. Differentiate between renewable and non-renewable sources of energy.  | (05 Marks) |
|          | b. Discuss advantages of water tube boilers over fire tube boiler.   | (05 Marks) |
|          | c. Explain with neat sketch, working principle of Lancashire Boiler.   | (10 Marks) |
| <b>2</b> | a. Explain the factors, which favor the use of renewable energy.   | (06 Marks) |
|          | b. What are the various renewable energy resources available and show how wind turbine can be used for electrical power generation, with a schematic sketch. | (08 Marks) |
|          | c. List out any five boiler mountings and explain briefly any two boiler mountings (only functions).   | (06 Marks) |

**PART – 2**

- |          |  |            |
|----------|--|------------|
| <b>3</b> | a. Explain with neat sketch, impulse and reaction turbines.  | (10 Marks) |
|          | b. Compare closed cycle gas turbine with open cycle gas turbine.   | (05 Marks) |
|          | c. List any five advantages of two-stroke engine over four-stroke engine.  | (05 Marks) |
| <b>4</b> | a. Explain with block diagrams principle of operation of open cycle and closed cycle gas turbine.  | (06 Marks) |
|          | b. Compare impulse and reaction turbine.   | (04 Marks) |
|          | c. A four stroke diesel engine has a piston diameter 250mm and stroke 400mm. The mean effective pressure is 4 bar and speed is 500rpm the diameter of the brake drum is 1000mm and the effective brake load is 4000N. Find IP, BP, FP. | (10 Marks) |

**PART – 3**

- |          |  |            |
|----------|--|------------|
| <b>5</b> | a. Explain any three machine tool operation.                           | (06 Marks) |
|          | b. Explain plane milling, end milling, slot milling, with neat sketch. | (06 Marks) |
|          | c. Classify the robots on the basis of physical configuration.         | (08 Marks) |
| <b>6</b> | a. Explain types of automation with example.                           | (06 Marks) |
|          | b. Explain taper turning operation by swiveling the compound rest.     | (06 Marks) |
|          | c. Explain NC and CNC machine with simple block diagram.               | (08 Marks) |

**PART – 4**

- |          |   |            |
|----------|---|------------|
| <b>7</b> | a. Write down applications of ferrous metals.                               | (05 Marks) |
|          | b. Define composites and list its classification.                           | (05 Marks) |
|          | c. Explain electric arc welding and oxy-acetylene welding with neat sketch. | (10 Marks) |

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 8 a. What is alloy? Write down its application. (05 Marks)  
b. Explain applications of composites. (05 Marks)  
c. Compare soldering and brazing. (05 Marks)  
d. Explain types of ferrous metals. (05 Marks)

**PART – 5**

- 9 a. What are the properties of good refrigerants? (04 Marks)  
b. Explain with neat sketch working principle of vapour compression refrigeration. (10 Marks)  
c. Explain the following:  
i) Refrigeration effect  
ii) Ton of refrigeration  
iii) COP (06 Marks)
- 10 a. Explain the working principle of vapour absorption refrigeration process with neat sketch. (10 Marks)  
b. Explain room air conditioner system with neat sketch. (10 Marks)

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14ELN15

First Semester B.E. Degree Examination, Dec.2014/Jan.2015

**Basic Electronics**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer FIVE full questions, selecting atleast ONE question from each part.**

**PART – 1**

1.
  - a. Draw and explain the V-I characteristics of a silicon P-N junction Diode. (05 Marks)
  - b. A single phase full – wave rectifier supplies power to a 1 K $\Omega$  load. The AC voltage applied to the diode is 300 – 0 – 300 V. If diode resistance is 25 $\Omega$  and that of the transformer secondary negligible. Determine average load current, average load voltage and rectification efficiency. (06 Marks)
  - c. Draw and explain the series negative clipper circuit with a suitable waveform. (04 Marks)
  - d. Derive an equation for the collector current of a P – N – P transistor in terms of base current and  $\alpha_{dc}$  and also obtain the relationship between  $\alpha_{dc}$  and  $\beta_{dc}$ . (05 Marks)
2.
  - a. With a neat circuit diagram and waveform, explain the working of a half – wave rectifier and show that its ripple factor is 1.21. (07 Marks)
  - b. Draw the common – emitter circuit and sketch the input and output characteristics. Also explain operating regions by indicating them on the characteristic curve. (07 Marks)
  - c. Explain the performance of Zener – Diode in terms of source and load effects. (06 Marks)

**PART – 2**

3.
  - a. Explain the operation of a fixed – bias circuit, with a suitable circuit diagram. (07 Marks)
  - b. What are the ideal characteristics of an operational amplifier? (05 Marks)
  - c. A voltage – divider bias circuit has  $V_{CC} = 15$  V,  $R_C = 2.7$  K $\Omega$  and  $R_E = 2.2$  K $\Omega$ ,  $R_1 = 22$  K $\Omega$ ,  $R_2 = 12$  K $\Omega$ ,  $h_{fc} = 50$ . Calculate  $V_E$ ,  $V_C$ ,  $I_C$  and  $V_{CE}$  and also draw DC load line and mark the Q – point. Assume  $V_{BE} = 0.7$  V. (08 Marks)
4.
  - a. Derive the expression of output voltage of a differentiator circuit using an opamp. (05 Marks)
  - b. Write expression for output voltage at points A, B, C, D and E as shown in Fig. 4(b). (10 Marks)

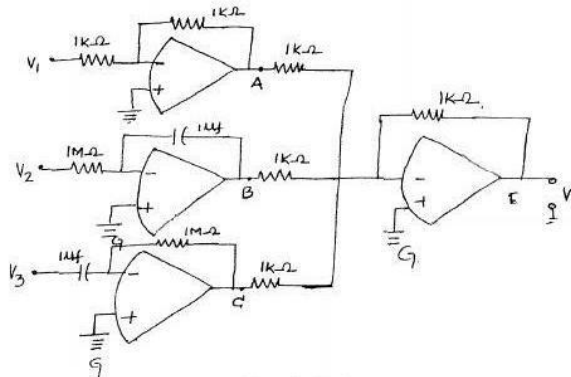


Fig. Q4(b)

- c. With a neat circuit diagram and waveform, explain how opamp can be used as a non – inverting amplifier. (05 Marks)

## PART – 3

- 5 a. State De Morgan's theorem for 4 – variables and prove them by the method of perfect induction. (06 Marks)
- b. Design full – adder circuit using three – variables and implement it using two half – adder. (06 Marks)
- c. Explain the construction of an OR – gate using diodes. (04 Marks)
- d. Realize basic gates from NAND gate. (04 Marks)
- 6 a. Design a logic circuit, symbol, and truth – table of exclusive – OR gate. (04 Marks)
- b. Convert :
- i)  $(294.6875)_{10} - ( )_8$
- ii)  $(356.15)_8 - ( )_2 - ( )_{10}$ . (05 Marks)
- c. Simplify and Realize using basic gates :
- i)  $\overline{ABC} + \overline{A}BC + A\overline{B}C + \overline{A}B\overline{C}$
- ii)  $(\overline{A} + B)(\overline{A} + \overline{C})(\overline{B} + C)$ . (06 Marks)
- d. Subtract  $(111)_2$  from  $(1010)_2$  using 1's and 2's complement method. (05 Marks)

## PART – 4

- 7 a. Explain the working of clocked R – S flip – flop with a suitable logic diagram and a truth-table. (06 Marks)
- b. Explain the logic pinout and signals of 8085 microprocessor. (08 Marks)
- c. Explain the construction and working of a linear variable differential transducer [LVDT]. (06 Marks)
- 8 a. With a neat block diagram, explain the architecture of 8051 microcontroller. (09 Marks)
- b. What is a transducer? Distinguish between active and passive transducer. (06 Marks)
- c. What is Thermister? Explain its advantages and limitations. (05 Marks)

## PART – 5

- 9 a. Define amplitude modulation and prove that  $P_t = P_c \left( 1 + \frac{m^2}{2} \right)$ . (05 Marks)
- b. What are commonly used frequency ranges in communication system? Mention the application of each range. (05 Marks)
- c. The total power content of an AM signal is 1000 W. Determine the power being transmitted at carrier frequency and at each of the side bands when percentage modulation is 100%. (05 Marks)
- d. Explain the differences between Amplitude and Frequency modulation. (05 Marks)
- 10 a. Explain the block diagram of ISDN. (06 Marks)
- b. What are the advantages of optical fiber communication? (05 Marks)
- c. Explain the basic principle of operation of mobile phones. (05 Marks)
- d. What is modulation? Explain need of modulation. (04 Marks)

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14ELE15

**First Semester B.E. Degree Examination, Dec.2014/Jan.2015**  
**Basic Electrical Engineering**

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting  
at least ONE full question from each part.**

**PART - 1**

- 1 a. Find the values of currents in all the branches of the network shown in Fig. Q1 (a). (06 Marks)

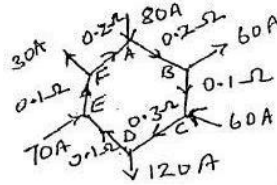


Fig. Q1 (a)

- b. A current of 20 A flows through two ammeters A and B in series. The potential difference across A is 0.2 V and across B is 0.3 V. Find how the same current will divide between A and B when they are in parallel. (06 Marks)
- c. Coils A and B in a magnetic circuit have 600 and 500 turns respectively. A current of 8 A in coil A produces a flux of 0.04 Wb. If co-efficient of coupling is 0.2, calculate
- Self inductance of coil A with B open circuited.
  - Flux linking with the coil B.
  - The average emf induced in coil B when the flux with it changes from zero to full value in 0.02 second.
  - Mutual inductance. (08 Marks)
- 2 a. A circuit consists of two parallel resistors having resistances of 20 Ω and 30 Ω respectively, connected in-series with a 15 Ω resistor. If the current through 30 Ω resistor is 1.2 A, find
- Currents in 20 Ω and 15 Ω resistors.
  - The voltage across the whole circuit.
  - Voltage across 15 Ω resistor and 20 Ω resistor.
  - Total power consumed in the circuit. (08 Marks)
- b. Obtain the relation between self inductances, mutual inductance and co-efficient of coupling. (06 Marks)
- c. A coil consists of 600 turns and a current of 10 A in the coil gives rise to a magnetic flux of 1 m. weber. Calculate (i) self inductance (ii) Induced emf and (iii) Energy stored when the current is reversed in 0.01 second. (06 Marks)

**PART - 2**

- 3 a. Derive the expression for armature torque developed in a d.c. motor. (06 Marks)
- b. Explain with a neat diagram, the constructional features and operation of an induction type single phase energy meter. (06 Marks)
- c. A 30 kW, 300 V DC shunt generator has armature and field resistances of 0.05 ohm and 100 ohm respectively. Calculate the total power developed by the armature when it delivers full output power. (08 Marks)
- 4 a. Derive the emf equation for a dc generator. (06 Marks)
- b. With a neat diagram explain the construction and working of dynamometer type wattmeter. (06 Marks)
- c. A 200 V lap wound dc shuntmotor has 800 conductors on its armature. The resistance of the armature winding is 0.5 Ω and that of field winding is 200 Ω. The motor takes a current of 21 A, the flux per pole is 30 mwb. Find the speed and torque developed in the motor. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

PART - 3

- 5 a. Obtain expression for the current through the pure inductor, if the voltage across it is  $v = v_m \sin \omega t$ . (06 Marks)
- b. A voltage  $v = 100 \sin 314t$  is applied to a circuit consisting of a 25 ohm resistor and an 80  $\mu\text{F}$  capacitor in series. Determine (i) peak value of current (ii) power factor (iii) Total power consumed by the circuit. (08 Marks)
- c. Write a short note on:  
 (i) Necessity of earthing.  
 (ii) Precautions to be taken to prevent electric shock. (06 Marks)
- 6 a. A voltage of 200 V is applied to a series circuit consisting of a resistor, an inductor and a capacitor. The respective voltages across these components are 170 V, 150 V and 100 V and the current is 4 A. Find (i) the power factor (ii) Resistance (iii) Impedance (iv) Inductive reactance and capacitive reactance. (08 Marks)
- b. Explain the necessity and the operation of earth leakage circuit breaker. (06 Marks)
- c. Two impedances  $z_1 = (6 - j8)$  ohms and  $z_2 = (16 + j12)$  ohms are connected in parallel. If the total current of the combination is  $(20 + j10)$  amperes, find  
 (i) Voltage across the combination.  
 (ii) Currents in the two branches. (06 Marks)

PART - 4

- 7 a. Obtain the relationship between line and phase, voltages and currents in a three phase balanced star connected system. (06 Marks)
- b. A 3-phase delta connected balanced load consumes a power of 60 k.w. taking a lagging current of 200 A at a line voltage of 400 V, 50 Hz. Find the parameters of each phase. (06 Marks)
- c. A 12 pole 500 rpm star connected alternator has 48 slots with 15 conductors per slot. The flux per pole is 0.02 webers. The winding factor is 0.97 and pitch factor is 0.98. Calculate the phase emf and line emf. (08 Marks)
- 8 a. Define phase sequence and list out the advantages of three phase system as compared to single phase system. (06 Marks)
- b. A 4-pole 1500 rpm star connected alternator has 9 slots / pole and 8 conductors per slot. Determine the flux per pole to give a terminal voltage of 3300 V. Take winding factor and pitch factor as unity. (08 Marks)
- c. The input power to a 3-phase induction motor running on 400 V, 50 Hz supply was measured by two wattmeter method and readings were 3000 W and -1000 W. Calculate (i) Total power input (ii) Power factor (iii) Line current. (06 Marks)

PART - 5

- 9 a. Derive emf equation of a transformer. (06 Marks)
- b. In a 25 KVA, 2000/200 V single phase transformer, the iron and full load copper losses are 350 watts and 400 watts respectively. Calculate the efficiency at unity power factor on (i) full load (ii) half full load. (08 Marks)
- c. An 8-pole alternator runs at 750 rpm and supplies power to a 6-pole induction motor which runs at 970 rpm. What is the slip of the induction motor? (06 Marks)
- 10 a. A 600 KVA transformer has an efficiency of 92% at full load, unity p.f. and half full load, 0.9 p.f. Determine its efficiency at 75% of full load, 0.9 p.f. (08 Marks)
- b. An 8-pole alternator runs at 750 rpm and supplies power to a 4-pole induction motor. The frequency of rotor current is 1.5 Hz. Determine the speed of the motor. (06 Marks)
- c. Derive the condition for which the efficiency of a transformer is maximum. (06 Marks)

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Question Paper Version : D

**First Semester B.E Degree Examination, Dec.14/Jan.2015  
Constitution of India and Professional Ethics**

**(COMMON TO ALL BRANCHES)**

Time: 2 hrs.]

[Max. Marks: 50

**INSTRUCTIONS TO THE CANDIDATES**

1. Answer all the fifty questions, each question carries **ONE mark**.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

1. A person to be appointed as Governor of a State must have completed the age of
 

a) 30 years	b) 35 years	c) 45 years	d) 50 years
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2. Who acts as the channel of communication between the Governor and the State Council of Ministers?
 

a) Chief Minister	b) Home Minister
c) Speaker of the Legislative Assembly	d) Finance Minister
3. A Judge of High Court when he wants to resign should address his resignation letter to the
 

a) Chief Justice of the High Court	b) Chief Justice of India
c) President of India	d) Chief Minister of the State
4. The interval between two consecutive sessions of a State Legislative Assembly should not be more than
 

a) 2 months	b) 3 months	c) 4 months	d) 6 months
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5. Who decides the disputes regarding election of the President?
 

a) The Election Commission	b) The Parliament
c) The Supreme Court	d) The Prime Minister
6. Decision on question as to disqualifications of membership of either house of Parliament rests with the
 

a) Election Commission	b) Chief Justice of India
c) Parliament	d) President after Consultation with the Election Commission
7. The Chief Election Commissioner holds office for a period of
 

a) 3 years	b) 6 years
c) 5 years	d) 6 years or till he attains the age of 65 years

8. Election Commission of India does not conduct elections to
  - a) State Legislature
  - b) Vice-President
  - c) Municipalities
  - d) Rajya Sabha
9. The procedure for amending the Constitution is detailed under
  - a) Article 360
  - b) Article 368
  - c) Article 352
  - d) Article 301
10. Which Constitutional Amendment Act limits the size of the Council of Ministers in the Union Government including Prime Minister to not more than 15% of the membership strength of Lok Sabha?
  - a) 42<sup>nd</sup> Amendment Act
  - b) 44<sup>th</sup> Amendment Act
  - c) 86<sup>th</sup> Amendment Act
  - d) 91<sup>st</sup> Amendment Act
11. Who decides whether a bill is a money bill or not?
  - a) President
  - b) Chairman of Rajya Sabha
  - c) Speaker of Lok Sabha
  - d) Minister of Parliamentary Affairs.
12. The Judges of the Supreme Court of India now retire at the age of
  - a) 60 years
  - b) 62 years
  - c) 58 years
  - d) 65 years
13. How many members are nominated to the Rajya Sabha by the President of India?
  - a) 10
  - b) 12
  - c) 14
  - d) 20
14. In the Union Government the Council of Ministers is collectively responsible to the
  - a) Prime Minister
  - b) President
  - c) Lok Sabha
  - d) Lok Sabha and Rajya Sabha
15. When both offices of the President and Vice-President happen to be vacant simultaneously who will discharge the duties of the President?
  - a) Prime Minister
  - b) Speaker of Lok Sabha
  - c) Union Home Minister
  - d) Chief Justice of India.
16. This is not a ground to declare National Emergency
  - a) Serious Internal disturbance
  - b) War
  - c) External aggression
  - d) Armed rebellion
17. When the State Emergency is in operation, the President cannot interfere in the matters of
  - a) State Executive
  - b) State Legislature
  - c) State Judiciary
  - d) All of these
18. Who is empowered to proclaim the Financial Emergency?
  - a) Finance Minister of the Union Government
  - b) President
  - c) Prime Minister
  - d) Parliament
19. Which one of the following is not the function of Municipalities?
  - a) Providing cattle ponds; prevention of cruelty to animals.
  - b) Providing water supply for domestic, industrial and commercial purposes.
  - c) Ensuring uninterrupted electric power supply to homes.
  - d) Collecting property taxes.
20. Which one of the following is not the function of Gram Panchayats?
  - a) Promotion of cottage industries
  - b) Care of public tanks
  - c) Supply of drinking water
  - d) Primary Education
21. Cultural and Educational Rights have been incorporated under Fundamental Rights with the objective to
  - a) Preserve Indian culture
  - b) Evolve a single culture
  - c) Eradicate illiteracy
  - d) Help minorities to conserve their culture

22. Dr. B.R. Ambedkar termed Article 32 of the Indian Constitution as the "Heart and Soul" of the Indian Constitution. Which one of the following Fundamental Right it contains?  
a) Right to freedom  
b) Right to constitutional remedies  
c) Right to education  
d) Right to freedom of religion
23. Prohibition of discrimination on grounds of religion, race, caste, sex or place of birth is a fundamental right classifiable under  
a) Right to freedom of religion  
b) Right against exploitation  
c) Right to equality  
d) None of these
24. Which fundamental right of Indian Constitution has been deleted by 44<sup>th</sup> Amendment Act, 1978?  
a) Right against exploitation  
b) Right to property  
c) Right to strike and protest  
d) Right to speak
25. Writ of Mandamus can be issued on the ground of  
a) Non-performance of public duties  
b) Unlawful detention  
c) Unlawful occupation of public office  
d) None of these
26. Protection of wild life comes under which of the following in India?  
a) Fundamental Rights  
b) Fundamental Duties  
c) Directive Principles of State policy  
d) None of these
27. Which of the following is enforceable in a Court of Law?  
a) Preamble  
b) Fundamental Rights  
c) Fundamental duties  
d) Directive principles of State Policy
28. Fundamental duties appearing in India Constitution are adopted from the Constitution of  
a) Germany  
b) U.K.  
c) U.S.A.  
d) Russia
29. Which one of the following is not a Directive Principle of State Policy?  
a) Free legal aid to poor  
b) Maternity relief  
c) Improvement of public health  
d) None of these
30. Which of the following is a Fundamental duty of the Indian citizen?  
a) Strive to eradicate untouchability  
b) To cast his/her vote  
c) To develop scientific temper  
d) To promote literacy
31. Which one of these is the primary source of Indian Constitution?  
a) British Constitution  
b) Irish Constitution  
c) Government of India Act, 1935  
d) U.S. Constitution
32. Who acted as the Chairman of the Drafting Committee of the Constituent Assembly?  
a) Dr. B. R Ambedkar  
b) B.C. Rajagopalachari  
c) Dr. Rajendra Prasad  
d) Jawaharlal Nehru
33. In the final form of the Constitution adopted by the Constituent Assembly, how many Articles and Schedules were there?  
a) 397 Articles and 7 Schedules  
b) 395 Articles 4 Schedules  
c) 400 Articles and 10 Schedules  
d) 395 Articles and 8 Schedules.
34. The Preamble of the Indian Constitution does not contain  
a) Democratic  
b) Adult Franchise  
c) Sovereignty  
d) Fraternity

35. The Emergency provisions incorporated in the Indian Constitution were influenced by the Constitution of  
 a) U.S.A.                      b) German Reich                      c) Russia                      d) Canada
36. Engineering ethics is \_\_\_\_  
 a) A macro ethics                      b) Business ethics  
 c) A preventive ethics                      d) A code of scientific rules based on ethics
37. Conflict of interest may be \_\_\_\_  
 a) False                      b) Imaginary                      c) Created                      d) Potential
38. The codes of ethics can be taken as guidelines by Engineers to \_\_\_\_  
 a) Overcome the work pressure                      b) Resolve the conflicts  
 c) Formulate the problem                      d) Escape from the responsibility
39. The use of intellectual property of others without permission or credit is referred as  
 a) Cooking                      b) Stealing                      c) Plagiarism                      d) Trimming
40. Which of the following is not a concept of responsibility?  
 a) Minimalist                      b) Maximalist                      c) Reasonable care                      d) Good works
41. The Fault Tree is used to  
 a) Improve safety                      b) Assess the risk involved  
 c) Take free consent                      d) Claim compensation
42. An Expert Testimony does not demand \_\_\_\_  
 a) Consulting extensively with the lawyer                      b) Adequate time for thorough investigation  
 c) Expert legal knowledge                      d) Objective and unbiased demeanor
43. When an engineer abuses Client-Professional confidentiality, it amounts to \_\_\_\_  
 a) Misusing the truth                      b) Criminal breach of trust  
 c) Self-deception                      d) None of these
44. An author retains copy right of his/her book for \_\_\_\_ after his or her death  
 a) 20 years                      b) 30 years                      c) 50 years                      d) 10 years
45. The formula of MTR Sambar Masala is an example of  
 a) Patent                      b) Trademark                      c) Copyright                      d) Trade secret
46. Mandal Commission deals with  
 a) Rights of the minority                      b) Laws relating to sexual harassment  
 c) Reservation for backward class people                      d) Laws relating to child labour
47. At present, how many seats are reserved for Scheduled Castes and Scheduled Tribes in Lok Sabha?  
 a) 100 and 50                      b) 79 and 40                      c) 89 and 45                      d) 70 and 30
48. National Commission for women was established in the year  
 a) 1985                      b) 1990                      c) 1995                      d) 2000
49. National Commissions for Scheduled castes and Scheduled Tribes have to submit their annual reports on the working of the safeguards to  
 a) Prime Minister                      b) Parliament  
 c) President                      d) Chief Justice of India
50. No child below the age of 14 years  
 a) Shall be employed in any industry                      b) Shall be employed in any office  
 c) Shall be employed in house-hold work                      d) Can be employed anywhere

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Question Paper Version : C

First Semester B.E Degree Examination, Dec.2014/Jan.2015

## ENVIRONMENTAL STUDIES

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 50

## INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fifty questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

1. 22<sup>nd</sup> April of every year is celebrated as \_\_\_\_\_  
 a) Environmental day                      b) United National day  
 c) Earth day                                  d) World AIDS day.
2. Plant use \_\_\_\_\_ gas for photosynthesis.  
 a) Oxygen                      b) Carbon dioxide                      c) Nitrogen                      d) Methane
3. The thickness of the earth's crust is  
 a) Between 5 to 70km                      b) 200 km                      c) 500 km                      d) 1000 km
4. EIA can be expanded as  
 a) Environmental Important Activity                      b) Eco – Industrial Act  
 c) Environmental Impact Assessment                      d) Environmental Industrial Impact
5. In an aquatic ecosystem phytoplankton can be considered as a  
 a) Consumer                      b) Producer                      c) Macro consumer                      d) None of these
6. The energy obtained from flowing water is  
 a) Tidal energy                      b) Hydropower energy                      c) Thermal energy                      d) None of these
7. Identify the nonrenewable source of energy from the following :  
 a) Wind power                      b) Hydropower                      c) Solar power                      d) Coal
8. What is the permissible range of pH for drinking water as per the Indian standards?  
 a) 6 to 9                      b) 6.5 to 7.5                      c) 6.5 to 8.5                      d) 6 to 8.5

9. The average life expectancy around the world is currently  
a) Increasing    b) Decreasing    c) Stabilizing    d) Not changing
10. Who is the author of the book 'Silent Spring'?  
a) Robin cook    b) Arthur Hailey    c) Rachel Carson    d) Darwin
11. As per the census of 2011, the India's literacy rate is  
a) 82.14%    b) 65.46%    c) 74.04%    d) 54.16%
12. Which of the following age structure pyramid indicates stable population?  
a) Pyramid shaped    b) Bell shaped    c) An urn shaped    d) None of these
13. Methyl Isocyanate gas tragedy took place in the year  
a) 1984    b) 1976    c) 1992    d) 1989
14. Which green house gas is known as colourless, sweetish odour and laughing gas?  
a) Methane    b) CFC    c) Carbon dioxide    d) Nitrous oxide
15. Ozone layer absorbs  
a) Cosmic rays    b) UV rays    c) Infrared rays    d) None of these
16. Formation of ozone layer is explained by \_\_\_\_\_ reaction.  
a) Chapman's reaction    b) Henderson's reaction  
c) Rosemund's reaction    d) Perkin's reaction
17. The Environmental Protection Act 1986 deals with  
a) Water    b) Air    c) Soil    d) All of these
18. The first united national conference on human environment was held in the year 1972 at  
a) Kyoto    b) Vienna    c) Stockholm    d) London
19. GIS can be expanded as  
a) Geological Information System    b) Geodynamic Intimation System  
c) Geographic Information System    d) Geographic Internet System
20. The Forest Conservation Act was enacted in the year \_\_\_\_  
a) 1986    b) 1974    c) 1980    d) 1972
21. Excess nitrates in drinking water is likely to cause  
a) Fluorosis    b) Minamata    c) Blue babies    d) None of these
22. Environmental protection is the fundamental duties of the citizen of India under the article  
a) 51 - A(g)    b) 48 - A    c) 47    d) 21
23. Which of the following is considered as an alternate fuel?  
a) Coal    b) CNG    c) Kerosene    d) Petrol
24. Nitrogen fixing bacteria exists in \_\_\_\_\_ of plants  
a) Leaf    b) Stem    c) Flower    d) Roots

25. Domesticated animals are used for  
a) Dairy products                      b) Production of fiber  
c) Production of meat                  d) All of these
26. The word 'Environment' is derived from  
a) English                      b) French                      c) Latin                      d) Spanish
27. The sequence of eating and being eaten in an ecosystem is called  
a) Food chain              b) Carbon cycle              c) Hydrological cycle      d) Anthroposystem
28. Which pyramid is always upright?  
a) Number                      b) Biomass                      c) Energy                      d) None of these
29. The major atmospheric gas layer in stratosphere is  
a) Hydrogen                      b) Helium                      c) Carbon dioxide              d) Ozone
30. Which atmospheric sphere is closest to the earth surface?  
a) Troposphere              b) Mesosphere              c) Stratosphere              d) Exosphere
31. What is the maximum allowable concentration of fluorides in drinking water?  
a) 1.0 mg/ℓ                      b) 1.25 mg/ℓ                      c) 1.50mg/ℓ                      d) 1.75mg/ℓ
32. Cholera and Typhoid are caused by  
a) Worms                      b) Virus                      c) Bacteria                      d) Fungus
33. Conversion of ammonium to  $\text{NO}_3$  by chemical oxidation is termed as  
a) Nitrification              b) Leaching                      c) Reduction                      d) Mineralization
34. The liquid waste generated from baths and kitchens is called as  
a) Sullage                      b) Domestic sewage              c) Run off                      d) Storm waste
35. Minamata episode of Japan is due to the poisoning of  
a) Cadmium                      b) Strontium                      c) Lead                      d) Mercury
36. Noise is measured in \_\_\_\_\_  
a) Decibels                      b) Joules                      c) PPM                      d) NTU
37. Which of the following is air pollutant?  
a)  $\text{O}_2$                       b) CO                      c)  $\text{N}_2$                       d) All of these
38. In our country the percentage of land under forest is about  
a) 15%                      b) 25%                      c) 35%                      d) 19%
39. Sound beyond which of the following level can be regarded as pollutant?  
a) 40dB                      b) 80dB                      c) 120 dB                      d) 150dB
40. BOD means  
a) Biochemical Oxygen Demand              b) Biophysical Oxygen Demand  
c) Biological Oxygen Demand                  d) All of these

41. PVC stands for  
a) Poly Vinyl Carbon                      b) Poly Vinyl Chloride  
c) Poly Vanadium Chloride              d) None of these
42. The pH value of the acid rain water is  
a) less than 2.7    b) less than 5.7    c) less than 3.7    d) less than 1.7
43. Each chlorine free radical can destroy the following number of ozone molecules  
a) 1,00,000    b) 10,000    c) 100    d) 1000
44. Which of the following statement is true?  
a) Acid rain causes stone cancer    b) Acid rain reduces soil fertility  
c) Acid rain results in acidification of water bodies.  
d) All of these
45. Major compound responsible for the destruction of stratospheric ozone layer is  
a) Oxygen    b) CFC    c) Carbon dioxide    d) Methane
46. The wild life protection Act was enacted in the year \_\_\_\_\_  
a) 1972    b) 1994    c) 1986    d) 2000
47. The leader of Chipko movement is  
a) Vandana Shiva                      b) Suresh Heblkar  
c) Medha Patkar                      d) Sunderlal Bahuguna
48. Which state is having highest women literacy rate in India?  
a) Karnataka    b) Kerala    c) Punjab    d) Rajasthan
49. Amount of oxygen present in atmospheric air is  
a) 0.03%    b) 21%    c) 36%    d) 0.9%
50. Which of the following conceptual spheres of the environment is having least storage capacity of matter?  
a) Atmosphere    b) Lithosphere    c) Biosphere    d) Hydrosphere