

CBCS SCHEME

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18MAT11

First Semester B.E. Degree Examination, Dec.2019/Jan.2020 Calculus and Linear Algebra

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. With usual notations prove that $\tan \phi = r \left(\frac{d\theta}{dr} \right)$. (06 Marks)
- b. Find the angle between the curves $r = \sin\theta + \cos\theta$ and $r = 2 \sin\theta$ (06 Marks)
- c. Show that the radius of curvature for the catenary of uniform strength $y = a \log \sec \left(\frac{x}{a} \right)$ is $a \sec \left(\frac{x}{a} \right)$. (08 Marks)

OR

- 2 a. Show that the pairs of curves $r = a(1 + \cos\theta)$ and $r = b(1 - \cos\theta)$ intersect each other Orthogonally. (06 Marks)
- b. Find the pedal equation of the curve $r^n = a^n \cos n\theta$. (06 Marks)
- c. Show that the evolute of $y^2 = 4ax$ is $27ay^2 = 4(x + a)^3$. (08 Marks)

Module-2

- 3 a. Find the Maclaurin's series for $\tan x$ upto the term x^4 . (06 Marks)
- b. Evaluate $\lim_{x \rightarrow 0} \left[\frac{a^x + b^x + c^x}{3} \right]^{1/x}$ (07 Marks)
- c. If $U = f(x-y, y-z, z-x)$, prove that $\frac{\partial U}{\partial x} + \frac{\partial U}{\partial y} + \frac{\partial U}{\partial z} = 0$ (07 Marks)

OR

- 4 a. Expand $\log(\sec x)$ upto the term containing x^4 using Maclaurin's series. (06 Marks)
- b. Find the extreme values of the function $f(x, y) = x^3 + y^3 - 3x - 12y + 20$. (07 Marks)
- c. Find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$ where $u = x^2 + y^2 + z^2$, $v = xy + yz + zx$, $w = x + y + z$. (07 Marks)

Module-3

- 5 a. Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz \, dzdydx$ (06 Marks)
- b. Evaluate $\int_{-2}^2 \int_0^{\sqrt{4-x^2}} (2-x)dydx$ by changing the order of integration. (07 Marks)
- c. Prove that $\beta(m, n) = \frac{\Gamma(m) \cdot \Gamma(n)}{\Gamma(m+n)}$ (07 Marks)

OR

- 6 a. Evaluate $\iint y \, dx \, dy$ over the region bounded by the first quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. (06 Marks)
- b. Find by double integration the area enclosed by the curve $r = a(1 + \cos\theta)$ between $\theta = 0$ and $\theta = \pi$. (07 Marks)
- c. Show that $\int_0^{\pi/2} \frac{d\theta}{\sqrt{\sin\theta}} \times \int_0^{\pi/2} \sqrt{\sin\theta} \, d\theta = \pi$. (07 Marks)

Module-4

- 7 a. Solve $\frac{dy}{dx} + \frac{y \cos x + \sin y + y}{\sin x + x \cos y + x} = 0$ (06 Marks)
- b. Solve $r \sin\theta - \cos\theta \frac{dr}{d\theta} = r^2$ (07 Marks)
- c. A series circuit with resistance R, inductance L and electromotive force E is governed by the differential equation $L \frac{di}{dt} + Ri = E$, where L and R are constants and initially the current i is zero. Find the current at any time t. (07 Marks)

OR

- 8 a. Solve $(4xy + 3y^2 - x)dx + x(x + 2y)dy = 0$. (06 Marks)
- b. Find the orthogonal trajectories of the family of parabolas $y^2 = 4ax$. (07 Marks)
- c. Solve $p^2 + 2py \cot x = y^2$. (07 Marks)

Module-5

- 9 a. Find the rank of $\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$ by elementary row transformations. (06 Marks)
- b. Apply Gauss-Jordan method to solve the system of equations
 $2x_1 + x_2 + 3x_3 = 1$,
 $4x_1 + 4x_2 + 7x_3 = 1$,
 $2x_1 + 5x_2 + 9x_3 = 3$. (07 Marks)
- c. Find the largest Eigen value and the corresponding Eigen vector of the matrix
 $A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$ by power method. Using initial vector $(100)^T$. (07 Marks)

OR

- 10 a. Solve by Gauss elimination method
 $x - 2y + 3z = 2$,
 $3x - y + 4z = 4$,
 $2x + y - 2z = 5$ (06 Marks)
- b. Solve the system of equations by Gauss-Seidal method
 $20x + y - 2z = 17$,
 $3x + 20y - z = -18$,
 $2x - 3y + 20z = 25$ (07 Marks)
- c. Reduce the matrix $A = \begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix}$ to the diagonal form. (07 Marks)

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18CHE12/22

First/Second Semester B.E. Degree Examination, Dec.2019/Jan.2020 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 Free Energy. Derive Nernst equation for single electrode potential. (07 Marks)
b. What are Reference Electrodes? Describe the construction and working of Calomel electrode. (06 Marks)
c. Explain the construction and working of Ni – Metal Hydride battery. Give the reaction during charging and discharging mode. Give any two applications. (07 Marks)

OR

- 2 a. Describe the construction and working of Lithium – ion battery. Give its applications. (07 Marks)
b. Write a note on Primary, Secondary and Reserve batteries. (06 Marks)
c. What are Concentration Cells? EMF of the cell $\text{Ag}/\text{AgNO}_3(\text{C}_1) // \text{AgNO}_3(\text{C}_2 = 0.2\text{m}) / \text{Ag}$ is 0.8V. Calculate C_1 of the cell. (07 Marks)

Module-2

- 3 a. What is Corrosion? Explain the Electrochemical theory of corrosion by taking iron as an example. (07 Marks)
b. Explain i) Differential Metal Corrosion ii) Pitting Corrosion. (07 Marks)
c. What do you mean by metal finishing? Mention any five technological importances. (06 Marks)

OR

- 4 a. Define and explain any two terms :
i) Polarisation ii) Decomposition potential iii) Over voltage. (06 Marks)
b. What is Electroless Plating? Explain the Electroless plating of copper. (07 Marks)
c. Explain the process of Galvanization. (07 Marks)

Module-3

- 5 a. What is Knocking? Explain the mechanism. (07 Marks)
b. On burning 0.96 grams of solid fuel in bomb calorimeter the temperature of 3500 grams of water increased by 2.7°C water equivalent of calorimeter and latent heat of steam are 385 grams and 587 cal/gram respectively. If the fuel contains 5% H_2 , calculate its gross and net calorific value. Specific heat of water = 4.187 kJ/kg K. (06 Marks)
c. What are Fuel Cells? Describe the construction and working of $\text{CH}_3\text{OH} - \text{O}_2$ fuel cell. (07 Marks)

OR

- 6 a. What are Solar Cells? Explain the construction and working of a typical P.V. Cell. (07 Marks)
b. Explain the production of solar grade Si by Union Carbide Process. (07 Marks)
c. Write a note on : i) Power alcohol ii) Unleaded petrol. (06 Marks)

Module-4

- 7 a. What are the main sources, effects and control of lead pollution? (07 Marks)
b. Mention the various causes, effects and disposal methods of e – waste. (07 Marks)
c. 50 ml of an industrial sewage has consumed 11.5 ml of 0.4N $K_2Cr_2O_7$ solution for complete oxidation. Calculate C.O.D of industrial sewage. (06 Marks)

OR

- 8 a. Explain the activated sludge treatment of sewage water. (07 Marks)
b. What is Desalination? Describe the desalination of seawater by reverse Osmosis process. (07 Marks)
c. Write a note on Ozone depletion. (06 Marks)

Module-5

- 9 a. Explain the theory, Instrumentation and Application of Calorimetry. (06 Marks)
b. What is Potentiometric titration? Explain the principle involved in Potentiometric titration. (07 Marks)
c. Write a note on Fullerene. Mention its application. (07 Marks)

OR

- 10 a. What are Nano – materials? Give their synthesis by Sol – gel techniques. (07 Marks)
b. Write a note on Graphenes. Mention their applications. (07 Marks)
c. Explain the theory and applications of Atomic Absorption Spectroscopy. (06 Marks)

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18PHY12/22

First/Second Semester B.E. Degree Examination, Dec.2019/Jan.2020 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 : velocity of light $C = 3 \times 10^8$ m/s; Planck's constant $h = 6.63 \times 10^{-34}$ J-S ; Mass of an electron $m = 9.11 \times 10^{-31}$ kg Boltzmann constant $K = 1.38 \times 10^{-23}$ J/K; Avagadro number $N_A = 6.02 \times 10^{26}$ /K mole.

Module-1

- Give the theory of forced vibrations and obtain the expression for amplitude. (08 Marks)
 - With a neat diagram, explain the construction and working of Reddy tube. Mention four applications of shock waves. (08 Marks)
 - Calculate the resonant frequency for a simple pendulum of length 1m. (04 Marks)

OR

- Define force constant and mention its physical significance. Derive the expression for force constant for springs in series and parallel combination. (08 Marks)
 - Define simple harmonic motion. Derive the differential equation of motion for it using Hook's law. Mention the characteristics and examples of simple harmonic motion. (08 Marks)
 - The distance between the two pressure sensors in a shock tube is 150mm. The time taken by a shock wave to travel this distance is 0.3ms. If the velocity of sound under the same condition is 340m/s. Find the Mach number of the shock wave. (04 Marks)

Module-2

- Explain longitudinal stress, longitudinal strain, volume stress and volume strain. Discuss the effect of stress, temperature, annealing and impurities on elasticity. (08 Marks)
 - Derive the relation between bulk modulus(k), Young's modulus (Y) and Poisson's ratio (σ), what are the limiting values of Poisson's ratio? (08 Marks)
 - Calculate the extension produced in a wire of length 2m and radius 0.013×10^{-2} m due to a force of 14.7 Newton applied along its length. Given, Young's modulus of the material of the wire $Y = 2.1 \times 10^{11}$ N/m². (04 Marks)

OR

- Describe a single cantilever and derive the expression for Young's modulus of the material of rectangular beam. (08 Marks)
 - Derive an expression for couple per unit twist for a solid cylinder with a diagram. (08 Marks)
 - Calculate the angular twist of a wire of length 0.3m and radius 0.2×10^{-3} m when a torque of 5×10^{-4} Nm is applied. (Rigidity modulus of the martial is 8×10^{10} N/m²). (04 Marks)

Module-3

- Explain Divergence and curl. Derive Gauss Divergence theorem. (08 Marks)
 - Define V-number and fractional index change. With a neat diagrams, explain different types of optical fibers. (08 Marks)
 - Find the divergence of the vector field \vec{A} given by $\vec{A} = 6x^2 \hat{a}_x + 3xy^2 \hat{a}_y + xyz^3 \hat{a}_z$ at a point P(1, 3, 6). (04 Marks)

OR

- 6 a. Derive the expression for displacement current. Mention 4 Maxwell's equations in differential form for time varying fields. (08 Marks)
- b. Derive an expression for numerical aperture in an optical fiber and state the condition for propagation. (08 Marks)
- c. Find the attenuation in an optical fiber of length 500m when a light signal of power 100mw emerges out of the fiber with a power 90mw. (04 Marks)

Module-4

- 7 a. State and explain Heisenberg's Uncertainty Principle. Show that the electron cannot exist inside the nucleus. (08 Marks)
- b. Define spontaneous emission and stimulated emission. Explain the construction and working of a semiconductor Laser. (08 Marks)
- c. A particle of mass $0.5\text{meV}/c^2$ has kinetic energy 100eV. Find its de Broglie wavelength, where c is the velocity of light. (04 Marks)

OR

- 8 a. Assuming the time independent Schrödinger wave equation, discuss the solution for a particle in one dimensional potential well of infinite height. Hence obtain the normalized wave function. (08 Marks)
- b. Derive the expression for energy density in terms of Einstein's coefficient. (08 Marks)
- c. The ratio of population of two energy levels is 1.059×10^{-30} . Find the wavelength of light emitted by spontaneous emissions at 330K. (04 Marks)

Module-5

- 9 a. Give the assumptions of quantum free electron theory. Discuss two successes of quantum free electron theory. (08 Marks)
- b. What are polar and non-polar dielectrics? Explain types of polarization. (08 Marks)
- c. Calculate the probability of an electron occupying an energy level 0.02eV above the Fermi level at 200K and 400K in a material. (04 Marks)

OR

- 10 a. Define internal field. Mention the expressions for internal field, for one dimension, for three dimensional, and Lorentz field for dielectrics. Derive Clausius – Mossotti equation. (08 Marks)
- b. Describe Fermi level in an intrinsic semiconductor and hence obtain the expression for Fermi energy in terms of energy gap of intrinsic semiconductor. (08 Marks)
- c. An elemental solid dielectric material has polarizability $7 \times 10^{-40}\text{Fm}^2$. Assuming the internal field to be Lorentz field, calculate the dielectric constant for the material if the material has 3×10^{28} atoms/ m^3 . (04 Marks)

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18CPS13/23

First/Second Semester B.E. Degree Examination, Dec.2019/Jan.2020

C Programming for Problem Solving

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. How would you explain the components of a computer with the block diagram? (08 Marks)
b. Describe the types of computers. (06 Marks)
c. Convert the following mathematical expression into C equivalent statements.

i) $m = x^4 + \sqrt{x + \frac{y}{k}} - 4x + 6$

ii) $x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$

iii) Area = $\pi r^2 + 2\pi rh$ (06 Marks)

OR

- 2 a. How can you write the basic structure of a C program? Explain with examples. (08 Marks)
b. Define a token. Explain the different tokens available in C language. (08 Marks)
c. How would you explain logical operator in a C language. (04 Marks)

Module-2

- 3 a. With examples how would describe the formatted input and formatted output statements in C language. (08 Marks)
b. How would you explain if – else statement in C language? Give the relevant example. (06 Marks)
c. Write a program in C to display the grade based on the marks as follows :

Marks	Grades
0 to 39	F
40 to 49	E
50 to 59	D
60 to 69	C
70 to 79	B
80 to 89	A
90 to 100	O

(06 Marks)

OR

- 4 a. How would you explain switch statement with an example? (08 Marks)
b. How the while loop differs from do-while loop? (06 Marks)
c. Write a program to check whether a given integer is palindrome or not? (06 Marks)

Module-3

- 5 a. Define an array. How would you explain declaration and initialization of one dimensional array? (06 Marks)
b. Write a program in C to implement binary searching technique. (06 Marks)
c. How would you explain with examples, the string manipulation functions? (08 Marks)

OR

- 6 a. Write a program to read N integers and to arrange them in ascending order using bubble sort technique. (06 Marks)
- b. How would you explain the declaration and initialization of string variables? (06 Marks)
- c. Write a program to multiply 2 matrices, by ensuring their multiplication compatibility. (08 Marks)

Module-4

- 7 a. How would you illustrate the elements of user defined functions with examples? (10 Marks)
- b. Write a program in C to find the factorial of a given integer using functions. (05 Marks)
- c. Explain how call by value differs from call by reference while invoking a function. (05 Marks)

OR

- 8 a. How would you explain the categories of user defined functions? (10 Marks)
- b. Write a program in C to compute the Fibonacci series up to n terms using recursion. (06 Marks)
- c. List the storage class specifiers. Explain any one of them. (04 Marks)

Module-5

- 9 a. Define a structure. How would you declare and initialize structure variables? Give examples. (07 Marks)
- b. Define a Pointer. How the pointers are declared and initialized? (06 Marks)
- c. Write a C program to read details of 10 students and to print the marks of the student if his name is given as input. (07 Marks)

OR

- 10 a. Write a program in C to add two numbers using pointers. (05 Marks)
- b. How would you explain the categories of preprocessor directives in C? (10 Marks)
- c. How would you explain nested structures? (05 Marks)

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18ELE13/23

First/Second Semester B.E. Degree Examination, Dec.2019/Jan.2020

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 Ohm's Law. Mention its limitations. (06 Marks)
b. Find E_1 , E_2 and I when the power dissipated in the 5Ω resistor is $125W$.(Ref. Fig.Q1(b)). (07 Marks)

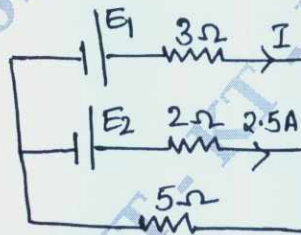


Fig.Q1(b)

- c. Define RMS value of alternating current, show that its value is proportional to maximum value. (07 Marks)

OR

- 2 a. Two 12V batteries with internal resistances 0.2Ω and 0.25Ω respectively are joined in parallel and a resistance of 1Ω is placed across the terminals. Find the current supplied by each battery. (07 Marks)
b. The equation for an AC voltage is given as $V = 0.04\sin(2000t + 60^\circ)V$. Determine the frequency, the angular frequency, instantaneous voltage when $t = 160\mu s$. What is the time represented by a 60° phase angle. (06 Marks)
c. Explain the generation of 1ϕ AC induced emf with suitable diagram. (07 Marks)

Module-2

- 3 a. Show that in a pure inductor the current lags behind the voltage by 90° . Also draw the voltage and current waveforms. (06 Marks)
b. Given $V = 200 \sin 377t$ volts and $i = 8 \sin(377t - 30^\circ)$ Amps for an AC circuit, determine :
i) Power factor ii) True power iii) Apparent power iv) Reactive power indicate the unit of power calculated. (08 Marks)
c. 3 similar coils each having resistance of 10Ω and reactance of 8Ω are connected in star across $400V$, 3ϕ supply. Determine : i) Line current ii) Total power iii) Reading of each of the two wattmeters connected to measure power. (06 Marks)

OR

- 4 a. Show that the power in a balanced 3ϕ star connected circuit can be measured by 2 Wattmeter. Draw the circuit and vector diagram. (08 Marks)
b. Three coils each of impedance $20\angle 60^\circ\Omega$ are connected in star to 3ϕ $400V$, $50Hz$ supply. Find the reading on each of the 2 wattmeters connected to measure the power input. (08 Marks)
c. What is meant by power factor in AC circuits? What is its significance in AC circuits? (04 Marks)

Module-3

- 5 a. Derive an emf equation of transformer with usual notation. (06 Marks)
 b. Explain the 2 way control and 3 way control of lamp with suitable circuit diagram and working table. (06 Marks)
 c. A 40KVA, 1ϕ transformer has core loss of 450W and full load copper loss 850Watts. If the power factor of the load is 0.8. Calculate :
 i) Full load efficiency
 ii) Maximum efficiency at UPF
 iii) Load for maximum efficiency. (08 Marks)

OR

- 6 a. List different types of loss in a transformer and explain each one in brief. (06 Marks)
 b. What is Earthing? Why earthing is required? With the help of sketch explain plate earthing. (08 Marks)
 c. Write a short note :
 i) MCB
 ii) Precautions against electric shock. (06 Marks)

Module-4

- 7 a. With a neat sketch, explain the construction of the various parts of DC generator. (08 Marks)
 b. Explain the significance of back emf in a DC motor. (06 Marks)
 c. A shunt wound DC generator delivers 496A at 440V to load. The resistance of the shunt field coil is 110Ω and that of armature winding is 0.02Ω . Calculate the emf induced in the armature. (06 Marks)

OR

- 8 a. Derive the torque equation of DC motor with usual notations. (06 Marks)
 b. A 6 pole lap-connected DC series motor, with 864 conductors, takes a current of 110A at 480V. The armature resistance and the series field resistance are 0.18Ω and 0.02Ω respectively. The flux per pole is 50mwb. Calculate :
 i) The speed ii) The gross torque. (07 Marks)
 c. Derive emf equation of a DC generator. (07 Marks)

Module-5

- 9 a. Derive the emf equation of synchronous generator. (06 Marks)
 b. With a circuit diagram, explain the working of star-delta starter for a 3ϕ induction motor. (07 Marks)
 c. A 12 pole, 3ϕ alternator is coupled to an engine running at 500rpm. It supplies an induction motor which has a full load speed of 1440rpm. Find the percentage slip and the number of poles of the motor. (07 Marks)

OR

- 10 a. Explain the concept of rotating magnetic field and show that resultant flux remains same at different instants of time. (07 Marks)
 b. A 3ϕ , 50Hz, 20pole, salient pole alternator with Y-connected stator winding has 180 slots on the stator. There are 8 conductors per slot and the coils are full-pitched. The flux per pole is 25mwb. Assuming sinusoidally distributed flux, calculate :
 i) Speed ii) Generated emf per phase iii) Line emf. (07 Marks)
 c. Describe the constructional features of synchronous generator with suitable diagram. (06 Marks)

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18CIV14/24

First/Second Semester B.E. Degree Examination, Dec.2019/Jan.2020 Elements of Civil Engineering and Mechanics

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Missing data, if any, may be suitably assumed.**

Module-1

- 1 a. State the scope of following fields of civil engineering. i) Geotechnical Engineering
ii) Transportation Engineering iii) Water Resources and Irrigation Engineering
iv) Structural Engineering. (08 Marks)
- b. State and explain basic concepts of idealization of mechanics. (04 Marks)
- c. Determine resultant force for the system shown in Fig.Q1(c). (08 Marks)

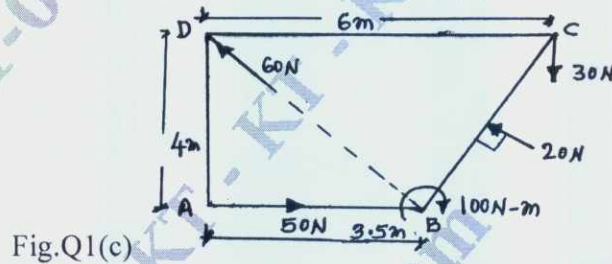


Fig.Q1(c)

OR

- 2 a. State and explain the effect of infrastructural facilities on social-economic development of a country. (08 Marks)
- b. State : i) Principle of transmissibility ii) Resolution and composition of forces. (04 Marks)
- c. Find the angle ' α ' if resultant force of the system shown in Fig.Q2(c) is vertical, also find magnitude of resultant force. (08 Marks)

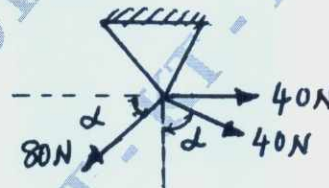


Fig.Q2(c)

Module-2

- 3 a. State and explain free body diagram with examples. (04 Marks)
- b. Find tension in string if the system is in equilibrium shown in Fig.Q3(b). (08 Marks)

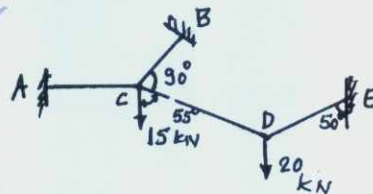


Fig.Q3(b)

- c. A uniform ladder weight 850N and length 6m rests on a horizontal ground and leans against a smooth vertical wall. The angle made by the ladder with horizontal is 65° . When man of weight 700N stands on the ladder at a distance of 4m from the top of the ladder, the ladder slides right side. Determine the coefficient of friction between ladder and ground. (08 Marks)

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

OR

- 4 a. State laws of dry friction. (04 Marks)
 b. Find contact pressure at surfaces of contact for the system shown Fig.Q4(b) for two identical cylinders P and Q. (08 Marks)

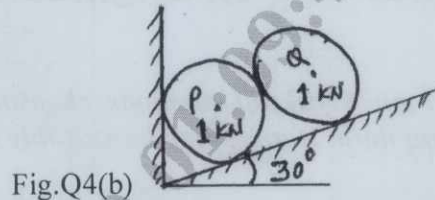


Fig.Q4(b)

- c. A block weighing 3kN overlying a 10° wedge on a horizontal floor and leaning against a vertical wall is to be raised by applying a horizontal force to the wedge. Angle of friction between wall and the block as 15° and for other surfaces of contact as 18° . Determine minimum horizontal force to be applied to rise the block shown in Fig.Q4(c). (08 Marks)

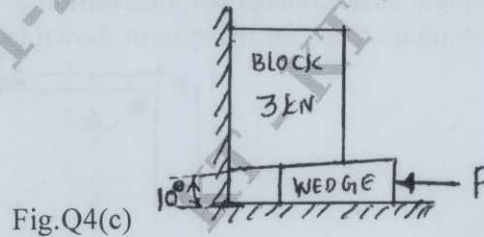


Fig.Q4(c)

Module-3

- 5 a. Distinguish between :
 i) Statically determinate and indeterminate beams with examples
 ii) Method of Joints and method of sections. (06 Marks)
 b. State assumptions made in truss analysis. (04 Marks)
 c. Find support reactions for the beam shown in Fig.Q5(c). (10 Marks)

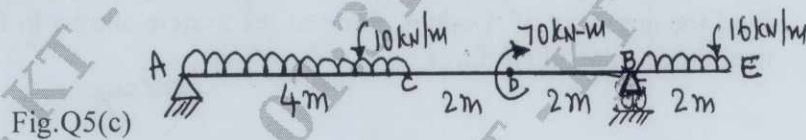


Fig.Q5(c)

OR

- 6 a. Define support and support reaction and explain different types of supports with neat sketches. (06 Marks)
 b. Find support reactions for cantilever beams shown in Fig.Q6(b). (04 Marks)

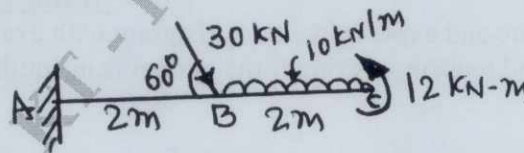


Fig.Q6(b)

- c. Find forces in members of truss shown in Fig.Q6(c) using methods of joints and tabulate member forces. (10 Marks)

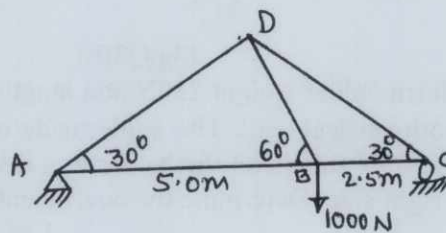


Fig.Q6(c)

Module-4

- 7 a. Determine second moment area of semicircle about horizontal diametrical axis. (06 Marks)
 b. State and prove parallel axes theorem. (04 Marks)
 c. Locate the Centroid of plane area shown in Fig.Q7(c). (10 Marks)

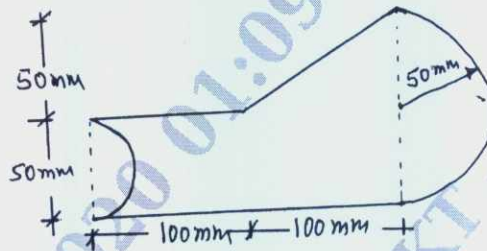


Fig.Q7(c)

OR

- 8 a. Determine the centroid of triangle of base 'B' and height 'H'. (06 Marks)
 b. Define : i) Radius of gyration ii) Product of inertia (04 Marks)
 iii) Centroid iv) Centre of gravity.
 c. Find radius of gyration about X-X axis shown in Fig.Q8(c). (10 Marks)

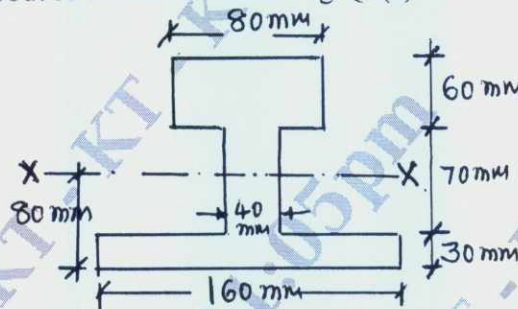


Fig.Q8(C)

Module-5

- 9 a. State and explain D'Alembert's principle. (04 Marks)
 b. Define : i) Super elevation and state the importance of super elevation (06 Marks)
 ii) Displacement, acceleration and instantaneous velocity.
 c. A bullet fired upwards at an angle of 30° to the horizontal from top of hill of height 80m and bullet strikes the ground which is 80m lower than the point of projection. If Initial velocity of bullet is 100m/sec. Find : (10 Marks)
 i) Maximum height the bullet rise above the point of projection
 ii) The velocity with which it strikes the ground
 iii) Time of flight of bullet.

OR

- 10 a. State Newton's laws of motion. (04 Marks)
 b. A body falling freely under the action of gravity passes two points 20m apart vertically in 0.4 seconds. From what height above the higher point the body starts to fall take $g = 9.8\text{m/sec}^2$. (08 Marks)
 c. A fly wheel rotating at 200rpm and after 10 seconds it rotating at 160rpm. If the retardation is uniform determine number of revolutions made and time taken by flywheel before it comes to rest from the speed of 200 rpm. (08 Marks)

CBCS SCHEME

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18ELN14/24

First/Second Semester B.E. Degree Examination, Dec.2019/Jan.2020 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 working of PN junction diode under forward and reverse biased conditions. (06 Marks)
- b. Explain the working of Photodiode. (05 Marks)
- c. Explain with neat circuit diagram and waveforms, the working of full wave bridge rectifier. Show that the efficiency of full wave bridge rectifier is 81%. (09 Marks)

OR

- 2 a. Explain the operation of Half wave rectifier with capacitor filter with neat circuit diagram and waveforms. (06 Marks)
- b. A full wave rectifier uses 2 diodes having internal resistance of 10Ω each. The transformer RMS secondary voltage from center to each end is 200V. Find I_m , I_{dc} , I_{rms} and V_{dc} if the load is 800Ω . (06 Marks)
- c. Explain how zener diode helps in voltage regulation with neat circuit diagram. Give detail mathematical analysis. (08 Marks)

Module-2

- 3 a. Explain the construction, working and characteristics of n-channel JFET. (09 Marks)
- b. With a neat circuit diagram, explain the working of CMOS Inverter. (06 Marks)
- c. For a n-channel JFET if $I_{DSS} = 9 \text{ mA}$ and $V_p = -6\text{V}$. Calculate I_D at $V_{gs} = -4\text{V}$ and V_{gs} at $I_D = 3 \text{ mA}$. (05 Marks)

OR

- 4 a. Explain the construction, working and characteristics of enhancement type MOSFET. (09 Marks)
- b. Explain the working of Silicon Controlled Rectifier [SCR] using two transistor model. (06 Marks)
- c. For an EMOSFET, determine the value of I_D if $I_{D(on)} = 4 \text{ mA}$, $V_{gs(on)} = 6\text{V}$, $V_T = 4\text{V}$ and $V_{gs} = 8\text{V}$. (05 Marks)

Module-3

- 5 a. What is an OP-AMP? List the characteristics of an ideal OP-AMP. (06 Marks)
- b. Explain the operation of an OP-AMP as inverting amplifier with neat diagram and waveforms. (06 Marks)
- c. Explain how OP-AMP can be used as (i) Integrator (ii) Voltage follower. (08 Marks)

OR

- 6 a. Explain the different input modes of an OP-AMP. (06 Marks)
- b. Design an adder circuit using OP-AMP to obtain an output voltage, $V_o = -[2V_1 + 3V_2 + 5V_3]$. Assume $R_f = 10 \text{ k}\Omega$. (06 Marks)

- c. Explain the following terms with respect to OP-AMP:
 (i) CMRR (ii) Slew rate (iii) Input bias current (iv) Supply Voltage Rejection ratio. (08 Marks)

Module-4

- 7 a. With a neat circuit diagram, explain how transistor is used as an amplifier. Derive an equation for A_v . (08 Marks)
 b. Explain RC phase shift oscillator with circuit diagram and necessary equations. (08 Marks)
 c. Explain the voltage series feedback circuit and derive an equation for voltage gain, A_v , with feedback. (04 Marks)

OR

- 8 a. With a neat circuit diagram, explain the working of Wein-bridge oscillator. (08 Marks)
 b. Explain the operation of IC555 as an Astable oscillator with neat circuit diagram and necessary equations. (08 Marks)
 c. The Transistor in CE configuration is shown in Fig.Q8(c) with $R_C = 1\text{ k}\Omega$ and $\beta_{DC} = 125$. Determine
 (i) V_{CE} at $V_{in} = 0\text{ V}$.
 (ii) $I_{B(\text{min})}$ to saturate the collector current
 (iii) $R_{B(\text{max})}$ when $V_{in} = 8\text{ V}$
 $V_{CE(\text{sat})}$ can be neglected.

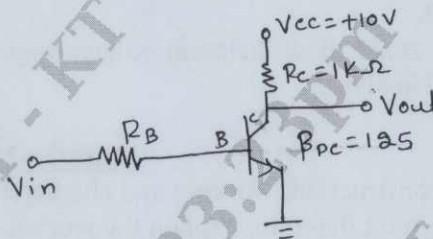


Fig.Q8(c)

(04 Marks)

Module-5

- 9 a. Design Full adder circuit and implement it using basic gates. (08 Marks)
 b. Find (i) $(1101\ 0111\ 0110\ 1010)_2 = (?)_{16}$
 (ii) $(EB986)_{16} = (?)_2$
 (iii) $(925.75)_{10} = (?)_8$ (06 Marks)
 c. Explain the basic elements of communication system with block diagram. (06 Marks)

OR

- 10 a. State and prove De-Morgan's theorem. (06 Marks)
 b. With a block diagram, explain the working of a 3-bit ripple counter. (06 Marks)
 c. What is a Flip-flop? Explain the operation of master-slave JK flip-flop. (08 Marks)

CBCS SCHEME

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18MAT21

Second Semester B.E. Degree Examination, Dec.2019/Jan.2020 Advanced Calculus and Numerical Methods

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 directional derivative of $\phi = 4xz^3 - 3x^2y^2z$ at $(2, -1, 2)$ along $2\bar{i} - 3\bar{j} + 6\bar{k}$. (06 Marks)
- b. If $\bar{f} = \nabla(x^3 + y^3 + z^3 - 3xyz)$ find $\text{div } \bar{f}$ and $\text{curl } \bar{f}$. (07 Marks)
- c. Find the constants a and b such that $\bar{F} = (axy + z^3)\bar{i} + (3x^3 - z)\bar{j} + (bxz^2 - y)\bar{k}$ is irrotational. Also find a scalar potential ϕ if $\bar{F} = \nabla\phi$. (07 Marks)

OR

- 2 a. If $\bar{F} = xy\bar{i} + yz\bar{j} + zx\bar{k}$ evaluate $\int_C \bar{F} \cdot d\bar{r}$ where C is the curve represented by $x = t, y = t^2, z = t^3, -1 \leq t \leq 1$. (06 Marks)
- b. Using Stoke's theorem Evaluate $\oint_C \bar{F} \cdot d\bar{r}$ if $\bar{F} = (x^2 + y^2)\bar{i} - 2xy\bar{j}$ taken round the rectangle bounded by $x = 0, x = a, y = 0, y = b$. (07 Marks)
- c. Using divergence theorem, evaluate $\iiint_S \bar{F} \cdot \hat{n} \, ds$ if $\bar{F} = (x^2 - yz)\bar{i} + (y^2 - zx)\bar{j} + (z^2 - xy)\bar{k}$ taken around $0 \leq x \leq 1, 0 \leq y \leq 1, 0 \leq z \leq 1$. (07 Marks)

Module-2

- 3 a. Solve $(4D^4 - 8D^3 - 7D^2 + 11D + 6)y = 0$ (06 Marks)
- b. Solve $(D^2 + 4D + 3)y = e^{-x}$ (07 Marks)
- c. Using the method of variation of parameter solve $y'' + 4y = \tan 2x$. (07 Marks)

OR

- 4 a. Solve $(D^3 - 1)y = 3 \cos 2x$ (06 Marks)
- b. Solve $x^2y'' - 5xy' + 8y = 2 \log x$ (07 Marks)
- c. The differential equation of a simple pendulum is $\frac{d^2x}{dt^2} + W_0^2x = F_0 \sin t$, where W_0 and F_0 are constants. Also initially $x = 0, \frac{dx}{dt} = 0$ solve it. (07 Marks)

Module-3

- 5 a. Find the PDE by eliminating the function from $z = y^2 + 2f\left(\frac{1}{x} + \log y\right)$. (06 Marks)
- b. Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$ given $\frac{\partial z}{\partial y} = -2 \sin y$, when $x = 0$ and $z = 0$, when y is odd multiple of $\frac{\pi}{2}$. (07 Marks)
- c. Derive one-dimensional wave equation in usual notations. (07 Marks)

OR

- 6 a. Solve $\frac{\partial^2 z}{\partial x^2} = a^2 z$ given that when $x = 0$ $\frac{\partial z}{\partial x} = a \sin y$ and $z = 0$. (06 Marks)
- b. Solve $x(y - z)p + y(z - x)q = z(x - y)$. (07 Marks)
- c. Find all possible solution of $U_t = C^2 U_{xx}$ one dimensional heat equation by variable separable method. (07 Marks)

Module-4

- 7 a. Test for convergence for
 $1 + \frac{2!}{2^2} + \frac{3!}{3^2} + \frac{4!}{4^2} + \dots$ (06 Marks)
- b. Find the series solution of Legendre differential equation
 $(1 - x^2)y'' - 2xy' + n(n + 1) = 0$ leading to $P_n(x)$. (07 Marks)
- c. Prove the orthogonality property of Bessel's function as
 $\int_0^1 x \bar{j}_n(\alpha x) \bar{j}_n(\beta x) dx = 0 \quad \alpha \neq \beta$ (07 Marks)

OR

- 8 a. Test for convergence for
 $\sum \left(1 + \frac{1}{\sqrt{n}}\right)^{-n^{3/2}}$ (06 Marks)
- b. Find the series solution of Bessel differential equation $x^2 y'' + xy' + (n^2 - x^2)y = 0$ Leading to $\bar{j}_n(x)$. (07 Marks)
- c. Express the polynomial $x^3 + 2x^2 - 4x + 5$ interms of Legendre polynomials. (07 Marks)

Module-5

- 9 a. Using Newton's forward difference formula find $f(38)$. (06 Marks)
- | | | | | | | |
|------|-----|-----|-----|-----|-----|-----|
| x | 40 | 50 | 60 | 70 | 80 | 90 |
| f(x) | 184 | 204 | 226 | 250 | 276 | 304 |
- b. Find the real root of the equation $x \log_{10} x = 1.2$ by Regula falsi method between 2 and 3 (Three iterations). (07 Marks)
- c. Evaluate $\int_4^{5.2} \log x dx$ by Weddle's rule considering six intervals. (07 Marks)

OR

- 10 a. Find $f(9)$ from the data by Newton's divided difference formula:
- | | | | | | |
|------|-----|-----|------|------|------|
| x | 5 | 7 | 11 | 13 | 17 |
| f(x) | 150 | 392 | 1452 | 2366 | 5202 |
- (06 Marks)
- b. Using Newton - Raphson method, find the real root of the equation $x \sin x + \cos x = 0$ near $x = \pi$. (07 Marks)
- c. By using Simpson's $\left(\frac{1}{3}\right)$ rule, evaluate $\int_0^6 \frac{dx}{1+x^2}$ by considering seven ordinates. (07 Marks)

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Question Paper Version : A

First Semester B.E Degree Examination, Dec.2019/Jan.2020

Technical English – I

(COMMON TO ALL BRANCHES)

Time: 3 hrs.]

[Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

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

-
1. Which of these element is not involved in the process of communication
a) Pipe b) Sender c) Message d) Channel
 2. Communication refers to an exchange of
a) Information b) Ideas c) Emotions d) All of these
 3. An informal flow of communication exists in the organization. It is
a) Grapes b) Grapevine c) Grapewine d) Water
 4. Intrapersonal Communication implies
a) Takes places with self b) Takes place with others
c) Takes place with animals d) Takes place with mothers
 5. Interpersonal Communication is also called
a) Dyadic b) Virtual reality
c) Mass Communication d) Public speaking
 6. Communication is a non-stop
a) Process b) Programme c) Plan d) Paper
 7. Our dress code is an example of
a) Non Verbal b) Verbal c) Written d) Spoken
 8. Extra personal communication takes place with
a) Animals b) Dolls c) Books d) Plants

9. Badly coded messages confuse the receiver
 a) True b) False c) Never d) We do not know
10. The building block of communication is
 a) Listening b) Singing c) Dancing d) Thinking
11. Communication that moves from bottom to top is
 a) Cross wise b) Downward c) Upward d) Horizontal
12. Written communication is important in an organization
 a) It has a legal status b) It can be thrown away
 c) People do not read d) Writing is boring
13. Which of the following is a oral communication
 a) Dictation b) Email c) Notice d) Letters
14. No communication is complete without
 a) Noise b) Feedback c) Sleep d) Yawn
15. The common barriers to communication in an organization is
 a) Listening barrier b) Language c) Cultural barrier d) All of these

Name the parts of speech which are underlined: (Q.No.16 to Q.No.20)

16. He walked around the park.
 a) Noun b) Preposition c) Verb d) Conjunction
17. She got a strawberry ice cream.
 a) Noun b) Verb c) Interjection d) Adverb
18. Older people have less energy.
 a) Verb b) Adjective c) Adverb d) Noun
19. My sister answered quietly.
 a) Noun b) Conjunction c) Verb d) adverb
20. I like chips and cake.
 a) Noun b) Conjunction c) Adverb d) Verb

Choose the correct option (phonetics): (Q.No.21 to Q.No.26)

21. Which of these terms refer to the study of speech process?
 a) Phonology b) Phonetic substance
 c) Phonetics d) Semantics
22. Which is not a type of phonetics?
 a) Articulatory b) Acoustic c) Personal d) Auditory

23. What is the full form of IPA?
a) Indian Phonetic Alphabet b) International Phonetic Alphabet
c) Indian Phonetic Agreement d) Indian People Alphabet
24. What is the phonetic transcription of “reach”?
a) [ra:tʃ] b) reah c) [ri:rʃ] d) [rəʃ]
25. The word plastic has (plas-tic)
a) 2 syllables with stress on one b) 2 syllables with stress on both
c) 2 syllables with no stress d) 3 syllables with stress on the third
26. The syllable structure for the word “PLANT”
a) CCVC b) CCCC c) CVVVV d) VVVV

Mark the compound noun: (Q.No27 to Q.No.30)

27. A lot of old students came to the alumini meet
a) old students b) Lot c) Meet d) Came
28. Her strength is amazing. (abstract noun)
a) Her b) Strength c) Was d) Amazing
29. I need the information about the college (which is unaccountable noun)
a) I b) Information c) College d) Need
30. Most kids like a play in the Water. (Identify the noun)
a) Unaccountable b) Countable c) Abstract d) Live

Point out the underlined nouns are common, proper, collective, abstract: (Q.No.31 to Q.No.35)

31. You must speak the truth.
a) Collective noun b) Proper c) Abstract d) Common
32. He gave me a bunch of grapes.
a) Proper b) Common c) Collective d) Abstract
33. Priya is my younger sister.
a) Proper b) Common c) Collective d) Abstract
34. The Lion is the king of beasts.
a) Proper b) Common c) Collective d) Abstract
35. He owns a fleet of cars.
a) Proper b) Common c) Collective d) Abstract

Silent and non silent words. Select the missing or silent letters: (Q.No.36 to Q.No.41)

36. a _____ nife.
a) k b) b c) x d) z

37. _____ rong.
a) X b) C c) W d) F
38. _____ sychology.
a) p b) b c) t d) k
39. I always _____ in class.
a) lisen b) list c) listn d) listen
40. The leaves fell in _____.
a) Autumn b) autum c) atum d) atom
41. Do you have a _____.
a) doubt b) dot c) dout d) dought

Find the Homophones which are right: (Q.No.42 to Q.No.46)

42. You might see a grizzly _____ in the forest.
a) bear b) bare c) boot d) boo
43. Hey, who _____ the pizza?
a) ate b) eight c) eat d) eaten
44. My mother says, I must not _____ my brothers.
a) tease b) teas c) tees d) taste
45. _____ is my favourite colour.
a) blue b) blew c) blu d) blow
46. He feels a little _____ after his illness.
a) weak b) week c) wak d) wake

Choose the right articles: (Q.No.47 to Q.No.51)

47. Sarala lives in _____ one bed room house.
a) an b) a c) the d) no article
48. The test result will be available in _____ hour.
a) a b) an c) the d) no article
49. _____ old friend of mine came today.
a) a b) an c) the d) no article
50. We are running out of _____ water. We need to buy a bottle.
a) a b) an c) the d) no article
51. _____ Mexico is a beautiful country.
a) a b) an c) the d) no article

Choose speech of sound : (Q.No.52 to Q.No.53)

52. Which has the sound / i: /
 a) see b) it c) fill d) money
53. RP is called
 a) Received Pronunciation b) Retotalled pronunciation
 c) Received pages d) Received sounds

Prepositional phrases – Choose the right one: (Q.No.54 to Q.No.65)

54. He is very simple _____ heart.
 a) on b) at c) a d) for
55. Could you put your ideas _____ paper?
 a) at b) on c) a d) for
56. Do not waste time _____ regret.
 a) with b) on c) above d) by
57. The shops are _____ walking distance.
 a) within b) with c) by d) on
58. She was blind _____ the age of ten.
 a) by b) under c) with d) at
59. He was _____ trial for murder.
 a) on b) by c) at d) in
60. She put her house up _____ sale.
 a) at b) for c) under d) within
61. I want to be a docter.
 a) doc-tor b) doct-r c) doct-re d) doctor
62. He likes to eat an apple.
 a) apple b) ap'pl c) app'le d) appl'e
63. The table was broken.
 a) teible b) tei'ble c) tayyal d) tabl'ee
64. today I am going to America.
 a) to'day b) To-day c) T-oday d) Tod'ay
65. The demand for cell phones was acute.
 a) deMand b) Demand c) DEMAND d) DeMond

Question tags: (Q.No.66 to Q.No.72)

66. Give an example,
a) will you b) won't you c) can you d) do you
67. Let's go to the party,
a) shall we b) shan't we c) should we d) do we
68. Gopal was never been to Gao,
a) was he? b) does he? c) hasn't he? d) will he?
69. You were at home,
a) weren't you b) are you c) do you d) had you
70. She is an American,
a) isn't she? b) is she? c) not she d) won't she
71. We must watch the movies,
a) shouldn't we b) mustn't we c) do they d) mustn't they
72. I am beautiful,
a) aren't I b) are I c) Is there d) am I not

Synonyms: (Q.No.73 to Q.No.82)

73. Accept
a) name b) extract c) make decision d) will
74. Important
a) essential b) useless c) specific d) horrible
75. Obsolete
a) currently b) trending c) out of date d) organised
76. Reel
a) bloated b) whirl c) restricted d) response
77. Erudite
a) Learned b) Easy c) Loving d) Fault
78. Destroy
a) rain b) build c) display d) ruin
79. Galore
a) scanty b) grand c) abundance d) sway

80. Prominently
a) predominantly b) distinctly c) indefinitely d) splendid
81. Enormous
a) huge b) small c) tiny d) invisible
82. Melodrama
a) tear jerker b) comedy c) horror d) romance

Choose the right meaning: (Q.No.83 to Q.No.85)

83. Analogy
a) dissimilar b) comparison c) meaning d) stupid
84. Woe
a) sad b) misery c) happiness d) anger
85. Articulate
a) clear b) eloquent c) expressive d) unintelligible

Choose Correct Prefix/Suffix: (Q.No.86 to Q.No.89)

86. He was an _____ happy man.
a) happyful b) unhappy c) rehappy d) dishappy
87. We had to _____ heat the oven before baking the cake.
a) pre b) un c) dis d) ful
88. We watched the fireworks _____ ploda in the sky.
a) un b) pre c) dis d) ex
89. Our teacher told us to be care _____ with fire.
a) much b) ful c) un d) dis

Correct spelling: (Q.No.90 to Q.No.92)

90. The class room could _____ all the students.
a) accomodat b) accomodate c) accomodat d) accommodate
91. An essential item in Indian _____ is dhal.
a) cuisine b) ciuisine c) ciusine d) cuisinee
92. Proper _____ is important to communication.
a) Etiquete b) Etiquette c) Etiquet d) Ettiquete

Choose the correct verb/tense: (Q.No.93 to Q.No.94)

93. Eagles horde _____ the dead bodies.
 a) over b) above c) across d) on
94. _____ of the water has evaporated.
 a) any b) many c) few d) some

Similar relationships – Analogues: (Q.No.95 to Q.No.100)

95. Flower : buds
 a) Tree : Seed b) Fish : Plankton c) Larva : Butterfly d) Eagle : Sparrow
96. Rabbit : Burrows
 a) Hens : Coops b) Den : Lion c) Birds : Jungle d) Insects : Fossils
97. Water : Cotton
 a) Petrol : Coal b) Cloth : Vapour c) Gallons : Bales d) Liters : Meters
98. Busy engaged : _____ Brief
 a) Laconic b) Impress c) Iconic d) Indefinite
99. Pearl : Oyster
 a) Gold : Diamond b) Petrol : Coal c) Ruby : Carbon d) Iron : Calcium
100. Dear : fawn
 a) Giraffe : Cow b) Goat : Kid c) Pig : Doe d) Ant : Drone
