CBCS SCHEME

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17MAT11

First Semester B.E. Degree Examination, June/July 2018
Engineering Mathematics – I

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Find the nth derivative of $\dfrac{x}{(x+1)(2x-3)}$. **(06 Marks)**

   b. Prove that the curves $r^n = a^n \cos n\theta$ and $r^n = b^n \sin n\theta$ intersects orthogonally. **(07 Marks)**

   c. Find the Pedal equation of the curve $r = a(1 + \cos \theta)$. **(07 Marks)**

OR

2 a. If $x = \tan y$ prove that $(1 + x^2)y_{n+2} + 2(n+1)xy_{n+1} + n(n+1)y_n = 0$. **(06 Marks)**

   b. With usual notation, prove that $\tan \phi = r \dfrac{d\theta}{dr}$. **(07 Marks)**

   c. Find the radius of curvature of the curve $y^2 = \dfrac{a^2(a-x)}{x}$ at the point $(a, 0)$ **(07 Marks)**

Module-2

3 a. Find the Taylor's series of $\log_e x$ about $x = 1$ upto the term containing fourth degree. **(06 Marks)**

   b. If $u = \sin^{-1}\left[\dfrac{x^2 y^2}{x+y}\right]$ then show that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = 3\tan u$. **(07 Marks)**

   c. If $u = x + 3y^2 - z^3$, $v = 4x^2yz$, $w = 2z^2 - xy$, find $\dfrac{\partial(u,v,w)}{\partial(x,y,z)}$ at $(1, -1, 0)$. **(07 Marks)**

OR

4 a. Evaluate $\displaystyle\lim_{x \to 0}\left(\dfrac{a^x + b^x + c^x + d^x}{4}\right)^{1/x}$. **(06 Marks)**

   b. Find the Maclaurin's expansion of $\sqrt{1 + \sin 2x}$ upto fourth degree term. **(07 Marks)**

   c. If $u = f\left(\dfrac{x}{y}, \dfrac{y}{z}, \dfrac{z}{x}\right)$ prove that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} + z\dfrac{\partial u}{\partial z} = 0$ **(07 Marks)**

Module-3

5 a. A particle moves along the curve $\vec{r} = (t^3 - 4t)\hat{i} + (t^2 + 4t)\hat{j} + (8t^2 - 3t^3)\hat{k}$ where t denotes time. Find the velocity and acceleration at $t = 2$. **(06 Marks)**

   b. If $\vec{f} = (x + y + az)\hat{i} + (bx + 2y - z)\hat{j} + (x + cy + 2z)\hat{k}$ is irrotational find a, b, c. Hence find the scalar potential ϕ such that $\vec{f} = \nabla\phi$. **(07 Marks)**

   c. Prove that curl (grad ϕ) = $\hat{0}$. **(07 Marks)**

1 of 2

OR

6   a.   If $\vec{f} = (x + y + 1)\hat{i} + \hat{j} - (x + y)\hat{k}$ show that $\vec{f} \cdot \text{curl } \vec{f} = 0$.   **(06 Marks)**

    b.   If $\vec{f} = \text{grad}(x y^3 z^2)$ find $\text{div } \vec{f}$ and $\text{curl } \vec{f}$.   **(07 Marks)**

    c.   Prove that $\text{div(curl } \vec{A}) = 0$ **(07 Marks)**

Module-4

7   a.   Evaluate $\displaystyle\int_0^a x\sqrt{ax - x^2}\, dx$ **(06 Marks)**

    b.   Solve $r \sin\theta - \cos\theta \dfrac{dr}{d\theta} = r^2$ **(07 Marks)**

    c.   Show that the family of parabolas $y^2 = 4a(x + a)$ is self orthogonal.   **(07 Marks)**

OR

8   a.   Obtain the reduction formula for $\displaystyle\int_0^{\pi/2} \cos^n x\, dx$.   **(06 Marks)**

    b.   Solve $(x^2 + y^2 + x)\, dx + xy\, dy = 0$.   **(07 Marks)**

    c.   Water at temperature 10°C takes 5 minutes to warm upto 20°C in a room temperature 40°C. Find the temperature after 20 minutes.   **(07 Marks)**

Module-5

9   a.   Find the rank of the matrix
$$\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$$
by reducing it to echelon form.   **(06 Marks)**

    b.   Find the largest eigen value and the corresponding eigen vector for
$$A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$$
taking $(1\ \ 0\ \ 0)^1$ as initial vector by using power method. (Carry out six iterations)   **(07 Marks)**

    c.   Show that the transformation $y_1 = 2x - 2y - z$, $y_2 = -4x + 5y + 32$ and $y_3 = x - y - z$ is regular and find the inverse transformation.   **(07 Marks)**

OR

10   a.   Solve the equations $20x + y - 2z = 17$; $3x + 20y - z = -18$, $2x - 3y + 20z = 25$ by using Gauss-Seidel method. (Carry out 3 iterations)   **(06 Marks)**

    b.   Diagonalise the matrix $A = \begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix}$ **(07 Marks)**

    c.   Reduce the quadratic form $3x^2 - 2y^2 - z^2 + 12yz + 8xz - 4xy$ into canonical form, using orthogonal transformation.   **(07 Marks)**

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17MAT21

Second Semester B.E. Degree Examination, June/July 2018
Engineering Mathematics – II

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Solve $\dfrac{d^2 y}{dx^2} - 6\dfrac{dy}{dx} + 9y = 6e^{3x}$. **(06 Marks)**

   b. Solve $\dfrac{d^3 y}{dx^3} + \dfrac{d^2 y}{dx^2} - 4\dfrac{dy}{dx} - 4y = 3e^x$. **(07 Marks)**

   c. Solve by the method of variation of parameter $y'' + y = \dfrac{1}{1 + \sin x}$. **(07 Marks)**

OR

2 a. Solve $\dfrac{d^2 y}{dx^2} - 6\dfrac{dy}{dx} + 25y = e^{2x} + \sin x + x$. **(06 Marks)**

   b. Solve $y'' + 4y' + 5y = -2\cosh x$; find y when $y = 0$ and $\dfrac{dy}{dx} = 1$ at $x = 0$. **(07 Marks)**

   c. Solve by the method of undetermined coefficient $(D^2 - 3D + 2)y = x^2 + e^x$. **(07 Marks)**

Module-2

3 a. Solve $x\dfrac{d^2 y}{dx^2} - \dfrac{2y}{x} = x + \dfrac{1}{x^2}$ **(06 Marks)**

   b. Solve $\dfrac{dy}{dx} - \dfrac{dx}{dy} = \dfrac{x}{y} - \dfrac{y}{x}$ **(07 Marks)**

   c. Find the general and singular solution for $xp^2 + xp - yp + 1 - y = 0$. **(07 Marks)**

OR

4 a. Solve $(2x + 3)^2 y'' - (2x + 3)y' - 12y = 6x$. **(06 Marks)**

   b. Solve $xy\left\{\left(\dfrac{dy}{dx}\right)^2 + 1\right\} = (x^2 + y^2)\dfrac{dy}{dx}$. **(07 Marks)**

   c. Find the general solution by reducing to Clairaut's form $(px - y)(x + py) = 2p$ using $U = x^2$ and $V = y^2$. **(07 Marks)**

Module-3

5 a. Find the partial differential equation of all spheres $(x - a)^2 + (y - b)^2 + z^2 = c^2$. **(06 Marks)**

   b. Solve $\dfrac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$ for which $\dfrac{\partial z}{\partial y} = -2\sin y$ when $x = 0$ and $z = 0$ when y is an odd multiple of $\dfrac{\pi}{2}$. **(07 Marks)**

   c. Derive one dimensional wave equation with usual notations. **(07 Marks)**

OR

6 a. Form the partial differential equation by eliminating the arbitrary function from $z = y\phi(x) + x\psi(y)$. **(06 Marks)**

b. Solve $\dfrac{\partial^2 z}{\partial y^2} = z$; given that when $y = 0$, $z = e^x$ and $\dfrac{\partial z}{\partial y} = e^{-x}$. **(07 Marks)**

c. Find the various possible solution for one dimensional heat equation by the method of separation of variables. **(07 Marks)**

Module-4

7 a. Prove that $\Gamma(\frac{1}{2}) = \sqrt{\pi}$. **(06 Marks)**

b. Evaluate $\displaystyle\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} x\,yz\, dz\, dy\, dx$ **(07 Marks)**

c. Evaluate $\displaystyle\iint xy(x+y)dxdy$ over the area between $y = x^2$ and $y = x$. **(07 Marks)**

OR

8 a. Evaluate $\displaystyle\int_0^\infty \int_x^\infty \dfrac{e^{-y}}{y}dydx$ by changing the order of integration. **(06 Marks)**

b. Show that the area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is $\dfrac{16}{3}a^2$. **(07 Marks)**

c. Prove that with usual notations $\beta(m,n) = \dfrac{\overline{|m}\,\overline{|n}}{\overline{|m+n}}$. **(07 Marks)**

Module-5

9 a. Find the Laplace transform of $\dfrac{\cos 2t - \cos 3t}{t}$. **(06 Marks)**

b. Express the function in terms of unit step function and hence find its Laplace transform
$$f(t) = \begin{cases} \cos t & 0 < t < \pi \\ 1 & \pi < t < 2\pi \\ \sin t & t > 2\pi \end{cases}$$
(07 Marks)

c. Find $L^{-1}\left\{\dfrac{s+3}{s^2 - 4s + 13} + \log_e\left(\dfrac{s+1}{s-1}\right)\right\}$. **(07 Marks)**

OR

10 a. Find the Laplace transform of the periodic function
$$f(t) = \begin{cases} t & 0 < t < \pi \\ \pi - t & \pi < t < 2\pi \end{cases} \text{ of period } 2\pi.$$
(06 Marks)

b. Using convolution theorem obtain the inverse Laplace transform of $\dfrac{s}{(s+2)(s^2+9)}$. **(07 Marks)**

c. Solve the equation $y'' - 3y' + 2y = e^{3t}$; $y(0) = 1$ and $y'(0) = 0$ using Laplace transform technique. **(07 Marks)**

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CBCS Scheme

USN [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] **17CHE12/22**

First/Second Semester B.E. Degree Examination, June/July 2018
Engineering Chemistry

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Define single electrode potential. Derive Nernst equation. **(07 Marks)**
   b. Describe the construction and working of zinc-air battery. Mention any two applications. **(07 Marks)**
   c. Define concentration cells. The cell potential of Ag concentration cell is $Ag/AgNO_3(0.002M)/(AgNO_3(XM)/Ag$ is 0.0751V at 25°C. Write the cell reactions and calculate the value of X. **(06 Marks)**

OR

2 a. What are reference electrodes? How will you determine the electrode potential of unknown electrode using calomel as reference electrode? **(07 Marks)**
   b. Explain the construction and working of Lithium ion battery. Mention its application. **(07 Marks)**
   c. What are fuel cells? Explain the construction and working of methanol-oxygen fuel cell. **(06 Marks)**

Module-2

3 a. Define corrosion. Explain electrochemical theory of corrosion by taking ion as example. **(07 Marks)**
   b. What is galvanizing? Explain the various steps involved in it. **(07 Marks)**
   c. Explain electroplating of Nickel by Watts Bath and mention its uses. **(06 Marks)**

OR

4 a. Explain stress corrosion and water line. **(07 Marks)**
   b. Explain the following: i) polarization   ii) over voltage. **(06 Marks)**
   c. What is electro less plating? Explain the electro less plating of copper. **(07 Marks)**

Module-3

5 a. A coal sample contains 5.8% H_2 is subjected to combustion in a bomb calorimeter. Calculate the gross and net calorific values. Given that mass of coal sample is 0.78×10^{-3} kg, mass of water in copper calorimeter is 2.5 kg, water equivalent of calorimeter is 0.83 kg rise in temperature is 3.2°C, latent heat of steam is 2454 kJ/kg and specific heat 4.187 kJ/kg/°C. **(07 Marks)**
   b. Define knocking. Explain the mechanism of knocking and mention its ill effects. **(07 Marks)**
   c. Define photovoltaic cell. Describe the construction and working of photo-voltaic cell with a neat diagram. **(06 Marks)**

OR

6 a. Define cracking. Explain fluidized catalytic cracking with a neat diagram. **(07 Marks)**
   b. Explain the Fischer-Tropsch process of synthesis of petrol. **(07 Marks)**
   c. Describe the method of purification of silicon by zone refining. **(06 Marks)**

Module-4

7 a. Distinguish between addition and condensation polymerization reactions with suitable examples. **(06 Marks)**

   b. Explain the mechanism of addition polymerization by taking vinyl chloride as example. **(07 Marks)**

   c. A polymer sample containing 100, 150 and 200 molecules having molar mass 3000 g/mol, 3500 g/mol and 4000 g/mol respectively. Calculate the number average and weight average molecular mass of the polymer. **(07 Marks)**

OR

8 a. Define T_g. Explain any three factors affecting T_g. **(07 Marks)**

   b. Describe the synthesis of (i) Polyurethane   (ii) Silicone rubber. Mention the application. **(07 Marks)**

   c. What are adhesives? Explain the synthesis and application of epoxy resins. **(06 Marks)**

Module-5

9 a. What is boiler feed water? Explain priming and foaming in boilers. **(06 Marks)**

   b. Define COD. In a COD tests 32.7 cm^3 and 23.5 cm^3 of 0.02N FAS solution are required for blank and sample titration respectively. The volume of test sample is 25 cm^3. Calculate the COD of solution. **(07 Marks)**

   c. Explain the synthesis of nanomaterial by sol-gel process. **(07 Marks)**

OR

10 a. Define BOD. Explain the determination of BOD. **(07 Marks)**

   b. What is desalination? Explain the desalination of seawater by electro dialysis. **(07 Marks)**

   c. Write a note on nano composites and fullerenes. **(06 Marks)**

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First/Second Semester B.E. Degree Examination, June/July 2018
Engineering Physics

Time: 3 hrs.   Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing one full question from each module.*
     2. *Physical constants : $C = 3 \times 10^8 m/s$, $h = 6.63 \times 10^{-34} JS$, $K = 1.38 \times 10^{-23} J/K$,*
        $m = 9.11 \times 10^{-31} kg$, $e = 1.6 \times 10^{-19} C$, $NA = 6.02 \times 10^{26} kmol$.

Module-1

1 a. Define a black body. Deduce Wien's law and Rayleigh Jeans law from Planks law of Radiation. **(07 Marks)**
   b. Set – up One dimensional time independent Schrodinger wave equation. **(06 Marks)**
   c. Explain the energy distribution in the spectrum of Black body. **(03 Marks)**
   d. An electron is bound in one dimensional potential well of width 0.12nm. Find the energy values in the ground state and also in first two excited states. **(04 Marks)**

OR

2 a. State Heisenberg's Uncertainty Principle. Show that free electrons cannot exist inside the nucleus. **(07 Marks)**
   b. Define Phase Velocity and Group Velocity. Derive the relation between them. **(06 Marks)**
   c. Write a note on Compton effect. **(03 Marks)**
   d. A particle of mass $0.65 MeV/C^2$ has free energy 120MeV. Find its deBroglie wavelength. [Where 'C' is speed of light]. **(04 Marks)**

Module-2

3 a. What is Fermi Factor? Discuss the variation of Fermi factor with temperature. **(07 Marks)**
   b. What is Superconductivity? Explain Type – I and Type – II superconductors. **(06 Marks)**
   c. Define : i) Mean collision time   ii) Relaxation time   iii) Drift velocity. **(03 Marks)**
   d. Find the probability that an energy level at 0.2eV below fermi level being occupied at temperatures 300K and 1000K. **(04 Marks)**

OR

4 a. Derive the expression for electrical conductivity by using Quantum free electron theory in case of metals. **(07 Marks)**
   b. Explain the failures of CFET. (Classical Free Electron Theory). **(06 Marks)**
   c. Write a note on High temperature superconductors. **(03 Marks)**
   d. The electron and hole mobilities of silicon are 0.14 $m^2 V^{-1} S^{-1}$ and 0.05 $m^2 V^{-1} S^{-1}$ respectively at a certain temperature. If the electron density is 1.5×10^{16} electrons/m^3 then calculate the resistivity of silicon. **(04 Marks)**

Module-3

5 a. Obtain an expression for energy density of radiation in terms of Einsteins co-efficient. **(07 Marks)**
   b. Write a note on different types of optical fibers. **(06 Marks)**
   c. Mention any three applications of LASERS. **(03 Marks)**
   d. Calculate the Numerical aperture, V – number and and number of modes in an optical fibre of core diameter 50μm. Refractive indices are 1.41 and 1.40 respectively at wavelength of 820nm. **(04 Marks)**

OR

6 a. Explain the construction and working of CO_2 Laser with the help of energy level diagram.
(07 Marks)
   b. What is Holography? With a neat diagram, explain the recording and reconstruction process of a Hologram.
(06 Marks)
   c. Define : i) Numerical Aperture   ii) Angle of Acceptance   iii) Attenuation. (03 Marks)
   d. Find the ratio of the populations of the two states in a material that produces light of wavelength 6328 $\overset{0}{A}$ at 27^0C.
(04 Marks)

Module-4

7 a. What are Miller Indices? Derive an expression for Interplanar distances in terms of Miller Indices.
(07 Marks)
   b. Explain Bragg's X – ray Spectrometer.
(06 Marks)
   c. Define : i) Unit cell   ii) Bravaice Lattice   iii) Primitive cell.
(03 Marks)
   d. Draw the following planes in a cubic unit cell :
      i) $(1\,1\,1)$ ii) $(0\,2\,0)$ iii) $(1\,\bar{1}\,2)$ iv) $(3\,0\,1)$.
(04 Marks)

OR

8 a. Explain in brief the Seven Crystal systems, with neat diagrams.
(07 Marks)
   b. Explain the crystal structure of diamond.
(05 Marks)
   c. Calculate APF for BCC and FCC structures.
(04 Marks)
   d. X – rays are diffracted in the first order from (110) plane of cubic crystal with lattice constant 3.036 $\overset{0}{A}$ at a glancing angle 9.6^0. Calculate the wavelength of X – rays. (04 Marks)

Module-5

9 a. What are Shock waves? Explain the construction and working of Reddy Shock tube.
(07 Marks)
   b. What are Nano materials? Explain the Sol – gel method of synthesis of nano materials.
(06 Marks)
   c. Mention four applications of shock waves.
(04 Marks)
   d. Calculate the wavelength of an electron accelerated under a potential difference of 100V in SEM.
(03 Marks)

OR

10 a. Explain the principle, construction and working of Scanning Electron Microscope.
(07 Marks)
    b. Define Carbon Nanotubes (CNTs). Discuss pyrolysis method of obtaining CNTs.
(06 Marks)
    c. Mention three applications of CNTs.
(03 Marks)
    d. Distinguish between Acoustic, Ultrasonic , Subsonic and Supersonic waves.
(04 Marks)

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CBCS SCHEME

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17PCD13/23

First/Second Semester B.E. Degree Examination, June/July 2018
Programming in C and Data Structures

Time: 3 hrs.

Max. Marks: 100

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

Left margin (rotated): 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-1

1 a. Write basic structure of C program and explain its different sections. **(08 Marks)**
   b. What are the rules to be followed to declare an identifier with example? **(04 Marks)**
   c. Write a note on different types of Type conversions, with an example/program for each. **(08 Marks)**

OR

2 a. Define C – tokens. List and explain different C – tokens. **(08 Marks)**
   b. Write a C program to convert number of days into months and days. (Hint : Assume a month has 30 days) (For e.g. 45 days = 1 month and 15 days). **(04 Marks)**
   c. Write a note on Operator precedence and Associativity. **(08 Marks)**

Module-2

3 a. An Electric power distribution company charges its domestic consumers as follows :

Consumption Units	Rate of charge
0 - 200	Rs 0.50 per units
201 - 400	Rs 100 + Rs 0.65 per unit excess of 200
401 - 600	Rs 230 + Rs 0.80 per unit excess of 400
601 - above	Rs 390 + Rs 1.00 per unit excess of 600

Write a C program to compute and print amount to be paid by the customer. **(08 Marks)**
   b. Write the Syntax of different looping control constructs and explain their working. **(08 Marks)**
   c. Distinguish between the following :
      i) goto and if   ii) break and continue. **(04 Marks)**

OR

4 a. Write the Syntax of nested if …else statement and explain its working. **(08 Marks)**
   b. Write a C program to convert a decimal number to binary form. **(08 Marks)**
   c. Differentiate between do…while loop and while loop, with the help of Syntax. **(04 Marks)**

Module-3

5 a. Write a C program to search a key integer element in the given array of N elements using binary search technique. Print the output with suitable headings. **(08 Marks)**
   b. Distinguish between the following types of variables :
      i) Automatic   ii) Global   iii) Static   iv) Register. **(08 Marks)**
   c. Explain the importance of strcmp ( ) and strcat ( ) string manipulation functions. **(04 Marks)**

OR

6 a. Write the Syntax and give an example for each : **(08 Marks)**
      i) Declaration of One – dimensional array   ii) Initialization of One – dimensional array
      iii) Declaration of Two – dimensional array   iv) Initialization of Two – dimensional array.

1 of 2

b. Write a C program to find n^th term of Fibonacci series using recursion. **(08 Marks)**

c. Write a C program to find length of a string without using strlen( ) function. **(04 Marks)**

Module-4

7   a. Write a note on the following with an example for each : **(08 Marks)**
        i) Arrays of structures   ii) Arrays within structures   iii) Structures within structures.

b. Write a C program to count the number of characters, Number of lines and number of white spaces from a file. **(08 Marks)**

c. Create structure st_record having members student Name (Sname) and student marks (Smarks). Write a C program which reads name and marks of two students and compare whether both students are same. **(04 Marks)**

OR

8   a. Mention importance of the following input/output file operations along with Syntax and example for each : **(08 Marks)**
        i) fscanf ( )   ii) fprintf ( )   iii) fopen ( )   iv) fclose ( ).

b. Create a structure st _ record having members to store name of student, marks scored in three different subjects. Create a user defined function cal-average ( ) to compute average marks scored by the student. Write a C program which reads details of a student and prints whether a student is pass or fail. **(08 Marks)**

c. Mention syntax and give an example for the following : **(04 Marks)**
        i) Structure definition   ii) Structure variable declaration.

Module-5

9   a. Write Syntax and give an example of function declaration of the following :
        i) malloc ( )   ii) calloc ( )   iii) realloc ( )   iv) free ( ). **(08 Marks)**

b. Write a note on categories of pre – processor directives. **(08 Marks)**

c. List two disadvantages of : i) Arrays   ii) Linked lists. **(04 Marks)**

OR

10 a. Write a note on the following data structures :
        i) Linked list   ii) Stack. **(08 Marks)**

b. Write a C program which copies contents of a string to another using pointer as function parameter. Print copied string. **(08 Marks)**

c. Mention significance of compiler control Pre – processor directives. **(04 Marks)**

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First/Second Semester B.E. Degree Examination, June/July 2018
## Elements of Civil Engineering and Mechanics

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1 a. Briefly explain the role of civil engineer in the infrastructural development. **(08 Marks)**
   b. Define Couple and Mention its characteristics. **(06 Marks)**
   c. Find the moment of 500N force about point A, B, C and D as shown in fig. Q1(c). **(06 Marks)**

Fig.Q1(c)

OR
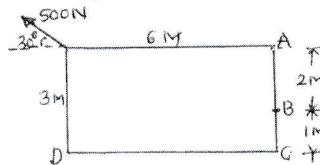
2 a. State and explain basic idealization in mechanics. **(08 Marks)**
   b. Explain the following bridges with neat sketches :
       i) Suspension bridge   ii) Arch bridge. **(06 Marks)**
   c. In the triangle ABC, a force at 'A' produces a clockwise moment of 90kN-m at B and an anticlockwise moment of 45kN-m at C. Find the magnitude and direction of the force as shown in fig.Q2(c). **(06 Marks)**
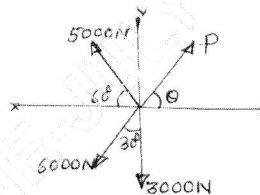
Fig.Q2(c)
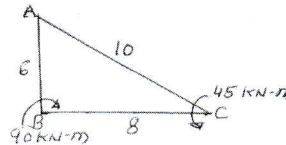
Module-2

3 a. State and prove Lami's theorem. Also write the significance of the law. **(10 Marks)**
   b. Four forces acting on the gusset plate of a joint in a bridge truss are shown in fig. Q3(b). Determine the value of 'P' and 'θ' to maintain the equilibrium of the joint. **(10 Marks)**
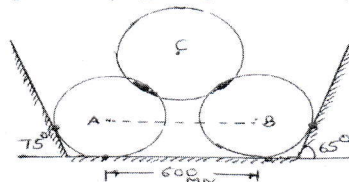
Fig.Q3(b)

OR

4 a. State the laws of Static friction. **(04 Marks)**
   b. Define i) Angle of friction   ii) Coefficient of friction   iii) Cone of friction. **(06 Marks)**
   c. Determine the reactions at contact points for spheres A, B and C as shown in fig.Q4(c). It is given that $W_A = W_B$ = 4kN, W_C = 6kN, $d_A = d_B$ = 500mm, d_C = 800mm. **(10 Marks)**

Fig.Q4(c)

Module-3

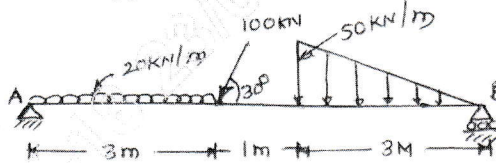5   a.   State and prove Varignon's theorem of moment.   (10 Marks)
    b.   Determine the reactions at the support for the beam as shown in fig. Q5(b).   (10 Marks)

Fig.Q5(b)

OR
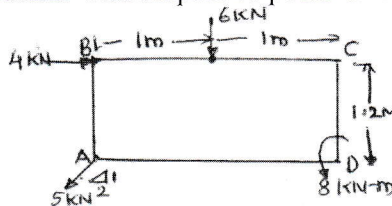
6   a.   Explain briefly with neat sketch :   (10 Marks)
         i) Types of load   ii) Types of support   iii) Types of beams.
    b.   Determine the resultant of the force system acting on a body as shown in fig. Q6(b). Also
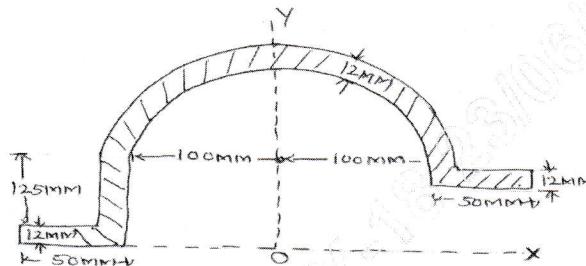   locate the position of the resultant with respect to point 'D'.   (10 Marks)

Fig.Q6(b)

Module-4

7   a.   State and prove Parallel Axis theorem.   (08 Marks)
    b.   With reference to the co-ordinate axis X and Y, locate the centroid of an area as shown in
         fig. Q7(b).   (12 Marks)

Fig.Q7(b)

OR

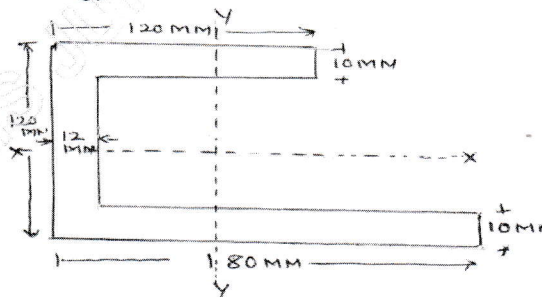8   a.   Determine the centroid of a triangular lamina about its base by method of integration.
                                                                                            (08 Marks)
    b.   Determine the moment of inertia of the section shown in fig. Q8(b) about its centroidal axis.
         Calculate the least radius of gyration for the section.   (12 Marks)
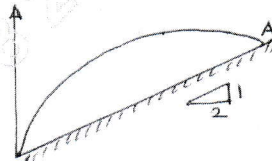
Fig.Q8(b)

Module-5

9 a. Determine the position at which the ball is thrown up the plane will strike the inclined plane as shown in fig. Q9(a). The initial velocity is 30m/sec and the angle of projection is $\tan^{-1}\left(\frac{4}{3}\right)$.

(10 Marks)

Fig.Q9(a)

b. A Burglar's car starts at an acceleration of 2m/sec^2. A police vigilant party came after 5 seconds and continued to chase the Burglar's car with a uniform velocity of 20m/sec. Find the time taken in which the police van will overtake the car. **(10 Marks)**

OR

10 a. What is a Projectile? Define the following terms briefly : **(10 Marks)**
   i) Angle of projection ii) Horizontal range   iii) Vertical height   iv) Time of flight.

b. A stone is dropped from the top of the tower 50m high. At the same time another stone is thrown up from the foot of the tower with a velocity of 25m/sec. At what distance from the top and after how much time the stones cross each other. **(10 Marks)**

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17EME14/24

First/Second Semester B.E. Degree Examination, June/July 2018
Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. Differentiate between Renewable and Non-Renewable energy resources. **(04 Marks)**
  b. With a neat sketch explain the principle of operation of a typical wind mill. **(08 Marks)**
  c. Showing all the components explain the principle of electric power generation from Hydro power plants. **(08 Marks)**

OR

2 a. Explain the following terms with T-H diagram:
   (i) Wet steam (i) Dry saturated steam   (iii) Super heated steam   (iv) Degree of superheat. **(08 Marks)**
  b. Name Boiler mountings and accessories. Explain its importance. **(04 Marks)**
  c. Explain with a neat sketch working principle of Babcock and Wilcox boiler. **(08 Marks)**

Module-2

3 a. With sketch explain working principle of De laval's Turbine. **(06 Marks)**
  b. Explain the working of closed cycle gas turbine. **(06 Marks)**
  c. Explain the working principle of Francis and Kaplan turbine. **(08 Marks)**

OR

4 a. How are IC engines classified? With a sketch explain the working principle of 4 stroke CI engine indicating PV-diagram. **(12 Marks)**
  b. A 4-stroke diesel engine has a piston diameter of 300 mm and stroke of 450 mm. Mean effective pressure is 4 bar, speed is 450 rpm. Diameter of the brake drum is 1 m and effective brake load is 450 N. Determine Indicated power, Brake power and Frictional power. **(08 Marks)**

Module-3

5 a. Explain with sketch following operations on Lathe:
   (i) Plane Turning   (ii) Knurling   (iii) Thread cutting **(06 Marks)**
  b. Explain with sketch the taper turning by swivelling compound tool rest. **(06 Marks)**
  c. With sketch explain the following operations :
   (i) Counter sinking   (ii) Counter boring   (iii) End milling   (iv) Slot milling **(08 Marks)**

OR

6 a. With a block diagram, explain the basic elements of NC automation system. **(06 Marks)**
  b. Classify the robot based on physical configuration. Explain the Cartesian coordinate robot with neat sketch. **(08 Marks)**
  c. Differentiate drilling and milling operation. **(06 Marks)**

Module-4

7 a. How are composite classified? What are the applications of composites in automobile and aerospace industry? **(06 Marks)**

   b. Write a note on application of ferrous and non-ferrous alloys. **(06 Marks)**

   c. Explain with a sketch working of electric arc welding process. **(08 Marks)**

OR

8 a. Explain with a sketch working of oxy-acetylene welding process. **(08 Marks)**

   b. Differentiate between Welding, Brazing and Soldering. **(06 Marks)**

   c. Explain clearly the different types of oxy-acetylene flames generated. **(06 Marks)**

Module-5

9 a. Define Refrigeration and Air conditioning. **(04 Marks)**

   b. Name commonly used refrigerants. Explain any six goal properties of refrigerants. **(08 Marks)**

   c. Explain with a sketch working of vapour absorption refrigeration system. **(08 Marks)**

OR

10 a. Define :
   (i) Refrigeration effect   (ii) Ton of refrigeration   (iii) COP
   (iv) Ice making capacity   (v) Relative cop   (vi) Unit of refrigeration. **(06 Marks)**

   b. Differentiate between vapour compression and vapour absorption refrigerating system. **(06 Marks)**

   c. With sketch explain the working of Air conditioner. **(08 Marks)**

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17ELE15/25

First/Second Semester B.E. Degree Examination, June/July 2018
Basic Electrical Engineering

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1 a. State and explain Kirchoff's laws with an example. **(07 Marks)**

   b. For the bridge circuit shown in Fig.Q1(b), calculate current in all the branches and power supplied by the source. **(08 Marks)**
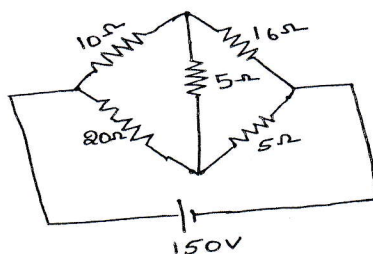

Fig.Q1(b)

   c. The winding of an electromagnet is wound with 96 turns and has resistance of 56 Ω. The exciting voltage is 250 volts, and the flux linking coil is 5 mWb. Find the energy stored in magnetic field. If the current is reversed in 0.1 sec, what emf is induced in the coil? **(05 Marks)**

OR

2 a. State and explain Ohm's law and also list out its limitations. **(06 Marks)**

   b. Define co-efficient of coupling and its relation with L_1, L_2 and M. **(06 Marks)**

   c. Find the currents in various branches of the given network shown in the Fig.Q2(c).
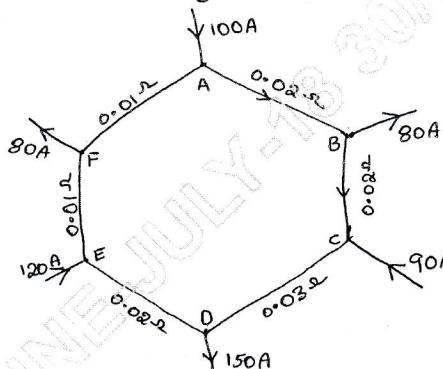
Fig.Q2(c) **(08 Marks)**

Module-2

3 a. Derive emf equation of D.C. generator. **(07 Marks)**

   b. With the neat diagram explain the construction and working of dynamometer type wattmeter. **(07 Marks)**

   c. A 4 pole lap connected DC generator has 600 armature conductors and runs at 1200 rpm. The generator has flux per pole is 0.06 Wb. Calculate emf induced. Find the speed at which it should be driven to produce the same emf when wave connected. **(06 Marks)**

OR

4 a. Derive the expression for armature torque. **(08 Marks)**

   b. With the neat diagram explain the construction and working of induction type energy meter. **(08 Marks)**

   c. List the applications of shunt and series motor. **(04 Marks)**

Module-3

5 a. Derive average value of sinusoidal voltage in terms of its maximum value. **(06 Marks)**

   b. With the sketch explain the working of three way control of lamp. **(06 Marks)**

   c. A voltage e = 100 sin 314t is applied to circuit consisting of 80 μF capacitor in series with 25 Ω resistor. Determine current and power factor in the circuit and also find voltage across the capacitor when current is half of its maximum value. **(08 Marks)**

OR

6 a. Show that power consumed by the pure capacitor is zero. Draw the voltage, current and power wave form. **(06 Marks)**

   b. Write a short note on :
      (i) Necessity of earthing (ii) Precaution to be taken to prevent electric shock. **(07 Marks)**

   c. A circuit consists of a resistance 10 Ω an inductance of 16 mH and a capacitance of 150 μF connected in series. A supply of 100 V, 50 Hz is applied to the circuit. Find the current, power factor and power consumed by the circuit. Draw the phasor diagram. **(07 Marks)**

Module-4

7 a. In 3φ star connection find the relation between line and phase values of current and voltage and also derive equation for 3φ power. **(08 Marks)**

   b. Write the differences between salient pole type and non salient pole type rotor of a synchronous generator. **(06 Marks)**

   c. Two wattmeters are connected to measure the input to a 3φ, 20 HP, 50 Hz induction motor that works at full load efficiency of 90% and the power factor of 0.85 lagging. Find the readings of two wattmeter. **(06 Marks)**

OR

8 a. Show that the 2 wattmeter are sufficient to measure 3φ power. **(08 Marks)**

   b. A 3φ 6 pole star connected alternator has an armature with 90 slots and 12 conductors per slot. It revolves at 1000 rpm, the flux per pole being 0.05 Wb, calculate the line value of the emf generated. If distribution factor 0.96 and pitch factor is 0.97. **(06 Marks)**

   c. A balanced star connected load of (8 + j6) per phase is connected to a 3φ, 230 V supply. Find the line current, power factor, reactive power and total volt amperes. **(06 Marks)**

Module-5

9 a. Derive emf equation of a transformer. **(06 Marks)**

   b. A 3φ induction motor with 4 poles is supplied from the alternator having 6 poles running at 1000 rpm. Calculate synchronous speed of the induction motor, its speed when slip is 0.04 and frequency of the rotor emf when the speed is 600 rpm. **(08 Marks)**

   c. Derive the condition for which the efficiency of a transformer is maximum. **(06 Marks)**

OR

10 a. Explain with diagrams the concept of rotating magnetic field in three phase induction motor. **(08 Marks)**

   b. A 500 kVA transformer has an efficiency of 92% at full load upf and at half full load 0.9 P.f. Determine its efficiency at 80% of full load and 0.95 P.f. **(06 Marks)**

   c. A 3φ, 50Hz, 6 pole induction motor has a full load percentage slip of 3% find synchronous speed and actual speed. **(06 Marks)**

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17ELN15/25

First/Second Semester B.E. Degree Examination, June/July 2018
Basic Electronics

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a. Explain the operation of p-n junction diode under forward and reverse bias condition.
                                                                                  (08 Marks)
    b. Explain how zener diode can be used as voltage regulator.   **(05 Marks)**
    c. With a neat diagram, explain the output characteristics of a transistor in common lease configuration.   **(07 Marks)**

### OR

2   a. With neat circuit diagram, explain the operation of Centre – tapped full wave rectifier. Draw input and output waveforms.   **(08 Marks)**
    b. Explain the working principle of NPN transistor.   **(08 Marks)**
    c. Explain the relationship between α and β. Find the values of β , α for a transistor has $I_B = 10\mu A$ and $I_C = 1mA$.   **(04 Marks)**

Module-2

3   a. With neat circuit diagram, explain the operation of voltage divider bias circuit with necessary equations.   **(05 Marks)**
    b. What is Op – amp? List the characteristics of an ideal Op-amp.   **(05 Marks)**
    c. Find the output of the following Op-amp circuit.   **(05 Marks)**

Fig.Q3(c)
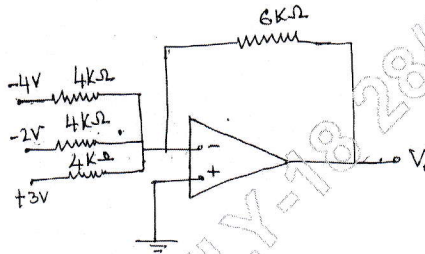
    d. Draw the circuit of Op-amp integrator. Derive the expression of output voltage.   **(05 Marks)**

OR

4   a. For the circuit shown in fig.Q4(a), find the Q – point values and draw d.c load line, where $V_{BE} = 0.7V$ and $\beta = 50$.   **(08 Marks)**

Fig.Q4(a)

    b. Define the following terms with respect to Op-amp.   **(05 Marks)**
    c. Draw the circuit of inverting Op-amp. Derive the expression for the voltage gain. **(07 Marks)**

Module-3

5 a. Convert : **(08 Marks)**
   i) $(11001.011)_2 = (\ )_{10}$ iii) $(64.73)_8 = (\ )_{16}$
   ii) $(186.75)_{10} = (\ )_2$ iv) $(ABCD)_{16} = (\ )_2$.

   b. Subtract the following using 2's Complement method. **(04 Marks)**
   i) $(111001)_2 - (101011)_2$ ii) $(1111)_2 - (1011)_2$.

   c. Simplify the following expression and realize using basic gates
   $$Y = ABC + AB\overline{C} + \overline{A}BC.$$ **(04 Marks)**

   d. State and prove de – Morgan's theorem using truth table for 2 variable. **(04 Marks)**

OR

6 a. Explain full adder circuit with truth table. Realize the circuit for sum and carry using basic gates. Also write the diagram showing full adder using two half adder. **(10 Marks)**

   b. Implement Ex - OR gate using only NAND gate. **(05 Marks)**

   c. Simplify and realize the following using only NAND gate.
   $$Y = \overline{A}\,\overline{B}\,\overline{C} + \overline{A}\,\overline{B}\,\overline{C} + \overline{A}\,\overline{B} + \overline{A}\,\overline{C}.$$ **(05 Marks)**

Module-4

7 a. Mention the difference between Latch and Flip flop. **(05 Marks)**

   b. Define Microcontroller, write important features. **(05 Marks)**

   c. With a neat block diagram, explain the architecture of 8051 microcontroller. **(10 Marks)**

OR

8 a. Write a note on NOR – gate latch. **(04 Marks)**

   b. Explain the working of clocked RS Flip flop using NAND gates. **(06 Marks)**

   c. Interface stepper motor to 8051 micro – controller. With a neat block diagram, explain its working principle. **(10 Marks)**

Module-5

9 a. With the help of block diagram, explain communication system. **(04 Marks)**

   b. Define Amplitude modulation. Derive Mathematical expression for the same. Draw waveforms. **(08 Marks)**

   c. Explain the construction and principle of operation of LVDT. **(08 Marks)**

OR

10 a. List the difference between AM and FM. **(04 Marks)**

   b. Explain Frequency modulation, with neat waveform. **(08 Marks)**

   c. Briefly explain the working of thermistor. Mention its applications. **(08 Marks)**

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CBCS Scheme

17CIV18/28

Question Paper Version : **D**

First/Second Semester B.E. Degree Examination, June/July 2018
Environmental Studies

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 30

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the thirty 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. Carbon cycle involves
   a) Ammonia, nitrate and proteins   b) Carbon dioxide, water and energy
   c) Sulphur dioxide, Sulphate & Proteins   d) Carbon, Nitrogen and Oxygen

2. Deforestation means
   a) conservation of forest   b) destruction of forest
   c) monocrop cultivation   d) decrease in agriculture

3. Blue baby syndrome is caused by the contamination of water due to
   a) Phosphates   b) Sulphur
   c) Arsenic   d) Nitrates

4. Excess fluorides in drinking water cause
   a) Blue babies   b) Fluorosis
   c) Beriberi   d) Rickets

5. Fixation of nitrogen is done by
   a) Lightening   b) Fixing bacteria
   c) Fertilizer factory   d) All of these

6. Recycled waste water can be used for
   a) crop irrigation   b) landscape gardening
   c) Replenishing fast depleting aquifers   d) All of these

7. The leader of "Chipko Movement" is
   a) Sunderlal Bahuguna   b) Medha Patkar
   c) Vandana Shiva   d) Mahatma Gandhi

8. GILO is a project associated with
   a) Environment protection   b) Environment education
   c) Women education   d) None of these

9. India has the largest share of which of the following :
   a) Manganese   b) Mica
   c) Copper   d) Silver

10. Physical pollution of water is due to
    a) Dissolved oxygen   b) pH
    c) Turbidity   d) None of these

11. Which of the following is the source of fly ash?
    a) Vehicular exhaust   b) Sewage
    c) Thermal power plant   d) All of these

12. The permissible range of pH for drinking water as per the Indian standard is
    a) 6 to 9   b) 6.5 to 8.5
    c) 6 to 8.5   d) 6.5 to 7.5

13. The sequence of eating and being eaten in an ecosystem is called
    a) Food chain   b) Carbon cycle
    c) Food web   d) hydrological cycle

14. In aquatic ecosystem phytoplankton can be considered as a
    a) Consumer   b) Producer
    c) Macro consumer   d) None of these

15. Ecological pyramids are studies of
    a) Pyramid of Energy   b) Pyramid of numbers
    c) Pyramid of biomass   d) all of these

16. E.I.A can be expanded as
    a) Environment & Industrial act   b) Environment & Impact Activities
    c) Environmental Impact Assessment d) None of these

17. Water logging is a phenomena in which
    a) Water patterns are rotated
    b) Soil root zone becomes saturated due to over irrigation.
    c) Erosion of soil
    d) Soil degradation

18. The permissible limit of Lead in domestic portable water as per BIS is
    a) 0.05 mg/L   b) 0.005 mg/L   c) 0.5 mg/L   d) 5 mg/L

19. Noise pollution is controlled by
    a) Reducing the noise at the source   b) Preventing its transmission
    c) Protecting the receiver   d) All of these

20. LPG is a mixture of
    a) N_2 and H_2S b) CO_2 and N_2
    c) Propane and butane   d) Methane and CO_2

21. Direct conversion of solar energy is attained by
    a) Solar photovoltaic cells   b) diesel hybrid system
    c) Solar thermal system   d) None of these.

22. Nuclear wastes are active for
    a) 5 years   b) 10 years   c) 50 years   d) centuries

23. Molasses from sugar industry is used to generate
    a) Biodiesel   b) Hydrogen   c) Bioethanol   d) Biomethanol

24. Demography is the study of
    a) Animals behaviour   b) Population growth
    c) Rivers   d) Forests

25. The major objectives of family welfare program is
    a) Employment generation   b) Population growth and control
    c) Disease control   d) None of these

26. Which green house gas is known as colorless, non flammable, sweetish odour and laughing gas?
    a) Methane   b) CO_2
    c) Nitrous oxide   d) SO_2

27. Nuclear fission reaction involves the bombardment of ^{235}U by
    a) Electrons   b) Neutrons
    c) Protons   d) Alpha radiation

28. Remote sensor detects
    a) Electromagnetic radiation   b) only visible radiations
    c) only IR radiations   d) only UV radiations

29. The tiger conservation project was started in
    a) 1973   b) 1975
    c) 1981   d) 2000

30. Centre for science and environment is
    a) Government organization   b) Non government organization
    c) International body   d) None of these

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