CBCS SCHEME

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15MAT11

First Semester B.E. Degree Examination, Dec.2018/Jan.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 y_n if $y = \dfrac{1}{x^2 - 5x + 6}$. **(06 Marks)**

b. Find the angle between the curves $r = a(1 + \cos\theta)$ $r^2 = a^2 \cos 2\theta$ **(05 Marks)**

c. Find the radius of curvature for the curve $y^2 = \dfrac{4a^2(2a - x)}{x}$ where the curve meets x-axis. **(05 Marks)**

OR

2 a. If $x = \sin t$ $y = \cos mt$ prove that $(1 - x^2)y_{n+2} - (2n+1)xy_{n+1} + (m^2 - n^2)y_n = 0$ **(06 Marks)**

b. Find the Pedal equation of the curve $r^m = a^m(\cos m\theta + \sin m\theta)$ **(05 Marks)**

c. Show that for the curve $r(1 - \cos\theta) = 2a$ ρ^2 varies as r^3. **(05 Marks)**

Module-2

3 a. Obtain the Taylor's expansion of $\tan^{-1}x$ in powers of $x - 1$ up to the term containing fourth degree. **(06 Marks)**

b. Evaluate $\lim\limits_{x \to 0}\left(\dfrac{1}{x^2} - \cot^2 x\right)$. **(05 Marks)**

c. If $z = x^2 \tan^{-1}\left(\dfrac{y}{x}\right) - y^2 \tan^{-1}\left(\dfrac{x}{y}\right)$ show that $\dfrac{\partial^2 z}{\partial x \partial y} = \dfrac{x^2 - y^2}{x^2 + y^2}$. **(05 Marks)**

OR

4 a. Using Maclaurin's series prove that $\sqrt{1 + \sin 2x} = 1 + x - \dfrac{x^2}{2} + \dfrac{x^4}{24} \ldots\ldots$ **(06 Marks)**

b. If $u = f\left(\dfrac{x}{y}, \dfrac{y}{z}, \dfrac{z}{x}\right)$ prove that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} + z\dfrac{\partial u}{\partial z} = 0$. **(05 Marks)**

c. If $u = \sqrt{x_1 x_2}$ $v = \sqrt{x_2 x_3}$ $w = \sqrt{x_3 x_1}$ find $J\left(\dfrac{u, v, w}{x_1 x_2 x_3}\right)$. **(05 Marks)**

Module-3

5 a. A particle moves along a curve whose parametric equations are $x = e^{-t}$, $y = 2\cos 3t$, $z = 2\sin 3t$ where t is the time. Find the velocity and acceleration at any time t and also their magnitudes at $t = 0$. **(05 Marks)**

b. Find div $\vec{F}$ and curl $\vec{F}$ where $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$ **(05 Marks)**

c. Show that $\vec{F} = (y + z)i + (z + x)j + (x + y)k$ is irrotational. Also find a scalar potential such that $\vec{F} = \nabla\phi$. **(06 Marks)**

1 of 2

OR

6 a. If $\vec{F} = (3x^2y - z)i + (xz^3 + y^4)j - 2x^3z^2k$ find grad (div $\vec{F}$) at $(2, -1, 0)$ (06 Marks)

b. Show that $\vec{F} = \dfrac{xi + yj}{x^2 + y^2}$ is both solenoidal and irrotational. (05 Marks)

c. Prove curl (grad ϕ) = 0 for any scalar function ϕ. (05 Marks)

Module-4

7 a. Obtain reduction formula for $\displaystyle\int_0^{\pi/2} \operatorname{Sin}^n x \, dx$ where n is a positive integer. (06 Marks)

b. Evaluate $\displaystyle\int_0^{\pi/6} \operatorname{Cos}^4 3x \operatorname{Sin}^2 6x \, dx$ using reduction formula. (05 Marks)

c. Solve $\dfrac{dy}{dx} + \dfrac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$. (05 Marks)

OR

8 a. Obtain reduction formula for $\displaystyle\int_0^{\pi/2} \operatorname{Cos}^n x \, dx$ where n is a positive integer. (06 Marks)

b. Obtain the orthogonal trajectory of the family of curves $r = a(1 + \operatorname{Sin}\theta)$ (05 Marks)

c. If the temperature of the air is 30°C and metal ball cools from 100°C to 70°C in 15 minutes, find how long will it take for the metal ball to reach temperature of 40°C . (05 Marks)

Module-5

9 a. Find the rank of the matrix $A = \begin{bmatrix} 2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$. (06 Marks)

b. Solve by Gauss Jordan method $2x + 5y + 7z = 52$, $2x + y - z = 0$, $x + y + z = 9$. (05 Marks)

c. Find the largest eigen value and the corresponding eigen vector by power method given that
$A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{bmatrix}$ by taking the initial approximation to the eigen vector as $[1 \quad 0.8, -0.8]^1$.

(05 Marks)

OR

10 a. Use Gauss seidel method to solve the equations
$x + y + 54z = 110$, $27x + 6y - z = 85$, $6x + 15y + 2z = 72$. (06 Marks)

b. Reduce the matrix to diagonal form $A = \begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix}$ and hence find A^4. (05 Marks)

c. Reduce the quadratic form $8x^2 + 7y^2 + 3z^2 - 12xy + 4xz - 8yz$ into canonical form. (05 Marks)

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USN [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]   **15CHE12/22**

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.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. Derive Nernst equation for single electrode potential.   **(05 Marks)**
    b. Define electrolyte concentration cell. The e.m.f of cell Ag|AgNO$_3$ (0.001M)|| Ag NO$_3$(XM)| Ag is 0.0591 V at 25°C. Find the value of X.   **(05 Marks)**
    c. Explain the following battery characteristics:
       i)   Cell potential
       ii) Capacity
       iii) Cycle life.   **(06 Marks)**

OR

2   a. Define reference electrode. Discuss the construction and working of Ag-Agcl electrode.   **(05 Marks)**
    b. Describe the construction and working of Lithium – ion battery. Mention its application.   **(05 Marks)**
    c. Describe construction, working and application of methanol O$_2$ fuel cell using H$_2$SO$_4$ as electrolyte.   **(06 Marks)**

Module-2

3   a. Explain electrochemical theory of corrosion taking Iron as an example.   **(05 Marks)**
    b. Explain the following factors affecting corrosion
       (i)   Nature of corrosion product
       (ii) Ratio of Anodic to cathodic Area
       (iii) p^H of the medium.   **(05 Marks)**
    c. Describe electroplating of chromium (decorative and Hard). Mention the reasons for not using chromium Anode in electroplating of chromium.   **(06 Marks)**

OR

4   a. Explain waterline and pitting corrosion.   **(06 Marks)**
    b. What is metal finishing? Mention technological importance of metal finishing.   **(05 Marks)**
    c. Describe electro-less plating of copper with plating reactions.   **(05 Marks)**

Module-3

5   a. Define Cracking. Explain fluidized bed catalytic cracking method with a neat diagram.   **(05 Marks)**
    b. What is Reforming of petroleum? Give any three reactions involved in reforming. **(05 Marks)**
    c. What is photovoltaic cell? Explain the construction and working of photovoltaic cell. Mention any two advantages.   **(06 Marks)**

OR

6 a. Calculate the Gross or Net calorific value of a coal sample from the following data obtained
      from Bomb calorimetric experiment. **(05 Marks)**

   i)   Weight of coal   = 0.65×10^{-3} kg
   ii) Weight water in colorimeter   = 1200g
   iii) Water equivalent of calorimeter   = 400g
   iv) Latent heat of steam   = 587×4.2 kJ/kg
   v)   Rise in temperature   = 1.8°C
   vi) Sp-heat of water   = 4.187kJ/kg % of H = 5

   b. Explain the modules, panels and arrays of the design of PV cell. **(06 Marks)**
   c. Explain the purification of silicon by zone refining process. **(05 Marks)**

Module-4

7 a. Explain free radical mechanism for addition polymerization taking vinyl chloride as an
      example. **(06 Marks)**
   b. Describe the synthesis and applications of the following polymer.
      i)   Plexiglass (PMMA)
      ii) Polyurethane **(06 Marks)**
   c. What is glass transition temperature? Discuss how flexibility of polymer chain affects glass
      transition temperature. **(04 Marks)**

OR

8 a. Calculate number average and weight average of a polymer in which 200 molecules of
      1000 g/mole, 300 molecules of 2000g/mole and 500 molecules of 3000 g/mole are present
      respectively. **(06 Marks)**
   b. Explain the synthesis, properties and application of silicon rubber. **(05 Marks)**
   c. What is polymer composite? Describe the synthesis an application of Kevlar fibre. **(05 Marks)**

Module-5

9 a. Explain Scale and Sludge formation in the boiler. **(05 Marks)**
   b. Explain determination of DO (Dissolved O_2) by Winkler's method. **(06 Marks)**
   c. Write a note on fullerene. **(05 Marks)**

OR

10 a. Explain desalination of sea water by ion selective electrodialysis method. **(05 Marks)**
   b. Explain the synthesis of nanomaterial by chemical vapour condensation method. Mention
      advantages of this method. **(05 Marks)**
   c. Write short notes on Carbon nanotubes and Dendrimers. **(06 Marks)**

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USN ☐☐☐☐☐☐☐☐☐☐   **15PHY12/22**

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.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 : Plank's constant, h = 6.63× 10^{-34} JS; Mass of electron,
         m = 9.11 × 10^{-31} kg; Boltzmann constant, k = 1.38 × 10^{-23} J/k;
         Avogadro number, N_A = 6.02 × 10^{26}/Kmole; Velocity of
         light, c = 3 × 10^8 m/s; Charge of electron, e = 1.602 × 10^{-19}C.

Module-1

1   a.   What are postulates of Plank's quantum theory of black body radiations? Deduce Rayleigh and Jean's law from Planks's law. **(06 Marks)**
    b.   Define phase velocity and group velocity. Obtain the relation between group velocity and phase velocity. **(06 Marks)**
    c.   An electron has a speed of 800 m/s with an accuracy of 0.004%. Calculate the certainty with which one can locate the position of the electron. **(04 Marks)**

OR

2   a.   State Heisenberg's uncertainty principle and express three forms of uncertainty relations. **(04 Marks)**
    b.   Explain probability density. Set up one dimensional time independent Schrodinger wave equation. **(08 Marks)**
    c.   An electron is confined to move between two rigid walls separated by 1 nm. Find the de-Broglie wavelength of the electron corresponding to first excited energy state. **(04 Marks)**

Module-2

3   a.   Define Fermi-Dirac distribution function and explain the effect of temperature and energy on Fermi factor. **(06 Marks)**
    b.   Discuss the merits of quantum free electron theory. **(06 Marks)**
    c.   A metallic wire has a resistivity of $1.42 × 10^{-8}$ Ωm for an electric field of 0.14 Vm^{-1}. Find:
         i) Mean collision time   ii) Average draft velocity, assuming that there are $6 × 10^{28}$ electrons/m^3. **(04 Marks)**

OR

4   a.   Explain in brief expressions for electron and hole concentrations in conduction band and valence band of intrinsic semi conductor. **(06 Marks)**
    b.   What is Meissner effect? Explain two types of super conductors. **(06 Marks)**
    c.   Calculate the Fermi energy of sodium at 0 K assuming that it has one free electron per atom and a density of sodium is 970 kg/m^3 and atomic weight 23. **(04 Marks)**

Module-3

5   a.   Explain the welding mechanism and measurements of atmospheric pollutants using laser. **(05 Marks)**
    b.   Describe the construction and working of carbon dioxide laser with energy level diagram. **(08 Marks)**
    c.   Optical power of 1 mw is launched into an optical fibre of length 100 m. If the power emerging from the other end is 0.3 mw. Calculate the fibre attenuation. **(03 Marks)**

OR

6 a. Discuss the different types of optical fibres with sketches. (06 Marks)
   b. What is holography? Explain the recording and reconstruction processes in holography with neat diagram. (06 Marks)
   c. The output wavelength of CO_2 laser is 10.6 μm. If it produces an output of 1 kw, how many photons are emitted in one minute? (04 Marks)

Module-4

7 a. Define atomic packing factor. Explain seven crystal systems. (08 Marks)
   b. What are Miller Indices? Explain the procedure to find Miller Indices with example. (04 Marks)
   c. Calculate the wavelength of monochromatic beam of x-ray is incident on the plane (121) of NaCℓ, with a glancing angle 23.8°, results in second order diffraction maxima with a lattice constant 3.21 Å. (04 Marks)

OR

8 a. Define the terms:
      i)   Unit cell
      ii) Space lattice
      iii) Co-ordination number
      iv) Basis
      v)   Crystal structure (05 Marks)
   b. Define polymorphism and allotropy. Describe Bragg's spectrometer. Explain the determination of crystal structure. (08 Marks)
   c. Molybdenum has a BCC structure. Its Lattice parameter is 3.15 Å. Determine the radius of molybdenum atom. (03 Marks)

Module-5

9 a. Explain the construction and working of scanning electron microscope with neat diagram. (06 Marks)
   b. Define Mach number. Explain the distinction between subsonic and supersonic waves with suitable example. (05 Marks)
   c. Describe construction and working of Reddy's shock tube. (05 Marks)

OR

10 a. Explain density of states for any three quantum structures with graphical representation. (06 Marks)
   b. Describe sol-gel method for producing nano materials. (05 Marks)
   c. Explain the synthesis of carbon nanotubes using arc-discharge method. (05 Marks)

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USN | | | | | | | | | | **15PCD13/23**

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.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.   What is an operator? Explain the arithmetic, logical, and bitwise operators in C language.
                                                                   (08 Marks)
    b.   Write a C program which takes as input p,t,r. Compute the simple interest and display the result.
                                                                   (08 Marks)

OR

2   a.   What is the purpose of pirntf( ) statement? Explain the formatted printf( ) along with examples.
                                                                   (08 Marks)
    b.   What is type conversion? Illustrate different ways of type conversion with an example.
                                                                   (08 Marks)

Module-2

3   a.   Write a C program to calculate area of circle, rectangle and triangle using SWITCH case.
                                                                   (08 Marks)
    b.   What is two way selection statements? Explain nested if statement and cascaded IF-ELSE with examples.
                                                                   (08 Marks)

OR

4   a.   Write a C program to find GCD of two non–zero integer numbers. If the first number is less than the second number, then the program must exchange the two numbers before computing GCD.
                                                                   (08 Marks)
    b.   Illustrate with an example break and continue statements.   **(03 Marks)**
    c.   Compare while loop and do-while loop with syntax, flowchart and examples.   **(05 Marks)**

Module-3

5   a.   Define an array. Explain declaration and initialization of one dimensional array with an example.
                                                                   (08 Marks)
    b.   Write a C program to accept an alphanumeric (Eg : "ABC123DEFR") string, to count the number of characters and digits. Also display the result.
                                                                   (08 Marks)

OR

6   a.   Explain any four string manipulation functions with examples.   **(08 Marks)**
    b.   Write a C program to check a number is a prime number or not.   **(04 Marks)**
    c.   What is function? Write a C program to find square of a number using function.   **(04 Marks)**

Module-4

7 a. Write a C program to create a structure using typedef and input the following details of "N" students (USN : String Name : String Average : float grade : char). Print the names of students with their average is > = 60%. **(10 Marks)**

   b. Differentiate between structure and union with examples. **(06 Marks)**

OR

8 a. Explain how the structure variable passed as a parameter to a function with example. **(06 Marks)**

   b. Explain the following file operations along with syntax and examples :
      i) fopen( )   ii) fclose( )   iii) fscan( )   iv) fprintf( )   v) fgets( ). **(10 Marks)**

Module-5

9 a. List out various memory allocation and de-allocation mechanisms available in C? Write a C program to demonstrate them. **(08 Marks)**

   b. Discuss any two preprocessor directives in 'C'. **(03 Marks)**

   c. Define pointer. What are the operators used by pointer with an example. List the advantages and disadvantages of pointer. **(05 Marks)**

OR

10 a. Describe the two ways of passing parameters to function with examples. **(08 Marks)**

    b. Define stack. Explain the primitive operations on the stack. Write a C program to demonstrate it. **(08 Marks)**

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USN ☐☐☐☐☐☐☐☐☐☐   **15CIV13/23**

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Elements of Civil Engineering and Engineering Mechanics

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1   a.   Explain role of civil engineer in the infrastructural development.   **(06 Marks)**
     b.   Define force and its characteristics.   **(03 Marks)**
     c.   Determine the angle θ for the force F = 200N shown in Fig Q1(c) so that it produces
        i) maximum moment about A   ii) the minimum moment about A. Determine the maximum
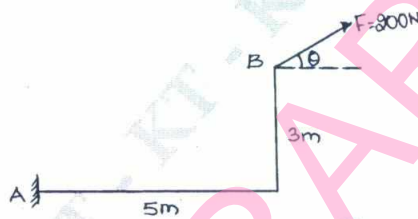   and minimum moment.   **(07 Marks)**

Fig Q1(c)

OR

2   a.   Explain different types of roads.   **(04 Marks)**
     b.   Explain with neat sketch law of physical independence, Law of super position and law of
        transmissibility of force.   **(06 Marks)**
     c.   The moment of a certain force F is 180 kN-m clockwise about 0 and 90kN-m counter
        clockwise about B. If its moment about A is zero, determine the force F for Fig Q2(c).

Fig Q2(c)   **(06 Marks)**

Module-2

3   a.   Stat and prove parallelogram law of forces.   **(05 Marks)**
     b.   Forces are transmitted by two members as shown in Fig Q3(b). If the resultant of these
        forces is 1400N directed upward vertically, find angle α and β.

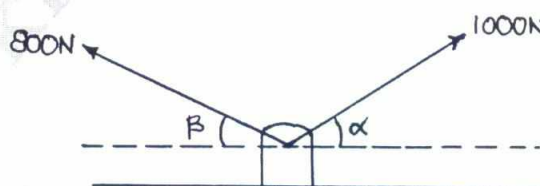Fig Q3(b)   **(06 Marks)**

c. Compute the resultant of the force system as in Fig Q3(c).

Fig Q3(c)   **(05 Marks)**
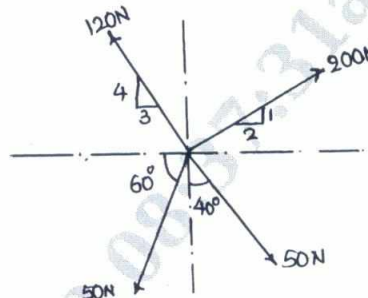
OR

(05 Marks)

4 a. State prove Lami's theorem.   **(05 Marks)**
   b. Determine the tension in the string and the reaction at contact surface for the cylinder of weight 1000N placed as shown in Fig 4(b).   **(05 Marks)**
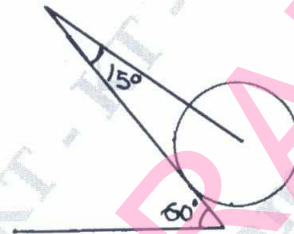
Fig Q4 (b)

c. What should be the value of θ in Fig Q4(c) which will make the motion of 900N block down the plane to impend? The coefficient of friction for all contact surfaces is 0.33.

Fig Q4(c)   **(06 Marks)**

Module-3

5 a. State and prove Varignon's principle of moments.   **(06 Marks)**
   b. Determine the resultant of the force system acting on the plate as shown in Fig Q5(b) with respect to AB and AD.   **(10 Marks)**
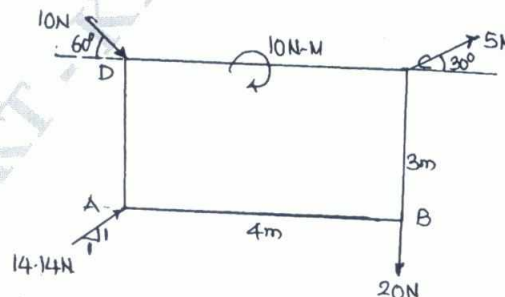
Fig Q5(b)
2 of 4

OR

6 a. Explain with neat sketch different types of beams and loadings. **(06 Marks)**
   b. Determine the reactions at A and B for the loaded beam shown in Fig Q6(b).
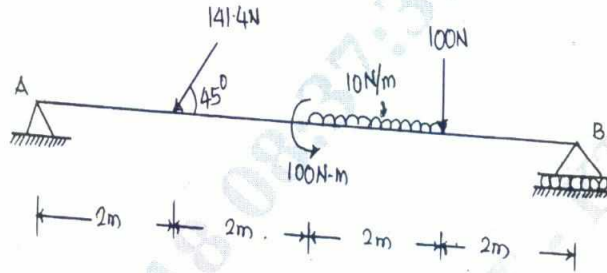
Fig Q6(b) **(10 Marks)**

Module-4

7 a. State and prove parallel axes theorem. **(06 Marks)**
   b. Determine the position of the centriod for the shaded area with respect to the axes shown in Fig Q7(b).
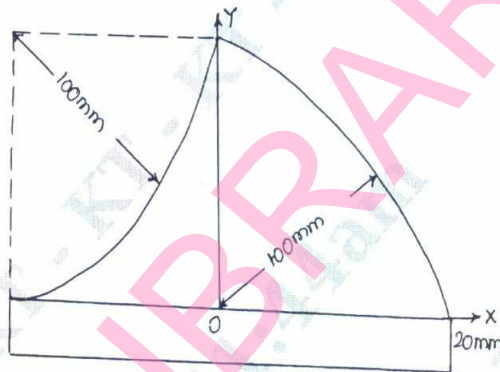
Fig Q7(b) **(10 Marks)**

OR

8 a. From first principle derive the relation for centroid of a triangle with base b and height h. **(06 Marks)**
   b. Determine the moment of inertia of a prestressed concrete beam section shown in Fig Q8(b) about horizontal and vertical axis passing through centriod.
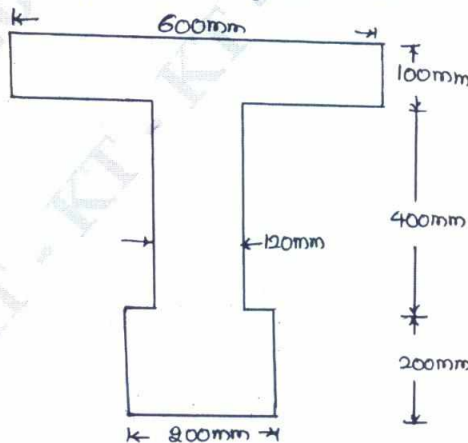
Fig Q8(b) **(10 Marks)**

Module-5

9 a. Explain Displacement, Distance travelled, velocity and acceleration in rectilinear kinematic.

(08 Marks)

b. A sprinter in a 100m race accelerates uniformly for the first 40m and then runs with constant velocity. If the sprinter's time for the first 40m is 5.2 seconds, determine his time for race.

(04 Marks)

c. A ball is projected vertically upwards with a velocity of 20m/sec. Two seconds later, a second ball is projected vertically upwards with a velocity of 16m/sec. Find the height above the surface at which the two ball meet.

(04 Marks)

OR

**10** a. A cricket ball thrown from a height of 1.8m above ground level at an angle of 30° with the horizontal with a velocity of 12m/sec is caught by a fielder at a height of 0.6m above the ground as shown in Fig Q10(a). Determine the distance between the two players.

Fig Q10(a)

(08 Marks)

b. The motion of a particle starting from rest is defined by $a = 10t - t^2$ where a is in m/sec² and t is in seconds. Find the displacement before it starts in reverse direction of motion and velocity when acceleration changes its direction.

(08 Marks)

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First/Second Semester B.E. Degree Examination, Dec.2018/Jan.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.   Deduce an expression for stored energy in a magnetic field.   (04 Marks)
    b.   Find current in the battery, the current in each branch and pd cross AB in the network shown
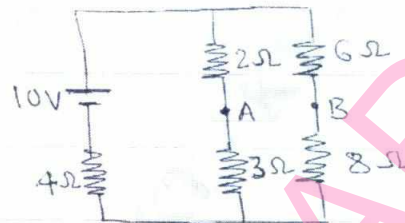   in Fig.Q1(b).   (06 Marks)

Fig.Q1(b)

    c.   A coil of 1000 turns is wound on a silicon steel ring of relative permeability 1200. The ring
         has a mean diameter of 10cm and cross–sectional area of 12 sq.cm. When a current of 4
         amperes flows through the coil. Find :
         i)   Flux in the core
         ii) Inductance of the coil
         iii) The e.m.f included in the coil if the flux falls to zero in 15 milli seconds
         iv) Now if another similar coil is placed such that 70% magnetic coupling exists between
              the coils. Find the mutual inductance.   (06 Marks)

OR

2   a.   State Fleming's right hand rule. Mention its application.   (04 Marks)
    b.   A resistance of 10Ω is connected in series with the two resistances each of 15Ω arranged in
         parallel. What resistance must be shunted across this parallel combination so that the total
         current taken will be 1.5A from 20V supply applied?   (06 Marks)
    c.   Coils A and B in magnetic circuit have 600 and 500 turns respectively. A current of 8A in
         coil A produces a flux of 0.04 Wb. If coefficient of coupling is 0.2, Calculate :
         i)   Self inductance of coil A with B open circuited
         ii) Flux linking with coil B
         iii) The average e.m.f induced in coil B when the flux with it changes from zero to full
              value in 0.02 second
         iv) Mutual inductance.   (06 Marks)

Module-2

3   a.   With a neat sketch explain the construction of a DC machine.   (06 Marks)
    b.   State the application of DC shunt motor and DC series motor.   (04 Marks)
    c.   A 4 pole. 220V, Lap connected, DC shunt motor has 36 slots. Each slot containing 16
         conductors. It draws a current of 40A form the supply. The field resistance and armature
         resistance are 110Ω, 0.1Ω respectively. The motor develops an output power of 6KW. The
         flux for pole is 40 MWb. Calculate :
         i) The speed   ii) The torque developed by the armature   iii) The shaft torque.   (06 Marks)

OR

4 a. Explain different characteristics of a DC series motor. **(05 Marks)**
   b. With the help of neat diagram, explain the construction and principle of operation of single phase energy meter. **(06 Marks)**
   c. An 8 pole, Lap-connected armature has 40 slots with 12 conductors per slot, generates a voltage of 500V. Determine the speed at which it is running if the flux per pole is 50 MWb. **(05 Marks)**

Module-3

5 a. With a neat circuit diagram and a switching table, explain three way control of lamp. **(04 Marks)**
   b. Derive an expression for RMS value of an alternating quantity. **(06 Marks)**
   c. Two impedances of $Z_1 = 10 + j15\Omega$ and $Z_2 = 6 - j8\Omega$ are connected in parallel. If the supply current is 20A. What is the power dissipated in each branch? **(06 Marks)**

OR

6 a. Show that the average power consumed by pure inductor is zero. **(05 Marks)**
   b. Explain the plate earthing along with a neat diagram. **(06 Marks)**
   c. An alternating current of frequency of 60Hz has a maximum value of 12A
      i) Write down the equations for its instantaneous value
      ii) Find the value of current after $\frac{1}{360}$ seconds
      iii) Find the time taken to reach 9.6 Amps for the first time. **(06 Marks)**

Module-4

7 a. Obtain the relationship between line and phase values of current in a three phase balanced delta connected system. **(05 Marks)**
   b. Discuss the different types of rotor used in alternator **(07 Marks)**
   c. A 3 phase star connected system has 4Ω resistance in series with an inductance of 10mH per phase is applied voltage is 415V with frequency of 50 Hz. Find the power drawn by the circuit. **(04 Marks**

OR

8 a. Derive e.m.f equation of an alternator. **(05 Marks)**
   b. Three coils each of impedance $20\lfloor60°$ are connected in star to a 3 phase, 400V, 50Hz supply. Find the reading on each of the two wattmeters connected to measure the power input. **(05 Marks)**
   c. A 3-phase, 6-pole, star connected alternator revolves at 1000rpm. The stator has 90 slots and 8 conductors per slot. The flux per pole is 0.05 Wb. Calculate voltage generated if $k_w = 0.96$. **(06 Marks)**

Module-5

9 a. Explain the principle of operation of a 3-phase induction motor. **(05 Marks)**
   b. With a neat sketch explain the constructional details of core and shell type transformer. **(06 Marks)**
   c. A 100 KVA, 6000/400V, 50Hz, single phase transformer has 100 turns in the secondary. Find : i) Full load primary current and secondary current ii) number of turns in the primary coil iii) maximum flux in the core. **(05 Marks**

OR

10 a. A 6 pole induction motor is supplied by a 10 pole alternator which is driven at 600rpm. If the motor is running at 970 rpm, determine the percentage slip. **(05 Marks)**
    b. Derive the expression for frequency of rotor currents. **(04 Marks)**
    c. A 600 KVA transformer has an efficiency of 92% at full load, unity pf. and at half load, 0.9 pf. Determine its efficiency at 75% of full load and 0.9pf. **(07 Marks)**

* * * 2 of 2 * * *

USN | | | | | | | | | | **15ELN15/25**

First/Second Semester B.E. Degree Examination, Dec.2018/Jan.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 and explain the V-I characteristics of a Silicon diode. **(05 Marks)**
    b. Find the value of the series resistance 'R_S' required to drive a forward current of 1.25mA through a germanium diode from a 4.5V barrtery. Write the circuit diagram showing all the values. **(04 Marks)**
    c. With circuit diagram, explain the operation of center-tapped full wave rectifier. Draw input and output waveforms. **(07 Marks)**

OR

2   a. Design the Zener regulator for the following specifications. Output voltage = 5V, load current = 20mA, Zener voltage $P_{Z(min)}$ = 500 mW and input voltage = 12V± 3V. **(05 Marks)**
    b. Draw CE circuit and sketch the input and output characteristics also explain the operating regions by indicating them on the characteristics curve. **(08 Marks)**
    c. Calculate the values of I_C and I_E for a BJT with α = 0.97 and I_B = 50 μA. Also determine the value of β_{dc}. **(03 Marks)**

Module-2

3   a. Determine the operating point for a Silicon transistor biased by base bias method, for β = 100, R_C = 2.5kΩ, R_B = 500kΩ and V_{CC} = 20V. Also draw the DC load line. **(06 Marks)**
    b. With a net circuit diagram. Explain the voltage divider bias circuit. **(07 Marks)**
    c. Compare base bias and voltage divider bias circuits. **(03 Marks)**

OR

4   a. List the characteristics of an ideal op-amp. **(05 Marks)**
    b. A non-inverting amplifier has input resistance of 10kΩ and feedback resistance of 60 kΩ? With a load resistance of 47kΩ. Draw the circuit and calculate the output voltage, voltage gain, load current, when the input voltage is 1.5V. **(06 Marks)**
    c. Derive the expression for 3–input summing amplifier. **(05 Marks)**

Module-3

5 a. Compare analog and digital signal. (04 Marks)
   b. Convert :
      i) $(1AD.EO)_{16} = (?)_{10} = (?)_8$
      ii) $(1101101)_2 = (?)_{10}$
      iii) $(69)_{10} = (?)_2$ (05 Marks)
   c. Perform the subtraction :
      i) $(10010)_2$ and (1101) using 1's complement method
      ii) $(10010)_2$ and $(01101)_2$ using 2's complement method. (07 Marks)

OR

6 a. State and prove DC – Morgan's theorems for 4 variables. (08 Marks)
   b. Simplify the following expression and realize using basic gates :
      $Y = A(\overline{ABC} + A\overline{BC})$. (04 Marks)
   c. Realize half adder using only NAND gate. (04 Marks)

Module-4

7 a. Define flip-flop. Give the difference between a later and flip-flop. (04 Marks)
   b. Explain the working of a NOR gate later. (06 Marks)
   c. With diagram and truth table explain clocked RS –flip-flop. (06 Marks)

OR

8 a. List the important features of 8051 microcontroller. (03 Marks)
   b. Explain the architecture of 8051 microcontroller. (07 Marks)
   c. With block diagram, explain the micro-controller based stepper motor control system. (06 Marks)

Module-5

9 a. With a neat block diagram, explain the elements of communication system. (06 Marks)
   b. A carrier of 1MHz, with 400W of its power is amplitude modulated with a sinusoidal signal of 2500Hz. The depth of modulation is 75%. Calculate the sideband frequencies, the band width, the power in the side bands and the total power in the modulated wave. (05 Marks)
   c. Give the comparison between AM and FM. (05 Marks)

OR

10 a. What is a Transducer? Distinguish between active and passive transducer. (05 Marks)
   b. A termistor has a material constant 'β' of 2000/° K. If its resistance is 100 kΩ at 300°k temperature, what will be the resistance at 500°k? (04 Marks)
   c. Explain the construction and the principle of operation of LVDT. Also list the advantages of LVDT. . (07 Marks)

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USN |___|___|___|___|___|___|___|___|___|___| **15MAT21**

Second Semester B.E. Degree Examination, Dec.2018/Jan.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 $\dfrac{d^2y}{dx^2} - 4y = \cosh(2x-1) + 3^x$ by inverse differential operator method. **(06 Marks)**

   b. Solve $\dfrac{d^2y}{dx^2} + 2\dfrac{dy}{dx} + 3y = e^x\cos x$ by inverse differential operator method. **(05 Marks)**

   c. Solve $(D^2 + 1)y = \operatorname{cosec} x$ by the method of variation of parameters. **(05 Marks)**

OR

2 a. Solve $(D^3 - 5D^2 + 8D - 4)y = (e^x + 1)^2$ by inverse differential operator method. **(06 Marks)**

   b. Solve $\dfrac{d^2y}{dx^2} - y = (1 + x^2)e^x$ by inverse differential operator method. **(05 Marks)**

   c. Solve $(D^2 - 3D + 2)y = x^2 + e^{3x}$ by the method of undetermined coefficients. **(05 Marks)**

Module-2

3 a. Solve $x^2y'' + xy' + y = \sin^2(\log x)$ **(06 Marks)**
   b. Solve $p^2 + p(x + y) + xy = 0$ **(05 Marks)**
   c. Solve $p = \sin(y - xp)$. Also find its singular solution. **(05 Marks)**

OR

4 a. Solve $(1 + 2x)^2 y'' - 6(1 + 2x)y' + 16y = 8(1 + 2x)^2$ **(06 Marks)**
   b. Solve $xp^2 - 2yp + x = 0$ **(05 Marks)**
   c. Solve $y = 2px + y^2p^3$ **(05 Marks)**

Module-3

5 a. Form the partial differential equation from $z = f(x + ay) + g(x - ay)$ by eliminating arbitrary functions f and g. **(06 Marks)**

   b. Solve $\dfrac{\partial^2 z}{\partial x \partial y} = \sin x \cos y$, given $\dfrac{\partial z}{\partial y} = -2\cos y$ when $x = 0$ and when y is odd multiple of π $z = 0$. **(05 Marks)**

   c. Derive one dimensional wave equation $\dfrac{\partial^2 y}{\partial t^2} = c^2 \dfrac{\partial^2 y}{\partial x^2}$. **(05 Marks)**

OR

6 a. Obtain the partial differential equation by eliminating a, b, c from $z = ax^2 + bxy + cy^2$. **(06 Marks)**

   b. Solve $\dfrac{\partial^2 z}{\partial y^2} = z$, given that $z = e^x$ and $\dfrac{\partial z}{\partial y} = e^{-x}$ when $y = 0$. **(05 Marks)**

c. Obtain the various possible solutions of one dimensional heat equation $\dfrac{\partial u}{\partial t} = c^2 \dfrac{\partial^2 u}{\partial x^2}$ by the method of variables separable. **(05 Marks)**

Module-4

7 a. Evaluate $\displaystyle\int_1^3 \int_{1/x}^1 \int_0^{\sqrt{xy}} xyz \, dz \, dy \, dx$ **(06 Marks)**

b. Change the order of integration in $\displaystyle\int_0^a \int_y^a \dfrac{x \, dx \, dy}{x^2 + y^2}$ and hence evaluate. **(05 Marks)**

c. Prove that $\displaystyle\int_0^{\pi/2} \sqrt{\sin\theta} \, d\theta \times \int_0^{\pi/2} \dfrac{d\theta}{\sqrt{\sin\theta}} = \pi$ **(05 Marks)**

OR

8 a. Evaluate $\displaystyle\int_0^a \int_0^{\sqrt{a^2 - x^2}} y^2 \sqrt{x^2 + y^2} \, dy \, dx$ by changing into polar coordinates. **(06 Marks)**

b. Find by double integration the area bounded between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$. **(05 Marks)**

c. Prove that $\beta(m,n) = \dfrac{\Gamma(m)\,\Gamma(n)}{\Gamma(m+n)}$ **(05 Marks)**

Module-5

9 a. Find (i) $L\{ te^{-2t} \sin^2 t \}$ (ii) $L\left\{ \dfrac{e^{-at} - e^{-bt}}{t} \right\}$ **(06 Marks)**

b. Given $f(t) = t^2$, $0 < t < 2a$ and $f(t + 2a) = f(t)$, find $L\{f(t)\}$. **(05 Marks)**

c. Using Laplace transforms solve the differential equation
$y'' - 2y' + y = e^{2t}$ with $y(0) = 0$ and $y'(0) = 1$. **(05 Marks)**

OR

10 a. Find $L^{-1}\left\{ \dfrac{2s-1}{s^2 + 2s + 17} \right\}$ **(06 Marks)**

b. Using convolution theorem find $L^{-1}\left\{ \dfrac{s}{(s^2 + a^2)^2} \right\}$ **(05 Marks)**

c. Express $f(t) = \begin{cases} \cos t & : \quad 0 < t \le \pi \\ \cos 2t & : \quad \pi < t \le 2\pi \\ \cos 3t & : \quad t > 2\pi \end{cases}$

interms of unit step function and hence find its Laplace transforms. **(05 Marks)**

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CBCS SCHEME

15CPH18/28

USN

First/Second Semester B.E Degree Examination, Dec.2018/Jan.2019
Constitution of India, Professional Ethics & 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.

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1. The Indian constitution has the distinction of - - - - -
   a) the world's largest written constitution
   b) the world's smallest written constitution
   c) the best constitution in the world
   d) one of the oldest constitution in the world

2. Which among the following was not a port of the original preamble of the constitution of India?
   a) sovereign   b) Democratic   c) secular   d) republic

3. How many categories of fundamental rights are guaranteed in part III of the constitution?
   a) 7   b) 5   c) 4   d) 6

4. The Bijoe Emmanuel V/s State of Kerala (the National Anthem Case) was a case, where the supreme cart of India interpreted the fundamental right, freedom to / of - - - - -
   a) assemble peacefully and without arms
   b) speech and expression
   c) move freely through the territory of India
   d) associations or unions

5. Which among the following was the fundamental right added to the constitution by an amendment in 2002?
   a) right to freedom
   b) right to education
   c) freedom to assemble peacefully and without arms
   d) freedom to practice any profession

-D1-

6. The constitutional goal of formulating the directive principles of state policy was to make India into a - - - -
    a) welfare state
    b) police state
    c) military state
    d) constitutional monarchy

7. In which case did the supreme court of India hold that children below the age of 14 years cannot be employed in any hazardous industry, mines or other work?
    a) Sarla Mudgal v/s union of India
    b) M.C. Mehta v/s state of Tamil Nadu
    c) T.M.A Pai v/s state of Karnataka
    d) S.R. Bommai v/s union of India

8. Article 51(A) of the constitution specifies a code of - - - fundamental duties for citizens.
    a) 10   b) 12   c) 11   d) 9

9. Article 41, which directs the state to provide opportunities to enjoy maternity care and relief comes under the - - - - of DPSP
    a) social and economic charter
    b) social security charter
    c) community welfare charter
    d) potential freedoms charter

10. The DPSP, as per Article 37 of the constitution are - - - - -
    a) justiciable   b) non-justiciable   c) partially justiciable   d) none of these

11. The constitutional head of the Indian state is - - - - -
    a) the prime minister
    b) the president
    c) the council of ministers
    d) the chief justice of India

12. The president of India can exercise - - - -
    i) Executive and military powers
    ii) Diplomatic and legislative powers
    iii) Ordinance making powers
    iv) Judicial and emergency powers

    a) i & ii   b) iii & iv   c) i & iii   d) i, ii, iii, & iv

13. The prime minister of India must be - - - - -
    a) a member of the Lok Sabha
    b) a member of the Rajya Sabha
    c) a member of either of the two houses
    d) None of these

14. The Rajya Sabha is also known as - - - - -
    a) the council of ministers
    b) the council of people
    c) the council of states
    d) the lower house

15. The power to interpret and safeguarded the constitution is vested with - - - - -
    a) the parliament
    b) the president
    c) the chief justice of India
    d) the supreme court of India

16. Which among the following is NOT a qualification to become the Governor of a state?
    a) She/He must be a citizen of India
    b) She/He must have attained the age of 35 years
    c) She/He shell be a number of either union or state legislature
    d) She/He shall not held any office of profit at the time a appointment

17. It is the prerogative of - - - - - to choose the council of ministers of state legislature
    a) the chief minister   b) the governor
    c) the speaker   d) the leadr of the opposition

18. How many India states have a bi-cameral legislature at present?
    a) 5   b) 6   c) 7   d) 8

19. Disputes related to elections are primarily settled by the - - - - -
    a) subordinate courts   b) high courts
    c) supreme court   d) election commission

20. Abolition of untouchability is mentioned in Article - - - - - of the Indian constitution
    a) 17   b) 19   c) 18   d) 275

21. National commission for scheduled castes and scheduled Tribes shall have the powers of a
    a) criminal court   b) tribunal   c) civil court   d) high court

22. The intervening period between two sessions of a state legislature shall not be more than
    a) 3 months   b) 4 months   c) 1 month   d) 6months

23. Which among the following is not an institution meant to safeguard the laws aimed at empowering women?
    a) National Human Rights Commission
    b) National Commission For Women And Children
    c) The Parliament
    d) Family Courts

24. What is prohibited by Article 24 of the constitution?
    a) child labour   b) traffic in humans
    c) child marriage   d) punishing children who committed heinous crime

25. The present chairman of National Human Rights Commission is - - - - -
    a) K.G. Balakrishnan   b) H.L. Dattu
    c) Venkata Chelliah   d) Santhosh Hegde

26. The chief election commissioner can be removed from his/her office by - - - - -
    a) an order of the president   b) an executive order by the parliament
    c) impeachment by the parliament   d) the supreme court

27. - - - - - is not a function of the election commission
    a) selecting candidates for political parties
    b) preparing electoral rolls
    c) conducting elections
    d) counting of votes and declaration of results

28. Fundamental rights and DPSP can be amended by - - - - -
    a) simple majority in the parliament
    b) two-third majority in the parliament
    c) two-third majority in the parliament with ratification by half of the state legislatures
    d) none of these

-D3-

29. Fundamental duties were added to the constitution by the - - - - -
    a) 44th Amendment Act of 1978   b) 73rd Amendment Act of 1993
    c) 77th Amendment Act of 1995   d) 42nd Amendment Act of 1976

30. Indian constitution is - - - - -
    a) rigid   b) flexible
    c) partly rigid and partly flexible   d) partly written and partly unwritten

31. One of the aims of studying engineering Ethics is to - - - - -
    a) inspire engineers acquire in depth knowledge in the engineering field
    b) stimulate moral imagination
    c) acquire new skills in engineering testing
    d) encourage research in engineering

32. The basis of or reference point for professional ethics is - - - - -
    a) common morality   b) personal morality
    c) business ethics   d) social morality

33. The skill and habit of thinking independently and rationally about ethical issues on the basis of moral concern is referred to as - - - - -
    a) moral integrity   b) moral consistency
    c) ethical awareness   d) moral autonomy

34. Which among the following is NOT an impediment to professional responsibility?
    a) courage   b) fear   c) self-deception   d) microscopic vision

35. Causing harm without aiming to cause harm but acting in conscious awareness that harm is likely to result is referred to as - - - - - causing harm
    a) intentionally   b) reckessly   c) negligently   d) inadvertently

36. The use of intellectual property of others without their permission or credit is - - - - -
    a) trimming   b) cooking   c) plagiarism   d) forging

37. Which among the following is not an attitude towards responsibility in engineering?
    a) reasonable care   b) good works   c) minimalist   d) idealistic

38. The question "What is 'safety' and how is it related to 'risk'?" is an example of - - - - inquiry
    a) conceptual   b) factual   c) normative   d) descriptive

39. When one is in a professional relationship - - - - - is supposed to take precedence over personal morality
    a) social morality   b) common morality   c) professional ethics   d) religious morality

40. Which among the following are part of the umbrella virtue called professional responsibility?
    a) self-direction virtues   b) public spirited virtues
    c) teamwork virtues   d) all of these

* * * * *

-D4-

USN | 1 | K | T | 1 | 6 | M | E | 4 | 0 | 4 |

Question Paper Version : A

First/Second Semester B.E Degree Examination, Dec.2018/Jan.2019
Environmental Studies
(COMMON TO ALL BRANCHES)

Time: 2 hrs.]   [Max. Marks: 40

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the fourty 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.

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1. The word ecology is proposed by
   a) Ernst Heckel   b) Helena curtis   c) Charles Southwick   d) Charles Alton

2. A food web consists of
   a) a portion of food chain   b) An organism position in food chain
   c) Interlocking of food chain   d) A set of similar consumers

3. Population explosion will cause
   a) Bio diversity   b) Stress on ecosystem
   c) More Employment   d) None of these

4. Which of the following statement is not true about animal husbandary?
   a) it is a part of agricultural activity
   b) It is breeding, feeding and management of animals
   c) It is live stock production
   d) It is protective of wild life.

5. Fossils fuels largely consists of
   a) Hydrocarbons
   b) Hydrogen sulphide
   c) Hydrochloric acid
   d) Carbon dioxide.

6. The major contributors to the acid rain are known as
   a) Precursors   b) Processors   c) Protons   d) Pollutants

7. Percentage methane content of biogas is
   a) 5.5   b) 85   c) 55   d) 0.55

8. Water used for irrigation of food crops fodder crops and medical herbs is known as
   a) Consumptive use   b) Commercial use
   c) Productive use   d) Auxiliary use

9. Environment (protection) Act was enacted in the year
   a) 1986   b) 1992   c) 1984   d) 1974

10. Pesticide causes
    a) eye irritation   b) skin irritation
    c) Respiratory ailments   d) all of the above

11. Which of the following is not a renewable source of energy
    a) Fossil fuel   b) Solar energy   c) Tidal wave energy   d) Wind energy

12. Percentage of fresh water available below the earth is
    a) 2.8%   b) 2.2%   c) 0.6%   d) 2.15%

13. The quantity of solar energy received by the earth is
    a) 5%   b) 15%   c) 99%   d) 45%

14. Smog is combination of,
    a) Smoking and Fog   b) Snow and Fog   c) Smoke and Snow   d) All the above

15. Agricultural revolution began
    a) 1000-2000 years ago   b) 1 million years ago
    c) 30,000 – 50,000 years ago   d) 10,000 – 20,000 years ago

16. Environmental pollution is due to
    a) Rapid urbanization   b) Deforestation
    c) Afforestation   d) a and b, as above

17. What is maximum allowable concentration of fluorides in drinking water?
    a) 1.0 mg/litre   b) 1.25 mg/litre   c) 1.50 mg/litre   d) 1.75 mg/litre

18. Which pyramid is always upright?
    a) Energy   b) Biomass   c) Numbers   d) Food chain

19. The leader of chipko movement is
    a) Sunderlal Bahuguna   b) Medha Patkar
    c) Vandana Shiva   d) Suresh Heblikar

20. Bhopal Gas Tragedy was caused due to leakage of
a) Methyl iso cyanate (MIC)   b) Sulphur dioxide
c) Mustard gas   d) Methane

21. Each chlorine free radical can destroy the following number of ozone molecules
a) 1000   b) 10,000   c) 1,00,000   d) 100

22. In aquatic ecosystem phytoplankton can be considered as a
a) Consumer   b) Producer
c) Saprotrophic organisms   d) Macro consumer

23. The first international earth summit was held in
a) Johannesberg   b) Kyoto   c) Stockholm   d) Riodejanerio

24. Ozone layer thickness is measured in
a) PPM   b) PPb   c) Decibels   d) Dobson unit

25. The water (Prevention and control of pollution) Act was enacted in the year
a) 1986   b) 1974   c) 1994   d) 2004

26. Karnataka State Pollution Control Board (KSPCB) was established in the year.
a) 1947   b) 1982   c) 1986   d) 1976

27. Which state is having highest woman literacy rate in India?
a) Karnataka   b) Punjab   c) Rajasthan   d) Kerala

28. Noise is measured in
a) Decibles   b) Jouls   c) PPM   d) NTU

29. Excess nitrates in drinking water is likely to cause
a) Fluorosis   b) Minamata
c) Blue baby syndrome   d) None of these

30. The word 'Environment is derived from,
a) Greek   b) French   c) Spanish   d) English

31. Forests prevent soil erosion by binding soil particles in their
a) Stems   b) Roots   c) Leaves   d) Buds

32. Study trends in human population growth and prediction of future growth is called
a) Demography   b) Biography   c) Kalography   d) Psychology

33. Large regional unit characterized by Flora and Fauna is
a) Biosphere   b) Biome   c) Ecosystem   d) All of these

34. Environment means
a) Sum total of all condition   b) A beautiful land scape
c) Industrial Production   d) Air and water

35. Remote sensing is a
   a) Satellite system   b) Ground segments   c) Sensor system   d) All of these

36. Terrace forming is practiced in
   a) Coastal areas   b) Hills   c) Deserts   d) Plains

37. Who is the author of the book "Silent Spring"?
   a) Robin cook   b) Arthur Hailey   c) Rachel carson   d) Darwin

38. Geothermal energy is a
   a) Heat energy   b) Current energy   c) Wind energy   d) Solar energy

39. Which of the following is not a "green house gas"?
   a) Oxygen   b) Carbon dioxide   c) Chlorofluro carbon   d) Methane.

40. GIS can be expanded as
   a) Geological information system   b) Geographic information system
   c) Geodynamic intimation system   d) Geographic internet system

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