

CBCS SCHEME

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15MAT11

First Semester B.E. Degree Examination, June/July 2019

Engineering Mathematics – I

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1
- a. Find the n^{th} derivative of $\frac{7x+6}{2x^2+7x+6}$ (05 Marks)
 - b. Find the angle between the radius vector and the tangent for the curve $r^m = a^m (\cos m\theta + \sin m\theta)$. (05 Marks)
 - c. Show that the radius of curvature at any point θ on the cycloid $x = a(\theta + \sin\theta)$, $y = a(1 - \cos\theta)$ is $4a \cos(\theta/2)$ (06 Marks)

OR

- 2 a. If $x = \sin t$ and $y = \cos mt$, prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} + (m^2-n^2)y_n = 0$. (05 Marks)
- b. Find the pedal equation of the curve $r^2 = a^2 \sec 2\theta$. (05 Marks)
- c. Prove with usual notation $\tan \phi = \frac{rd\theta}{dr}$. (06 Marks)

Module-2

- 3 a. Expand $e^{\sin x}$ using Maclaurin's series upto third degree term. (05 Marks)
- b. Evaluate $\lim_{x \rightarrow 0} \left[\frac{1}{x^2} - \frac{1}{\sin^2 x} \right]$. (05 Marks)
- c. If $u = e^{(ax+by)}$, $f(ax-by)$, prove that $b \frac{\partial u}{\partial x} + a \frac{\partial u}{\partial y} = 2abu$ (06 Marks)

OR

- 4 a. Expand $\sin x$ in ascending power of $\pi/2$ upto the term containing x^4 . (05 Marks)
- b. If $u = \tan^{-1} \left(\frac{x^3 + y^3}{x - y} \right)$, show that $x u_x + y u_y = \sin 2u$. (05 Marks)
- c. If $u = \frac{yz}{x}$, $v = \frac{zx}{y}$, $w = \frac{xy}{z}$. Find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$. (06 Marks)

Module-3

- 5 a. Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $x^2 + y^2 - z = 3$ at the point $(2, -1, 2)$. (05 Marks)
- b. Show that $\vec{F} = (y+z)\mathbf{i} + (x+z)\mathbf{j} + (x+y)\mathbf{k}$ is irrotational. Also find a scalar function ϕ such that $\vec{F} = \nabla\phi$. (05 Marks)
- c. Prove that $\nabla \cdot (\phi \vec{A}) = \phi(\nabla \cdot \vec{A}) + \nabla\phi \cdot \vec{A}$. (06 Marks)

OR

- 6 a. Prove that $\text{Curl}(\phi \vec{A}) = \phi(\text{Curl} \vec{A}) + \text{grad}\phi \times \vec{A}$ (05 Marks)
- b. A particle moves along the curve C ; $x = t^3 - 4t$, $y = t^2 + 4t$, $z = 8t^2 - 3t^3$ where 't' denotes the time. Find the component of acceleration at $t = 2$ along the tangent. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- c. Show that $\vec{F} = (2xy^2 + yz)\mathbf{i} + (2x^2y + xz + 2yz^2)\mathbf{j} + (2y^2z + xy)\mathbf{k}$ is a conservative force field. Find its scalar potential. (06 Marks)

Module-4

- 7 a. Obtain the reduction formula for $\int \sin^n x \, dx$. (05 Marks)
 b. Solve $(y^2 e^{xy^2} + 4x^3)dx + (2xye^{xy^2} - 3y^2)dy = 0$. (05 Marks)
 c. Find the orthogonal trajectories of $r = a(1 + \sin\theta)$. (06 Marks)

OR

- 8 a. Evaluate $\int_0^2 x\sqrt{2x-x^2} \, dx$ (05 Marks)
 b. Solve $(y^3 - 3x^2y)dx - (x^3 - 3xy^2)dy = 0$. (05 Marks)
 c. A bottle of mineral water at a room temperature of 72°F is kept in a refrigerator where the temperature is 44°F . After half an hour, water cooled to 61°F
 i) What is the temperature of the mineral water in another half an hour?
 ii) How long will it take to cool to 50°F ? (06 Marks)

Module-5

- 9 a. Find the rank of the matrix

$$A = \begin{bmatrix} 2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$$
 (05 Marks)
 b. Find the largest eigen value and corresponding eigenvector of the matrix

$$A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$
 by power method taking $X^{(0)} = [1, 1, 1]^T$ (05 Marks)
 c. Reduce the matrix $A = \begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix}$ to the diagonal form. (06 Marks)
- 10 a. Use Gauss elimination method to solve
 $2x + y + 4z = 12$
 $4x + 11y - z = 33$
 $8x - 3y + 2z = 20$ (05 Marks)
 b. Find the inverse transformation of the following linear transformation.
 $y_1 = x_1 + 2x_2 + 5x_3$
 $y_2 = 2x_1 + 4x_2 + 11x_3$
 $y_3 = -x_2 + 2x_3$ (05 Marks)
 c. Reduce the quadratic form $2x_1^2 + 2x_2^2 + 2x_3^2 + 2x_1x_3$ to the Canonical form. (06 Marks)

CBCS SCHEME

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15CHE12/22

First/Second Semester B.E. Degree Examination, June/July 2019 Engineering Chemistry

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is single electrode potential? Derive the Nernst equation for single electrode potential. (06 Marks)
- b. Define Electrolyte Concentration Cell. Two copper electrodes placed in CuSO_4 solutions of equal concentration are connected to form a concentration cell :
 - i) What is the Cell Voltage?
 - ii) If one of the solutions is diluted until the concentration of Cu^{2+} ions is $1/5^{\text{th}}$ of its original value, what will be the cell voltage after dilution? (05 Marks)
- c. Describe the construction, reactions and applications of Nickel metalhydride battery. (05 Marks)

OR

- 2 a. Describe the following battery characteristics :
 - i) Voltage
 - ii) Capacity
 - iii) Cycle life. (06 Marks)
- b. Explain the construction and working of Calomel electrode. (05 Marks)
- c. Describe the construction, electrode reactions and applications of Methanol – oxygen fuel cell. (05 Marks)

Module-2

- 3 a. Explain the effects of following variables on the nature of electro deposit :
 - i) Current density
 - ii) Metal ion concentration
 - iii) Complexing agents. (06 Marks)
- b. Explain the Electrochemical theory of corrosion with iron as an example. (05 Marks)
- c. Describe the Cathodic protection by Sacrificial Anode Method. (05 Marks)

OR

- 4 a. Describe the effects of following factors on the rate of corrosion :
 - i) Nature of metal
 - ii) Nature of corrosion products
 - iii) Difference in potential between anodic and cathodic regions. (06 Marks)
- b. Define Electroless plating. Explain the Electroless plating of copper. (05 Marks)
- c. Describe Electro deposition of Hard Chromium. (05 Marks)

Module-3

- 5 a. Explain how calorific value of a solid fuel is determined using Bomb Calorimeter. (06 Marks)
- b. Explain the purification of silicon by zone refining process. (05 Marks)
- c. A 0.85g of coal sample (carbon 90%, H_2 5% and ash 5%) was subjected to combustion in a bomb calorimeter. Mass of water taken in the calorimeter was 2000g and the water equivalent of calorimeter was 600g. The rise in temperature was 3.5°C . Calculate the gross and net calorific value of the sample. Given, specific heat of water = $4.187 \text{ kJ/kg}^{\circ}\text{C}$ and latent heat of steam 2454 kJ/kg . (05 Marks)

OR

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- 6 a. What is Photovoltaic cell? Explain the construction and working of PV cell. (06 Marks)
b. Describe Fluidized bed catalytic cracking. (05 Marks)
c. Explain the process of doping of silicon by diffusion technique. (05 Marks)

Module-4

- 7 a. Mention the preparation and applications of Poly methyl Methacrylate (PMMA) and poly carbonate. (06 Marks)
b. Define Glass transition temperature. Explain the following factors influencing the T_g value.
i) Flexibility ii) Intermolecular forces. (05 Marks)
c. Explain the free radical mechanism of addition polymerization by taking vinyl chloride as an example. (05 Marks)

OR

- 8 a. What is Conducting polymer? Explain the synthesis of conducting polyaniline. (06 Marks)
b. Define Adhesive. Explain the preparation and applications of Epoxy resin. (05 Marks)
c. A polymer has following composition , 100 molecules of molecular mass 1000g/mol, 200 molecules of molecular mass 2000g/mol and 500 molecules of molecular mass 5000g/mol. Calculate the number and weight average molecular weight. (05 Marks)

Module-5

- 9 a. Explain Winkler's method of determining dissolved oxygen. Give the reactions involved. (06 Marks)
b. Define COD. 25cm³ of an industrial effluent requires 12.5cm³ 0.5N K₂Cr₂O₇ for the complete oxidation. Calculate COD of the sample. Assuming that the effluent contains only oxalic acid. Calculate the amount of oxalic acid present in 1 dm³ (Eq.wt of oxalic acid = 45). (05 Marks)
c. Write a note on Dendrimer. (05 Marks)

OR

- 10 a. Explain the Synthesis of nano materials by Chemical vapour condensation and precipitate methods. (06 Marks)
b. Write a note on Carbon nanotubes. (05 Marks)
c. Explain the desalination of water by electro – dialysis. (05 Marks)

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First/Second Semester B.E. Degree Examination, June/July 2019 Engineering Physics

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. Physical Constants: Velocity of light, $C = 3 \times 10^8$ m/S,
Planck's constant $h = 6.625 \times 10^{-34}$ JS;
Mass of electron $m = 9.1 \times 10^{-31}$ kg,
Boltzmann constant $K = 1.38 \times 10^{-23}$ J/K,
Avagadro number, $N_A = 6.02 \times 10^{26}$ /Kmole,
Charge of electron $e = 1.6 \times 10^{-19}$ C

Module-1

- 1 a. Write Planck's radiation law. Show how one can arrive at Wien's law and Rayleigh-Jeans law from Planck's law. (06 Marks)
b. Set up time-independent one dimensional Schrodinger's wave equation. (06 Marks)
c. A particle of mass $0.5 \text{ MeV}/c^2$ has kinetic energy 100 eV. Find its de Broglie wavelength, where C is the velocity of light. (04 Marks)

OR

- 2 a. State Heisenberg's uncertainty principle. Prove that electron does not exist inside the nucleus. (07 Marks)
b. Define phase velocity and group velocity. Obtain the relation between group velocity and particle velocity. (05 Marks)
c. A spectral line of wavelength 5461 \AA has a width of 10^{-4} \AA . Evaluate the minimum time spent by the electrons in the upper energy state. (04 Marks)

Module-2

- 3 a. Explain failures of classical free electron theory. (06 Marks)
b. What is meant by critical field in the case of super conductors. Explain Type I and Type II super conductors. (06 Marks)
c. Calculate the probability of an electron occupying an energy level 0.02 eV above and below the Fermi level at 200 K. (04 Marks)

OR

- 4 a. Define Fermi factor. Discuss the variation of Fermi factor with temperature and energy. (07 Marks)
b. Explain BCS theory of super conductivity. (05 Marks)
c. The resistivity of intrinsic germanium at 27°C is equal to 0.47 ohm-meter. Assuming electron and hole mobilities as 0.38 and $0.18 \text{ m}^2\text{V}^{-1}\text{S}^{-1}$ respectively. Calculate the intrinsic carrier density. (04 Marks)

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Module-3

- 5 a. Explain the construction and working of semiconductor laser. (06 Marks)
 b. What is attenuation? Explain the various mechanisms through which attenuation takes place. (07 Marks)
 c. An optical fiber has a core material with refractive index of 1.55 and cladding refractive index of 1.50. The light is launched into it in air. Calculate its numerical aperture and the acceptance angle. (03 Marks)

OR

- 6 a. Describe the recording and reconstruction process in holography with the help of suitable diagrams. (06 Marks)
 b. Describe different types of optical fiber, along with the typical core and cladding diameter, refractive index profile and mode of propagation sketches. (06 Marks)
 c. The ratio of population of two energy levels is 1.059×10^{-30} . Find the wavelength of light emitted at 330 K. (04 Marks)

Module-4

- 7 a. Define Miller indices. Derive an expression for interplanar spacing in terms of Miller indices. (05 Marks)
 b. Explain the crystal structure of diamond. Show that packing factor for diamond is $\frac{\sqrt{3}}{16} \pi$. (05 Marks)
 c. Describe the construction and working of Bragg's spectrometer. (06 Marks)

OR

- 8 a. Obtain the relation between atomic radius and the lattice constant in the case of BCC structure. Also find the atomic packing factor in the case of simple cubic and face centered cubic system. (06 Marks)
 b. Explain unit cell and lattice parameters. Draw the crystal plane $(\bar{1} \ 3 \ 2)$ in a cubic unit cell. (06 Marks)
 c. A monochromatic X-ray beam of wavelength 0.7 \AA undergoes first order Bragg reflection from the plane (3 0 2) of a cubic crystal at a glancing angle of 35° . Calculate the lattice constant. (04 Marks)

Module-5

- 9 a. Explain the construction and working of Reddy shock tube. Mention any one characteristics of Reddy tube. (06 Marks)
 b. Write note on Ball milling method of preparation of nano materials. (04 Marks)
 c. Explain the conservation of mass, momentum and energy with respect to shock wave. (06 Marks)

OR

- 10 a. Explain three different structures of carbon nano tube. Write any one properties of carbon nano tube. (07 Marks)
 b. Define Mach number. Explain subsonic and supersonic waves. (05 Marks)
 c. Describe the arc discharge method of preparing carbon nano tubes. (04 Marks)

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15PCD13/23

First/Second Semester B.E. Degree Examination, June/July 2019 Programming in C and Data Structures

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Write a general structure of C program. Explain with example. (06 Marks)
- b. List basic data types in C. Write the significance of each data type. (04 Marks)
- c. What is Variable? Explain the syntax of variable declaration and variable initialization. (06 Marks)

OR

- 2 a. With syntax and example, explain the formatted and unformatted input and output functions in C. (06 Marks)
- b. Write a C program to convert temperature from degree centigrade to Fahrenheit. (04 Marks)
- c. Explain various operators supported by C. (06 Marks)

Module-2

- 3 a. Explain the syntax of for loop and write a program using for loop to find sum of first n natural numbers. (08 Marks)
- b. Explain the syntax of if statement and write a program to find largest of 3 numbers using if statement. (08 Marks)

OR

- 4 a. With example, explain the syntax of switch statement. (06 Marks)
- b. Explain Break and Continue statements. (04 Marks)
- c. Differentiate between while and do – while loops. (06 Marks)

Module-3

- 5 a. Explain declaration and initialization of two dimensional array and write a program to multiply two matrices. (10 Marks)
- b. What is function? Explain the differences between call by value and call by reference. (06 Marks)

OR

- 6 a. Explain the various string manipulation functions. (06 Marks)
- b. Write a C program to find factorial of a number using recursion. (04 Marks)
- c. Explain with example syntax of puts and gets functions. (06 Marks)

Module-4

- 7 a. What is File? Explain any five file manipulation functions with example. (08 Marks)
- b. Write a C program to maintain record of n students with appropriate fields and print the marks of student if name is entered. (08 Marks)

OR

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- 8 a. What is Structure? Explain the syntax of structure declaration. Explain structure within structure with an example. (08 Marks)
b. Write a C program to read text from file and display it on screen. (08 Marks)

Module-5

- 9 a. What is Stack? Explain various stack operations. (08 Marks)
b. What is Pointer? Write a C program to swap two numbers using pointers. (08 Marks)

OR

- 10 a. What is Dynamic Memory Allocation? Explain the four functions for memory management. (08 Marks)
b. Explain various Pre processor directives. (08 Marks)

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15CIV13/23

First/Second Semester B.E. Degree Examination, June/July 2019 Elements of Civil Engineering and Mechanics

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Briefly explain the scope of any four fields of civil engineering. (08 Marks)
b. Replace the force couple system by a single force with respect to AB and CD shown in Fig.Q.1(b). (08 Marks)

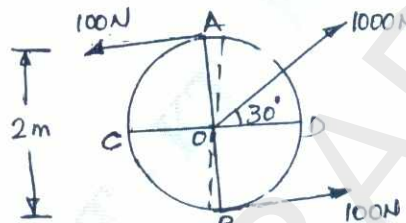


Fig.Q.1(b)

OR

- 2 a. Draw typical cross section of road and explain its components. (08 Marks)
b. Briefly explain:
i) Rigid body
ii) Principle of transmissibility of force
iii) Force and its characteristics
iv) Couple and its characteristics. (08 Marks)

Module-2

- 3 a. State and prove Lamis theorem. (08 Marks)
b. Determine the resultant of forces which are acting as shown in Fig.Q.3(b). (08 Marks)

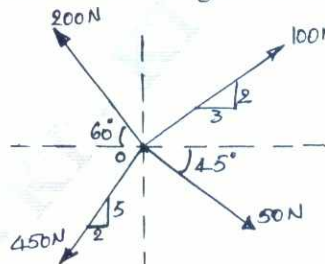


Fig.Q.3(b)

OR

- 4 a. Define:
i) Coefficient of friction
ii) Angle of friction
iii) Angle of repose
iv) Limiting friction. (08 Marks)

(08 Marks)

- b. A sphere of weight 100N rests against a vertical wall as shown in Fig.Q.4(b). If the sphere is 100mm radius and the rope RS is 400mm length, find the minimum horizontal force 'P' necessary to move the sphere free from the wall. (04 Marks)

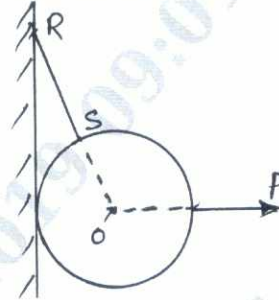


Fig.Q.4(b)

- c. Determine the value of W_1 and W_2 shown in Fig.Q.5(c) to keep BC horizontal. (04 Marks)

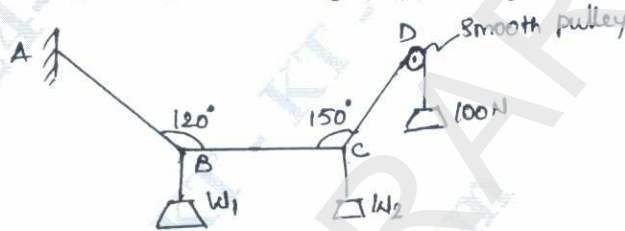


Fig.Q.5(c)

Module-3

- 5 a. State and prove Varignon's theorem. (08 Marks)
 b. Determine the support reactions at A and B for the beam shown in Fig.Q.5(b) (08 Marks)

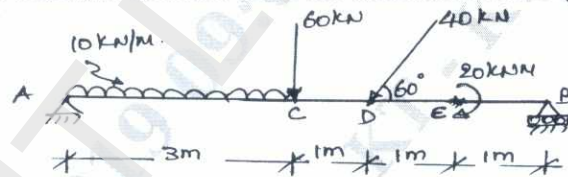


Fig.Q.5(b)

OR

- 6 a. Explain the different types of supports for beams. (08 Marks)
 b. Find the resultant of the system of coplanar forces acting on a lamina as shown in Fig.Q.6(b). Each square has a side of 10mm. (08 Marks)

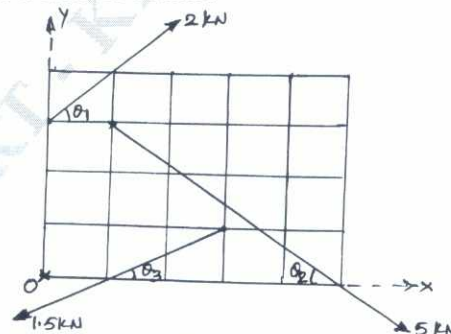


Fig.Q.6(b)

Module-4

- 7 a. State and prove parallel axis theorem. (08 Marks)
 b. Locate the centroid for the shaded area shown in Fig.Q.7(b) with respect to 'O'. (08 Marks)

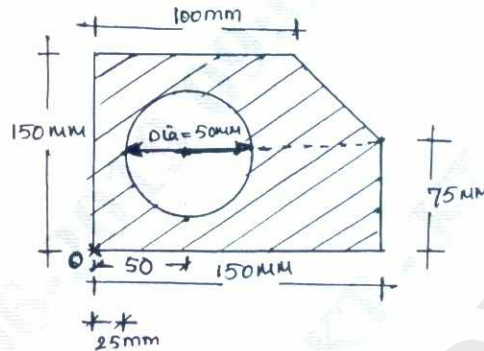


Fig.Q.7(b)

OR

- 8 a. Determine the moment of inertia of the shaded area shown in Fig.Q.8(a) about x x axis. (08 Marks)

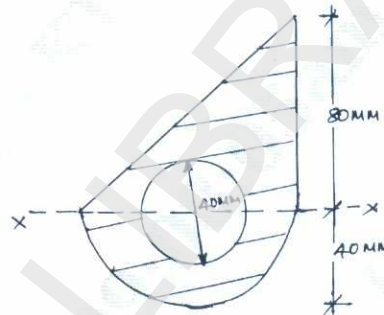


Fig.Q.8(a)

- b. Derive the expression of centroid of a semicircle by the method of integration. (08 Marks)

Module-5

- 9 a. Define: i) Displacement ii) Acceleration iii) Velocity iv) Speed. (08 Marks)
 b. Burglars car starts with an acceleration of 2m/sec^2 . A police van came after 10 seconds and continued to chase the burglars car with uniform velocity of 40m/sec . Find the time taken by the police van to overtake the burglars car. (08 Marks)

OR

- 10 a. A ball is dropped from the top of a tower 30m high. At the same instant a second ball is thrown upward from the ground with an initial velocity of 15m/sec . When and where do they pass? (08 Marks)
 b. A pilot flying his bomber at a height of 2000m with uniform horizontal velocity of 600 kmph wants to strike a target. At what distance from the target he should release the bomb. (08 Marks)

CBCS SCHEME

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15EME14/24

First/Second Semester B.E. Degree Examination, June/July 2019 Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Write a note on petroleum based solid fuels. (04 Marks)
b. With a schematic diagram, explain how solar energy is converted into electrical energy. (08 Marks)
c. What are boiler mountings and accessories? Give two examples for each. (04 Marks)

OR

- 2 a. Define the following:
i) Sensible heat
ii) Degree of superheat
iii) External work of evaporation
iv) Dry saturated steam. (04 Marks)
b. With a neat sketch explain the working of Bob-Cock and Wilcox boiler. (12 Marks)

Module-2

- 3 a. With a neat sketch explain the working of Kaplan turbine. (08 Marks)
b. With neat sketches and P-V diagram, explain the working of two stroke petrol engine. (08 Marks)

OR

- 4 a. Differentiate between open cycle and closed cycle gas turbines. (05 Marks)
b. Mention the function of following:
i) Scroll casing
ii) Draft tube
iii) Piston rings
iv) Cam shaft. (04 Marks)
c. The following observations were recorded during a test on a four stroke engine
Bore = 300mm, stroke = 40mm, speed = 250rpm, net load on the brake drum = 700N,
imep = 6 bar, fuel consumption = 0.0013 kg/s calorific value of fuel = 43900 kJ/kg, brake
drum diameter = 2m. Determine: i) Indicated power ii) Brake power iii) Mechanical
efficiency iv) Brake thermal efficiency. (07 Marks)

Module-3

- 5 a. Explain with a neat sketch taper turning by swiveling of compound rest method. (06 Marks)
b. What is programmable automation? What are its characteristics? (04 Marks)
c. With a neat block diagram, explain a CNC system. (06 Marks)

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OR

- 6 a. With neat sketches, explain the following machining operations:
i) Boring ii) Counter boring iii) End milling. (09 Marks)
- b. Explain with neat sketch, cylindrical coordinate configuration robot. What are its merits and demerits? (07 Marks)

Module-4

- 7 a. Classify non-ferrous metals. (03 Marks)
- b. Write a note on laminated composites. (06 Marks)
- c. Explain with a neat sketch the working of electric arc welding. (07 Marks)

OR

- 8 a. Mention the properties and uses of grey cast iron. (06 Marks)
- b. Write a note on soldering process. (06 Marks)
- c. List out the differences between brazing and welding. (04 Marks)

Module-5

- 9 a. Define the following:
i) Ton of refrigeration
ii) Coefficient of performance
iii) Air conditioning. (06 Marks)
- b. With a neat sketch, explain the working of room air conditioner. (10 Marks)

OR

- 10 a. With a neat sketch, explain the working of vapour absorption refrigeration system. (10 Marks)
- b. Differentiate between refrigeration and air conditioning. (06 Marks)

CBCS SCHEME

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15ELE15/25

First/Second Semester B.E. Degree Examination, June/July 2019 Basic Electrical Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. State Kirchhoff's laws. For the circuit shown in Fig.Q1(a) if $V_a = 60V$, $V_b = 20V$, $R_a = 20\Omega$, $R_b = 5\Omega$. Find V_c the voltage across R_c . (07 Marks)

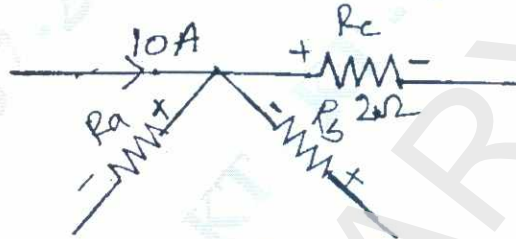


Fig.Q1(a)

- b. Explain statically and dynamically induced EMF's. (04 Marks)
- c. Two identical coils of 1200 turns each are placed side by side such that 60% of flux produced by coil links the other. A current of 10Amps in first coil sets up a flux of 0.12milli webers. If current in first coil changes from 10 Amps to -10 Amps in 20 milli seconds. Find :
 i) Self inductance of coils
 ii) The E.M.F's induced in both the coils. (05 Marks)

OR

- 2 a. For the circuit shown in Fig. Q2(a). i) Find 'R' ii) current through 20Ω resistance iii) power supplied by source if power dissipated in 40Ω is 160 watts. (06 Marks)

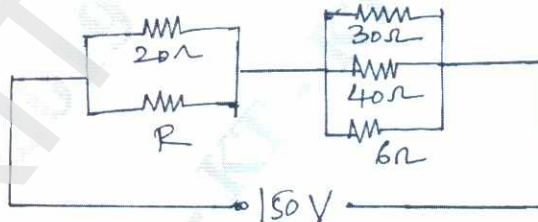


Fig.Q2(a)

- b. State Lenz's law and Flemings left hand rule. (04 Marks)
- c. For the circuit shown if Fig. Q2(c). Find voltage across AB i) with switch 'S' open ii) with switch 'S' closed. (06 Marks)

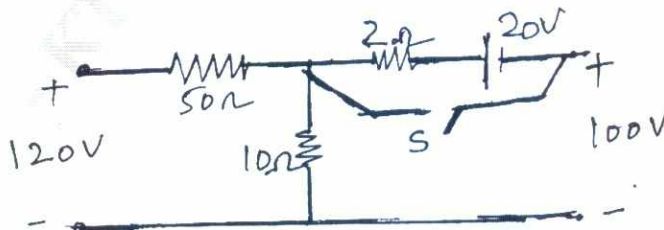


Fig.Q2(c)

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.

Module-2

- 3 a. Derive Torque equation for a DC motor (04 Marks)
 b. Explain with neat diagram the constructional features and operation of an induction type single phase energy meter. Show that revolution of disc is proportional to energy consumed. (06 Marks)
 c. A 40 KW long shunt compound generator supplies full load current at a load voltage of 400V. The shunt and series field resistances are 100Ω and 0.05Ω respectively.
 Find :
 i) Load resistance ii) armature current iii) induced EMF. (06 Marks)

OR

- 4 a. A 4-pole DC shunt motor working on 250 volts takes a current of 2 amperes when running at 1000 RPM. What will be its back EMF, speed if motor takes 51A at certain load? Armature and shunt field resistances are 0.2Ω and 250Ω respectively. (06 Marks)
 b. Derive EMF equation of a DC generator. (06 Marks)
 c. Explain the significance of back EMF and necessity of a starter for a DC motor. (04 Marks)

Module-3

- 5 a. For circuit shown in Fig.Q5(a) find current in all branches. Draw vector diagram. (06 Marks)

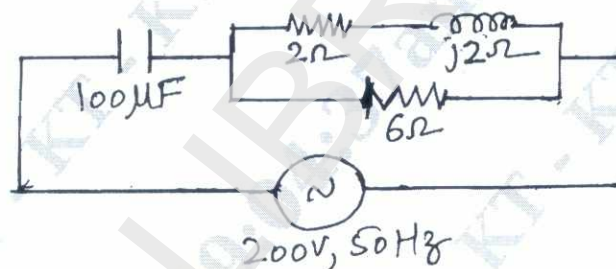


Fig.Q5(a)

- b. With neat diagram, explain plate Earthing. (05 Marks)
 c. Derive the expression for average power consumed in an R-L series circuit. (05 Marks)

OR

- 6 a. Derive RMS value for sinusoidal voltage with definition. (05 Marks)
 b. With suitable circuit diagrams table the operations of two way control of lamps. (05 Marks)
 c. A certain takes a current of $(-5 + j10)$ amperes when applied voltage is $(50 + j200)$ volts. If the frequency of the supply is 50Hz, Find :
 i) Circuit elements ii) apparent power iii) reactive power iv) power factor. (06 Marks)

Module-4

- 7 a. Show that with necessary circuit and vector diagram the two wattmeters used to measure power reads equal in a 3-phase balanced star connected purely resistive load. (06 Marks)
 b. Derive the EMF equation of an 3 – phase synchronous generator. (04 Marks)
 c. Three identical resistors are connected in star across 400V, 50Hz AC supply. The line current is 10Amps. Find power consumed when resistors are reconnected in delta with line current remaining the same. (06 Marks)

OR

- 8 a. A 3 – phase star connected alternator on open circuit is required to generate a line voltage of 3600V, 50Hz when driven at 500 RPM. The stator has 3 slots/pole/phase and 10 conductors/slot. Calculate useful flux/pole by assuming full pitched coils. (07 Marks)
- b. A certain 3–phase load takes 20KW at 25 KVA. Find the reading of two wattmeters to measure power. (04 Marks)
- c. With neat diagram, explain the construction and working of salient pole alternator.(05 Marks)

Module-5

- 9 a. Derive the EMF equation of a single-phase transformer. (04 Marks)
- b. Derive the condition for maximum efficiency and define voltage regulation for a single phase transformer. (06 Marks)
- c. The EMF in the stator of an 8-pole induction motor has a frequency of 50Hz and that of rotor is 1.5Hz. Find the speed of the rotor and slip. (06 Marks)

OR

- 10 a. With neat diagram, explain the star-delta starter for an 3-phase induction motor. (05 Marks)
- b. A transformer has a maximum efficiency of 98% at three-fourth load and unity power factor. The copper loss at this load is 314 watts. Compute the efficiency of transformer at 80% load with same power factor. (07 Marks)
- c. Explain the working of an squirrel cage induction motor with neat diagrams. (04 Marks)

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CBCS SCHEME

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15ELN15/25

First/Second Semester B.E. Degree Examination, June/July 2019 Basic Electronics

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Draw forward and reverse V- I, characteristics of Si and Ge diodes and make any two comparison between Si and Ge diodes. (04 Marks)
- b. With a neat circuit diagram, input and output waveforms, explain the working of an Half wave diode rectifier. (06 Marks)
- c. A full-wave rectifier supplies a load of 1000Ω . The ac voltage applied to it is $200-0-200$ V(rms). Calculate i) I_{DC} ii) I_{rms} iii) efficiency (η), Assume $R_f = 0\Omega$. (06 Marks)

OR

- 2 a. Define ' α ' and ' β ' of a transistor amplifier and derive the relation between α and β . (04 Marks)
- b. With a neat circuit diagram, input and output waveforms, explain the operation of a Full wave two diode rectifier. (06 Marks)
- c. Draw an output characteristics of CE-transistor amplifier, mark different regions of working on it, explain each region of working. (06 Marks)

Module-2

- 3 a. With a neat sketch and equations, explain what is dc load line and bias point in a CE base bias amplifier. (04 Marks)
- b. Explain with neat circuit diagram and equations, voltage divider bias amplifier. (06 Marks)
- c. Design bias-bias transistor circuit, using 'Si' transistor having ' β ' value of 100, V_{CC} is 10V, and dc bias conditions are to be $V_{ce} = 5v$ and $I_c = 5mA$. (06 Marks)

OR

- 4 a. Define CMRR and slew rate and write any four ideal characteristics for op-amp. (04 Marks)
- b. With a neat circuit diagram, derive an equation for op-amp application as
- | | |
|-------------------------------|-----------------------------|
| i) Inverting amplifier | ii) Non-inverting amplifier |
| iii) Inverting 2-input summer | iv) Subtractor |
| v) Integrator | vi) Differentiator. |
- (12 Marks)

Module-3

- 5 a. Convert $(1101010)_2 = ()_{10}$ and $(65)_{10} = ()_2$ (04 Marks)
- b. Convert $(ABCD)_{16} = ()_8$ and $(16000)_8 = ()_{16}$ (04 Marks)
- c. Write the truth table, design equations and circuit diagram of an Half adder using logic gates. (08 Marks)

OR

- 6 a. State and prove De Morgan's Theorem for 3-variables. (04 Marks)
- b. Realize AND, OR and EX-OR gates using NAND gates. (06 Marks)
- c. Perform the following subtraction using 1's and 2's complement, $(10111001)_2 - (1011)_2$. (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.

Module-4

- 7 a. Compare flip-flop and Latch. (02 Marks)
b. With circuit diagram and truth table explain the working of a NAND gate latch. (07 Marks)
c. Explain the operation of clocked RS-flip flop, with circuit diagram and truth table. (07 Marks)

OR

- 8 a. Explain with circuit diagram and truth table working of NOR gate latch. (06 Marks)
b. Draw the architecture of 8051 microcontroller, explain the function of each block used in it. (10 Marks)

Module-5

- 9 a. Draw the block diagram of communication system, explain the functions of each block used in it. (05 Marks)
b. Define amplitude modulation and derive equation of amplitude modulated double side band wave. (05 Marks)
c. A carrier of 2MHz has 1kW of its power amplitude modulated with a sinusoidal signal of 2KHz, the depth of modulation is 60%. Calculate the side band frequencies, signal band width, power in side bands, and total power of modulated wave. (06 Marks)

OR

- 10 a. Distinguish between active and passive transducers. (02 Marks)
b. Bring out any four differences between amplitude modulation and frequency modulation. (04 Marks)
c. Explain with neat diagram working of LVDT. (10 Marks)

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Second Semester B.E. Degree Examination, June/July 2019 Engineering Mathematics – II

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Solve $(D^2 - 4D + 4)y = e^{2x} + \cos 2x + 4$ by inverse differential operator method. (06 Marks)
- b. Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 5y = e^{2x} \sin x$ by inverse differential operator method. (05 Marks)
- c. Using the method of undetermined coefficients, solve $y'' - 3y' + 2y = x^2 + e^x$. (05 Marks)

OR

- 2 a. Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$ by inverse differential operator method. (06 Marks)
- b. Solve $(D^3 - 6D^2 + 11D - 6)y = e^{-2x} + e^{-3x}$ by inverse differential operator method. (05 Marks)
- c. Solve $y'' - 2y' + y = \frac{e^x}{x}$ by method of variation of parameters. (05 Marks)

Module-2

- 3 a. Solve $(2x - 1)^2 \frac{d^2y}{dx^2} + (2x - 1) \frac{dy}{dx} - 2y = 8x^2 - 2x + 3$. (06 Marks)
- b. Solve $xy \left(\frac{dy}{dx}\right)^2 - (x^2 + y^2) \frac{dy}{dx} + xy = 0$ (05 Marks)
- c. Solve $x^2(y - px) = p^2y$ by reducing into Clairaut's form and using the substitution $X = x^2$ and $Y = y^2$. (05 Marks)

OR

- 4 a. Solve $x^2y'' - xy' + 2y = x \sin(\log x)$. (06 Marks)
- b. Obtain the general solution of the differential equation $p^2 + 4x^5p - 12x^4y = 0$. (05 Marks)
- c. Obtain the general and singular solution of $y = 2px + p^2y$. (05 Marks)

Module-3

- 5 a. Form the partial differential equation by eliminating the arbitrary function from the relation $Z = y f(x) + x g(y)$. (06 Marks)
- b. Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$ for which $\frac{\partial z}{\partial y} = -2 \sin y$ when $x = 0$ and $z = 0$ when y is an odd multiple of $\pi/2$. (05 Marks)
- c. Derive one dimensional wave equation $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$. (05 Marks)

OR

- 6 a. Form a partial differential by eliminating the arbitrary function ϕ from the relation $\phi(x^2 + y^2 + z^2, z^2 - 2xy) = 0$. (06 Marks)
- b. Solve $\frac{\partial^2 z}{\partial x^2} + 4z = 0$, given that when $x = 0$, $z = e^{2y}$ and $\frac{\partial z}{\partial x} = 2$ (05 Marks)
- c. Determine the solution of the heat equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial K^2}$ by the method of separation of variables for the constant K is positive. (05 Marks)

Module-4

- 7 a. Evaluate $\int_1^2 \int_3^4 (xy + e^y) dy dx$. (06 Marks)
- b. Evaluate $\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy dx$ by changing the order of integration. (05 Marks)
- c. Obtain the relation between the beta and gamma function in the form $\beta(m, n) = \frac{\Gamma(m) \cdot \Gamma(n)}{\Gamma(m+n)}$ (05 Marks)

OR

- 8 a. Evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy$ by changing into polar coordinates. (06 Marks)
- b. Evaluate $\int_0^a \int_0^x \int_0^{x+y} e^{x+y+z} dz dy dx$. (05 Marks)
- c. Using beta and gamma function, prove that $\int_0^1 \frac{x^2}{\sqrt{1-x^4}} dx \times \int_0^1 \frac{x^2}{\sqrt{1+x^4}} dx = \frac{\pi}{4\sqrt{2}}$. (05 Marks)

Module-5

- 9 a. Find $L\left[\frac{\cos 2t - \cos 3t}{t} + t \sin t\right]$. (06 Marks)
- b. If $f(t) = \begin{cases} t & 0 \leq t \leq \pi \\ 2\pi - t & \pi < t \leq 2\pi \end{cases}$, where $f(t + 2\pi) = f(t)$, then prove that $L[f(t)] = \frac{1}{s^2} \tan h\left[\frac{\pi s}{2}\right]$. (05 Marks)
- c. Find $L^{-1}\left[\frac{s}{(s^2 + a^2)^2}\right]$ using convolution theorem. (05 Marks)

OR

- 10 a. Express $f(t) = \begin{cases} 1 & 0 < t < 1 \\ t & 1 < t < 2 \\ t^2 & t > 2 \end{cases}$ in term of unit step function and hence find its Laplace transform. (06 Marks)
- b. Find $L^{-1}\left[\frac{s+5}{s^2-6s+13}\right]$. (05 Marks)
- c. Employ the Laplace transform to solve the differential equation $y''(t) + 4y'(t) + 4y(t) = e^{-t}$ with the initial condition $y(0) = 0$ and $y'(0) = 0$. (05 Marks)

** 2 of 2 **

CBCS Scheme

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Question Paper Version : C

First/Second Semester B.E Degree Examination, June / July 2017 Environmental Studies

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 40

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the forty 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. Environmental (protection) act was enacted in the year,
a) 1986 b) 1992 c) 1984 d) 1974
2. The forest (conservation) act was enacted in the year,
a) 1986 b) 1974 c) 1994 d) 1972
3. The leader of Chipko movement is,
a) Sunderlal Bahuguna b) Medha Patkar c) Vandana Shiva d) Suresh Hebliker
4. Chernobyl Nuclear disaster occurred in the year,
a) 1984 b) 1985 c) 1986 d) 1987
5. The computer driven system that permits storing and retrieving environmental information,
a) GIS b) Digital information c) Information technology d) None of these
6. Bacteria that are commonly associated with root nodules are,
a) Rhizobium b) Bacillus c) Pseudomonas d) None of these
7. Earth's fresh water reserves are about,
a) 2.6% b) 26% c) 0.26% d) 1.6%

8. The Earth is believed to have come to existence some,
a) 3.5 billion years ago b) 4.5 billion years ago
c) 4.5 million years ago d) 5.5 million years ago
9. Which of the following is considered as an alternate fuel?
a) CNG b) Kerosine c) Coal d) Petrol
10. Wind Farms are located in,
a) River basin b) Plain area c) Hilly area d) Valley area
11. Hydrogen energy can be tapped through,
a) Heat pumps b) Fuel cells c) Photovoltaic cell d) Gasifier
12. With Minimum resource maximum energy can be created by,
a) Solar radiation b) Wind c) Nuclear fuels d) Tidal waves
13. Nuclear fusion uses the following as a fuel,
a) Carbon b) Helium c) Hydrogen d) Water
14. Biogas is gaseous fuel composed mainly of,
a) Methane and carbon dioxide b) Methane and hydrogen sulphide
c) Methane and Carbon monoxide d) None of these
15. Reduction in brightness of the famous Taj Mahal is due to,
a) Global warming b) Air pollution c) Ozone depletion d) Afforestation
16. Ozone layer thickness is measured in,
a) PPM b) PPB c) Decibels d) Dobson units
17. Bhopal gas tragedy caused due to leakage of,
a) Methyl Iso Cyanate b) Sulphur dioxide c) Hydrogen Sulphide d) Methane
18. Septic tank is,
a) An aerobic attached growth treatment system
b) An aerobic suspended growth biological treatment system
c) An aerobic attached growth biological treatment system.
d) An aerobic suspended growth treatment system.
19. Sound that is safest to the human ear should not exceed,
a) 45 Db b) 125 Db c) 70 Db d) 85 Db
20. Scientific means of M.S.W management involves,
a) Collection and transport b) Segregation
c) Safe disposal d) All of these
21. Cow dung can be used,
a) as manure b) for production of Bio gas
c) as fuel d) All of these

22. Biomedical waste can be disposed off by,
 a) Incineration
 b) Autoclaving and Land filling
 c) Both (a) and (b)
 d) None of these
23. The objectives of Integrated Child Development Services (ICDS) are,
 a) Immunization
 b) Health check up and referral services.
 c) Pre-school non-formal education
 d) All of these
24. The international protocol to protect the ozone layer is,
 a) Montreal protocol
 b) The Vienna protocol
 c) Kyoto protocol
 d) Cartagena protocol
25. Major purpose of most of the dams around the world is,
 a) Power generation
 b) Irrigation
 c) Drinking water supply
 d) Flood control
26. The Permissible range of pH for drinking water as per the Indian standard,
 a) 6 to 9
 b) 6.5 to 7.5
 c) 6 to 8.5
 d) 6.5 to 8.5
27. Excess of fluorides in drinking water is likely to cause,
 a) Blue babies
 b) Fluorosis
 c) Taste and Odour
 d) Colour
28. The largest reservoir of nitrogen on our planet is,
 a) Ocean
 b) Atmosphere
 c) Biosphere
 d) Fossil fuels
29. Mining means,
 a) Conserve and Preserve minerals
 b) Check pollution due to mineral resource
 c) Extract minerals and ores
 d) None of these
30. E.I.A can be expanded as,
 a) Environment and Industrila act
 b) Environmental Impact activity
 c) Environmental Impact Assessment
 d) Environmentally important activity.
31. "Earth Day" is held every year on,
 a) June 5th
 b) November 23rd
 c) April 22nd
 d) May 16
32. Water logging is a phenomena in which,
 a) Crop patterns are rotated
 b) Soil root zone becomes saturated due to over irrigation,
 c) Erosion of soil
 d) None of these
33. The term environment has been derived from French word which means to encircle or surround.
 a) Environ
 b) Oikor
 c) Geo
 d) Aqua
34. Which of the following component of the environment are effective transport of matter?
 a) Atmosphere and hydrosphere
 b) Atmosphere and Lithosphere
 c) Hydrosphere and Lithosphere
 d) Lithosphere and hydrosphere.

35. Which of the following is a biotic component of an ecosystem:
a) Fungi b) Solar light c) Temperature d) Humidity
36. The sequence of eating and being eaten in an ecosystem is called,
a) Food chain b) Carbon cycle c) Hydrological cycle d) None of these
37. Primary consumer is,
a) Herbivores b) Carnivores c) Macro consumer d) Omni vores
38. The Major atmospheric gas layer in stratosphere is,
a) Hydrogen b) Carbon dioxide c) Ozone d) Oxygen
39. A food web consists of,
a) a portion of a food chain b) an organisms position in a food chain
c) Interlocking of food chain d) a set of similar consumer
40. India has a world's largest share of which of the following:
a) Manganese b) Mica c) Copper d) Diamond

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First/Second Semester B.E Degree Examination, June/July 2019
Constitution of India, Professional Ethics and Human Rights

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 40

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the forty 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. The date of commencement of Indian Constitution is
a) 26-01-1950 b) 26-11-1949 c) 15-08-1947 d) 14-08-1947
2. In the final form of the constitution adopted by the constituent assembly, how many articles and schedules were there?
a) 395 Articles and 8 Schedules b) 398 Articles and 7 Schedules
c) 319 Articles and 8 Schedules d) 365 Articles and 7 Schedules
3. The preamble of the constitution of India has been amended so for
a) Four times b) Thrice c) Twice d) Once
4. The preamble was amended by
a) 24th amendment b) 42nd amendment c) 44th amendment d) 76th amendment
5. A state which does not promote or interfere in the affairs of religion is referred to as
a) Secular b) Democratic c) Socialist d) Liberal
6. Universal adult franchise shows that India is a country which is
a) Democratic b) Secular c) Socialist d) Sovereign
7. The first temporary 2-day president of the constituent assembly was
a) Rajendra Prasad b) BR Ambedkar
c) Sachidananda Sinha d) Shyamaprasad Mukharjee

22. Election Commission of India is
 a) One member commission
 b) Two member commission
 c) Multimember commission
 d) None of these
23. The 'amendment procedure' to the constitution is borrowed from the constitution of
 a) Britian
 b) USA
 c) Germany
 d) Canada
24. The amendment which restricted the size of council of ministers to 15% of legislative members is
 a) 91
 b) 86
 c) 76
 d) 74
25. Amendment that protects reservation to SC/ST employees in promotions is
 a) 42
 b) 86
 c) 77
 d) 91
26. Reservation for schedule castes and scheduled tribes in the house of the people is as per article
 a) 370
 b) 330
 c) 395
 d) 313
27. Which article gives special provisions to the state of Jammu and Kashmir?
 a) 370
 b) 330
 c) 395
 d) 313
28. The Prime Minister of India during the proclamation of emergency in 1975 was
 a) Charan Singh
 b) VP Singh
 c) VP Narasimha Rao
 d) Indira Gandhi
29. Chairperson of National Human Rights Commission is a
 a) Member of Parliament
 b) Retired Chief Justice of India
 c) Politician above the age of 60
 d) None of these
30. The National human rights commission of India was constituted on
 a) 12-10-2003
 b) 12-10-1993
 c) 10-12-1993
 d) 10-12-2003
31. Statutory provisions for Panchayat Raj as third level of administration in villages is included in the amendment
 a) 72
 b) 73
 c) 77
 d) 84
32. Powers to impose taxes by Panchayats is included in
 a) Article 330
 b) Article 243A
 c) Article 243B
 d) Article 243H
33. Which one is not a trade secret
 a) Equipment
 b) Pattern
 c) Formula
 d) Theorem
34. 'Fear' is an impediment to
 a) accountability
 b) liability
 c) transparency
 d) responsibility
35. The use of intellectual property for others without their permission or credit is referred as
 a) Trimming
 b) Forging
 c) Cooking
 d) Plagiarism

36. Which of the following does not depict the attitude towards responsibility?
a) Good works b) Protest c) Minimalist d) Reasonable care
37. The smoothing of irregularities to make data to look extremely precise done researches called
a) Forging b) Plagiarism c) Trimming d) Cooking
38. Which of the following is not preserved as an intellectual property?
a) Patterns b) Copy Rights
c) Government Regulations d) Trade Secrets
39. Corrupt professional judgment leads to
a) Reliability b) Integrity c) Conflict of interest d) None of these
40. One of the ways of reducing the risk is
a) Complex interaction b) Changing the working system
c) Normalization of deviance d) Tight coupling

* * * * *