

# CBCS SCHEME

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21MAT11

## First Semester B.E. Degree Examination, June/July 2023 Calculus and Differential Equations

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  $\tan \phi = r \frac{d\theta}{dr}$ . (06 Marks)  
b. Find the angle between the curves  $r^2 \sin 2\theta = 4$  and  $r^2 = 16 \sin 2\theta$ . (07 Marks)  
c. Show that for the curve  $r(1 - \cos\theta) = 2a$ ,  $\rho^2$  varies as  $r^3$ . (07 Marks)

OR

- 2 a. Find the pedal equation of the curve  $\frac{2a}{r} = 1 + \cos\theta$ . (06 Marks)  
b. Find the angle between the curves  $r = a \log \theta$  and  $r = \frac{a}{\log \theta}$ . (07 Marks)  
c. Find the radius of curvature of the curve  $x^3 + y^3 = 3axy$  at  $(\frac{3a}{2}, \frac{3a}{2})$ . (07 Marks)

### Module-2

- 3 a. Expand the function  $\sqrt{1 + \sin 2x}$  by Maclaurin's series up to the term containing  $x^4$ . (06 Marks)  
b. If  $u = f(2x - 3y, 3y - 4z, 4z - 2x)$  then show that  $6u_x + 4u_y + 3u_z = 0$ . (07 Marks)  
c. If  $x = r \sin\theta \cos\phi$ ,  $y = r \sin\theta \sin\phi$ ,  $z = r \cos\theta$ . Show that  $\frac{\partial(x, y, z)}{\partial(r, \theta, \phi)} = r^2 \sin\theta$ . (07 Marks)

OR

- 4 a. Evaluate:  $\lim_{x \rightarrow 0} \left( \frac{a^x + b^x + c^x}{3} \right)^{1/x}$ . (06 Marks)  
b. If  $u = \tan^{-1}(y/x)$  where  $x = e^t - e^{-t}$  and  $y = e^t + e^{-t}$ , find the total derivative  $\frac{du}{dt}$  using partial differentiation. (07 Marks)  
c. Find the extreme values of  $x^3 + y^3 - 3x - 12y + 20$ . (07 Marks)

### Module-3

- 5 a. Solve:  $\frac{dy}{dx} - y \tan x = y^2 \sec x$ . (06 Marks)  
b. Find the orthogonal trajectories of the family of curves  $\frac{x^2}{a^2} + \frac{y^2}{b^2 + \lambda} = 1$  where  $\lambda$  is a parameter. (07 Marks)  
c. Solve:  $p^2 + 2py \cot x - y^2 = 0$ . (07 Marks)

OR

- 6 a. Solve :  $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$ . (06 Marks)  
 b. Water at temperature  $10^\circ\text{C}$  takes 5 minutes to warm up to  $20^\circ\text{C}$  at a room temperature of  $40^\circ\text{C}$ . Find the temperature of the water after 20 minutes. (07 Marks)  
 c. Find the general solution of the equation  $(px - y)(py + x) = a^2p$  by reducing into Clairaut's form by taking the substitution  $X = x^2, Y = y^2$ . (07 Marks)

Module-4

- 7 a. Solve :  $(4D^4 - 4D^3 - 23D^2 + 12D + 36)y = 0$ . (06 Marks)  
 b. Solve :  $\frac{d^2y}{dx^2} + \frac{dy}{dx} = x^2 + 2x + 4$ . (07 Marks)  
 c. Solve by using method of variation of parameters  $y'' - 2y' + y = \frac{e^x}{x}$ . (07 Marks)

OR

- 8 a. Solve :  $y'' + 2y' + y = e^{3x}$ . (06 Marks)  
 b. Solve :  $x^3 \frac{d^3y}{dx^3} + 3x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + 8y = 65 \cos(\log x)$ . (07 Marks)  
 c. Solve :  $(D^2 + 4)y = x^2$ . (07 Marks)

Module-5

- 9 a. Find the rank of a matrix by reducing in to echelon form  

$$\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$$
 (06 Marks)  
 b. Solve the system of equations by Gauss-Jordan method:  $2x + 5y + 7z = 52, 2x + y - z = 0, x + y + z = 9$ . (07 Marks)  
 c. Solve the system of equations by Gauss-Seidel iterative method :  $x + y + 54z = 110, 27x + 6y - z = 85, 6x + 15y + 2z = 72$ . Perform 3 iterations by choosing  $(0, 0, 0)$  as initial approximation. (07 Marks)

OR

- 10 a. For what values of  $\lambda$  and  $\mu$ , the system of equations  $x + y + z = 6, x + 2y + 3z = 10, x + 2y + \lambda z = \mu$  has (i) no solution (ii) Unique solution (iii) Infinitely many solutions. (06 Marks)  
 b. Solve the system of equations by Gauss elimination method:  $x + y + z = 9, x - 2y + 3z = 8, 2x + y - z = 3$ . (07 Marks)  
 c. Using Rayleigh's power method, find the largest eigen value and the corresponding eigen vector of the matrix  $\begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{bmatrix}$  by taking  $[1 \ 0 \ 0]^T$  as initial eigen vector. Carry out 5 iterations. (07 Marks)

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21MAT21

## Second Semester B.E. Degree Examination, June/July 2023 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. Evaluate  $\int_{-c}^c \int_{-b}^b \int_{-a}^a (x + y + z) dx dy dz$ . (06 Marks)
- b. Evaluate  $\int_0^1 \int_x^{\sqrt{x}} xy dy dx$  by changing the order of integration. (07 Marks)
- c. Prove that  $\pi(\frac{1}{2}) = \sqrt{\pi}$ , using definition of Gama function. (07 Marks)

OR

- 2 a. Evaluate  $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy$  by changing into polar coordinates. (06 Marks)
- b. Find the area between the parabolas  $y^2 = 4ax$  and  $x^2 = 4ay$  by using double integration. (07 Marks)
- c. Show that  $\beta(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ . (07 Marks)

### Module-2

- 3 a. Find the directional derivative of  $\phi = x^2yz + 4xz^2$  at the point  $(1, -2, -1)$  along  $2\hat{i} - \hat{j} - 2\hat{k}$ . (06 Marks)
- b. If  $\vec{F} = \nabla(xy^3z^2)$ , find  $\text{div } \vec{F}$  and  $\text{curl } \vec{F}$  at the point  $(1, -1, 1)$ . (07 Marks)
- c. If  $\vec{F} = (x + y + az)\hat{i} + (bx + 2y - z)\hat{j} + (x + cy + 2z)\hat{k}$ , find  $a, b, c$  such that  $\text{curl } \vec{F} = 0$ . (07 Marks)

OR

- 4 a. If  $\vec{F} = xy\hat{i} + yz\hat{j} + zx\hat{k}$ , evaluate  $\int_C \vec{F} \cdot d\vec{v}$  where 'c' is the curve represented by  $x = t, y = t^2, z = t^3, -1 \leq t \leq 1$ . (06 Marks)
- b. Using Green's theorem, evaluate  $\int_C (xy + y^2) dx + x^2 dy$ , where 'c' is bounded by  $y = x$  and  $y = x^2$ . (07 Marks)
- c. Apply Stoke's theorem to evaluate  $\iint \text{curl } \vec{F} \cdot \hat{n} ds$  where  $\vec{F} = (x^2 + y^2)\hat{i} - 2xy\hat{j}$  taken around the rectangle bounded by the lines  $x = \pm a, y = 0$  and  $y = b$ . (07 Marks)

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

**Module-3**

- 5 a. Form a partial differential equation by eliminating arbitrary function from  $Z = f(x + at) + g(x - at)$ . (06 Marks)
- b. Solve  $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$  for which  $\frac{\partial z}{\partial y} = -2 \sin y$  when  $x = 0$  and  $z = 0$  when  $y$  is an odd multiple of  $\frac{\pi}{2}$ . (07 Marks)
- c. Derive one dimensional heat equation. (07 Marks)

**OR**

- 6 a. Form a partial differential equation by eliminating arbitrary constant from  $Z = (x - a)^2 + (y - b)^2$ . (06 Marks)
- b. Solve  $(y - z)p + (z - x)q = x - y$ . (07 Marks)
- c. Solve  $\frac{\partial^2 z}{\partial y^2} = z$  given that when  $y = 0$ ,  $z = e^x$  and  $\frac{\partial z}{\partial y} = e^x$ . (07 Marks)

**Module-4**

- 7 a. The area of a circle (A) corresponding to diameter (D) is given below:

D	80	85	90	95	100
A	5026	5674	6362	7088	7854

- Find the area corresponding to diameter 105 using an appropriate interpolation formula. (06 Marks)
- b. Find a real root of  $x^3 - 2x - 5 = 0$  using Regula-Falsi method correct to 3 decimal places whose root lies between 2 and 2.5. (07 Marks)
- c. Evaluate  $\int_0^{\pi/2} \sqrt{\cos \theta} d\theta$  by taking 7 ordinates by Simpson's 1/3<sup>rd</sup> rule. (07 Marks)

**OR**

- 8 a. Use Newton's divided difference formula to find  $f(4)$  given the data:

x	0	2	3	6
f(x)	-4	2	14	158

- (06 Marks)
- b. Use Newton-Raphson method to find a real root of  $x \sin x + \cos x = 0$  near  $x = \Pi$ . Carry out the iterations upto 4 decimal places. (07 Marks)
- c. Use Lagrange's interpolation formula to find  $y$  when  $x = 35$  to the following data:

x	25	30	40	60
f(x)	50	55	70	95

(07 Marks)

**Module-5**

- 9 a. Use the Taylor series method to find  $y(0.2)$  from  $\frac{dy}{dx} = y + \sin x$ ,  $y(0) = 1$ . (06 Marks)
- b. Use Runge-Kutta method of order 4, find  $y$  at  $x = 0.1$ , given that  $\frac{dy}{dx} = 3e^x + 2y$ ,  $y(0) = 0$  with  $h = 0.1$ . (07 Marks)
- c. Apply Milne's predictor-corrector method, to find  $y(1.4)$  from  $\frac{dy}{dx} = x^2 + \frac{y}{2}$  given that  $y(1) = 2$ ,  $y(1.1) = 2.2156$ ,  $y(1.2) = 2.4649$ ,  $y(1.3) = 2.7514$ . (07 Marks)

**OR**

- 10 a. Use modified Euler's method to solve  $\frac{dy}{dx} = x^2 + y$  with  $y(0) = 1$ ,  $h = 0.05$  at  $x = 0.1$ . (06 Marks)
- b. Use Taylor series method to find  $y(0.1)$  from  $\frac{dy}{dx} = x^2 + y^2$  with  $y(0) = 1$ . (07 Marks)
- c. Use Runge-Kutta method of 4<sup>th</sup> order, find  $y(0.1)$  given that  $\frac{dy}{dx} = 3x + \frac{y}{2}$ ,  $y(0) = 1$  with  $h = 0.1$ . (07 Marks)

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21CHE12/22

## First/Second Semester B.E. Degree Examination, June/July 2023 Engineering Chemistry

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- Define single electrode potential. Derive Nernst equation for single electrode potential. (07 Marks)
  - What are ion selective electrodes? Explain the determination of pH using Glass Electrode. (07 Marks)
  - Distinguish between primary, secondary and reserve batteries. (06 Marks)

OR

- Describe the construction and working of Li-ion battery. Mention its applications. (07 Marks)
  - What voltage will be generated by a cell that consists of iron electrode immersed in 0.1M FeSO<sub>4</sub> solution and a silver electrode immersed in 0.05M AgNO<sub>3</sub> solution at 298K. given standard electrode potentials of Fe and Ag are -0.44V and 0.80V respectively. Write the cell representation and cell reactions. (07 Marks)
  - What are reference electrodes? Explain the construction and working of calomel electrode. (06 Marks)

### Module-2

- What is corrosion? Describe the electrochemical theory of corrosion by taking iron metal as an example. (07 Marks)
  - Explain the factors affecting the rate of corrosion :
    - Nature of corrosion product
    - Ratio of anode to cathodic areas
    - pH. (07 Marks)
  - What is electroless plating? Outline the electroless plating of copper. (06 Marks)

OR

- What is meant by metal finishing? Mention (any five) technological importance of metal finishing. (06 Marks)
  - What is electroplating? Discuss the electroplating of chromium. (07 Marks)
  - Explain the process of :
    - Galvanizing process
    - Anodizing of Aluminium. (07 Marks)

### Module-3

- What are polymer composites? Explain the synthesis and application of Kevlar fibre. (06 Marks)
  - What are conducting polymers? Describe the mechanism of conduction in poly Aniline. (07 Marks)
  - Briefly explain the carbon nanotubes with properties and applications. (07 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

- 6 a. Describe the synthesis of nano-material by sol-gel technique. (07 Marks)  
b. Explain any three size dependent properties of nano material. (06 Marks)  
c. Explain the synthesis, properties and application of polyurethane. (07 Marks)

**Module-4**

- 7 a. Briefly explain any six basic principles of green chemistry. (06 Marks)  
b. Explain the synthesis of paracetamol by conventional and green route from phenol. (07 Marks)  
c. What are PV cells? Describe the construction and working of photovoltaic cells. (07 Marks)

OR

- 8 a. With a neat diagram, explain the production of hydrogen by photocatalytic method. (07 Marks)  
b. Explain the following with example : (07 Marks)  
i) Solvent free reaction  
ii) Micro wave synthesis. (06 Marks)  
c. Describe the construction and working of methanol-oxygen fuel cell. (06 Marks)

**Module-5**

- 9 a. Explain the theory, instrumentation and application of colorimetry. (07 Marks)  
b. Explain the determination of hardness of water by EDTA method. (07 Marks)  
c. In c COD test 28.5cm<sup>3</sup> and 13.5cm<sup>3</sup> of 0.05N FAS solutions are required for blank and sample titration respectively. The volume of test sample used is 25cm<sup>3</sup>. Calculate the COD of the sample solution. (06 Marks)

OR

- 10 a. Define the following units of standard solution : (06 Marks)  
i) Normality  
ii) Molarity  
iii) PPM. (07 Marks)  
b. Define COD. Explain the determination of COD of waste water sample. (07 Marks)  
c. Explain the theory, instrumentation and application of flame photometry. (07 Marks)

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## First/Second Semester B.E. Degree Examination, June/July 2023 Engineering Physics

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Draw neat sketches wherever necessary.  
3. Constants: Speed of light "C" =  $3 \times 10^8$  m/s, Boltzmann constant "K" =  $1.38 \times 10^{-23}$  J/K, Planck's constant "h" =  $6.625 \times 10^{-34}$  JS. Acceleration due to gravity "g" =  $9.8$  m/s<sup>2</sup>, permittivity of free space. " $\epsilon_0$ " =  $8.854 \times 10^{-12}$  F/m.*

### Module-1

- 1 a. Obtain the expressions for force constant for series and parallel combination of springs also mention expressions for period of oscillation for series and parallel combination. (08 Marks)
- b. What are damped oscillations? Establish equation of motion for damped vibrations and obtain its general solution. (08 Marks)
- c. A car has a spring system that supports the in-built mass 1000kg. When a person with a weight 980N sits at the centre of gravity, the spring system sinks by 2.8cm. When the car hits a bump, it starts oscillating vertically. Find the period and frequency of oscillation. (04 Marks)

OR

- 2 a. Give the theory of forced vibration and obtain expression for amplitude and phase. (08 Marks)
- b. Illustrate the generation of shock waves using the Reddy shock tube and give any four applications of shock waves. (08 Marks)
- c. The distance between the two pressure sensors in shock tube is 100mm. The time taken by a shock wave to travel this distance is 100 microsecond. If the velocity of sound under the same condition is 340m/s, find the Mach number of the shock wave. (04 Marks)

### Module-2

- 3 a. State Heisenberg uncertainty principle and give its physical significance. Show that electron does not exist inside the nucleus by this principle. (08 Marks)
- b. Starting from Planck's quantum theory of radiation arrive at Wien's law and Rayleigh Jean's law. (08 Marks)
- c. Compute the de Broglie wavelength for a neutron moving with one tenth part of the velocity of light, given, mass of neutron =  $1.674 \times 10^{-27}$  kg. (04 Marks)

OR

- 4 a. Set up one-dimensional time-independent Schrodinger's equation. (08 Marks)
- b. Discuss the eigenfunction, eigenvalues and probability density for a particle in a potential well of infinite height. (08 Marks)
- c. An electron has a speed of 100m/s. The inherent uncertainty in its measurement is 0.005%. Calculate corresponding uncertainty that arises in the measurement of its position. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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**Module-3**

- 5 a. Derive the expression for energy density in terms of Einstein's coefficients. (06 Marks)  
 b. Derive the expression for numerical aperture of an optical fiber and discuss the block diagram of point-to-point communication. (10 Marks)  
 c. The ratio of population of two energy levels is  $1.059 \times 10^{-30}$ , find the wavelength of light emitted by spontaneous emissions at 330K. (04 Marks)

**OR**

- 6 a. Explain construction and working of CO<sub>2</sub> laser with necessary diagrams. (08 Marks)  
 b. What is attenuation? Explain different types of optical fibers. (08 Marks)  
 c. The attenuation of light in an optical-fiber is estimated at 2.2dB/km. What fractional initial intensity remains after 2km and 6km. (04 Marks)

**Module-4**

- 7 a. What is Hall effect? Obtain the expression for the Hall coefficient. (08 Marks)  
 b. Define polarization, dipole and dipole moment derive Clausius-Mossotti equation. (08 Marks)  
 c. The resistivity of intrinsic germanium at 27°C is equal to 0.47 ohm-meter. Assuming electron and hole mobilities as 0.38 and 0.18m<sup>2</sup>/vs respectively, calculate the intrinsic carrier density. (04 Marks)

**OR**

- 8 a. Define Fermi energy and Fermi factor. Discuss the dependence of Fermi factor on temperature and energy. (08 Marks)  
 b. Discuss merits of quantum free electron theory give expressions for holes and electrons concentration in semiconductors. (08 Marks)  
 c. Find the probability that an energy level at 0.2eV below Fermi level being occupied at temperatures 300K and 1000K. (04 Marks)

**Module-5**

- 9 a. With neat diagram, explain the principle, construction and working of X-ray photoelectron spectroscope. (08 Marks)  
 b. With necessary diagram, explain the principle construction and working of Atomic force microscope. (08 Marks)  
 c. X-ray of wavelength 0.12nm are found to undergo second order reflection at a Bragg angle of 28° from crystal. What is the interplanar spacing of the reflecting planes of the crystal? (04 Marks)

**OR**

- 10 a. With the help of neat diagram describe the principle construction and working of scanning electron microscope. (08 Marks)  
 b. Define nano material, mention classification of nano materials explain in brief how crystal size is determined by Scherrer's equation. (08 Marks)  
 c. The spacing between principal planes of the crystals is 2.82 Å. It is found that first order Bragg reflection occurs at an angle of 10°, what is the wavelength of X-rays? (04 Marks)

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# CBCS SCHEME

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21ELE13/23

## First/Second Semester B.E. Degree Examination, June/July 2023 Basic Electrical Engineering

Time: 3 hrs.

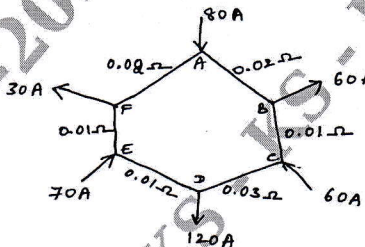
Max. Marks: 100

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

### Module-1

- 1 a. State and explain Kirchoff's current and Voltage law. (06 Marks)  
 b. Determine the current in all branches of the network shown in Fig. Q1(b). (07 Marks)

Fig. Q1(b)

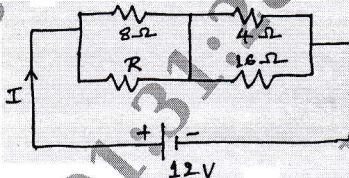


- c. Define RMS value of an alternating current and derive an expression for it. (07 Marks)

### OR

- 2 a. State and explain maximum power transfer theorem. (06 Marks)  
 b. If the total power dissipated in the circuit shown below in Fig. Q2(b) is 18W. Determine  
 i) Value of 'R' and its current ii) Power consumed by 8Ω resistor. (07 Marks)

Fig. Q2(b)



- c. Discuss about AC through pure inductive circuit with voltage and current waveforms. Also show that in a pure inductive circuit, average power is zero. (07 Marks)

### Module-2

- 3 a. Discuss in detail about AC through series RL circuit with voltage and impedance triangles and also draw voltage and current waveforms. (07 Marks)  
 b. A circuit consists of 20Ω resistance in series with inductance of 0.05H. A supply of 230V, 50Hz is given to the circuit. Calculate i) Current ii) Phase angle iii) Power factor iv) Active power v) Reactive power. (07 Marks)  
 c. An impedance  $Z_1$  consists of 10Ω resistance and 0.12H inductance in series. Impedance  $Z_2$  consists of 20Ω resistance and 40μF capacitance in series.  $Z_1$  &  $Z_2$  are in parallel across 200V, 50Hz supply. Calculate i) Current in each branch ii) The supply current iii) Total power factor. (06 Marks)

### OR

- 4 a. Establish the relationship between phase and line values of voltages and currents in a 3 phase, delta connected circuit with relevant phasor diagram, also derive equation for 3 phase power. (08 Marks)  
 b. Briefly explain the measurement of 3 phase power using two Wattmeter method. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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- c. A 400V, 3 phase supply is connected across a star connected balanced load of three impedances each consisting of  $32\Omega$  resistance and  $24\Omega$  inductive reactance. Calculate  
 i) Line current ii) True power iii) Apparent power iv) Reactive power.  
 (07 Marks)

### Module-3

- 5 a. Draw a neat labeled diagram, showing the construction of DC Generator and explain the functions of i) Yoke ii) Pole shoe. (06 Marks)  
 b. A 4 pole lap connected DC generator has armature with 60 slots and 10 conductors per slot runs at 1200 rpm with a total flux of 0.24 wb. Calculate i) Emf induced in generator ii) The speed at which it should be driven to produce the same Emf when armature is wave connected. (06 Marks)  
 c. Sketch and discuss about i) Torque Versus Armature current ii) Speed versus Armature current characteristics of both DC shunt and DC series motor, also mention its applications. (08 Marks)

OR

- 6 a. With neat diagrams, discuss about core and shell type of transformers. (06 Marks)  
 b. Derive the condition for which efficiency of transformer is maximum. (06 Marks)  
 c. A 40 KVA single phase transformer has core loss of 450W and full load copper loss of 850W, if the power factor is 0.8, calculate i) Full load efficiency ii) Maximum efficiency at unity power factor iii) Load in KVA for maximum efficiency. (08 Marks)

### Module-4

- 7 a. Explain the concept of rotating magnetic field and show that the resultant flux has a constant magnitude of  $1.5\phi_m$  when measured at various angular positions. (08 Marks)  
 b. With neat sketch, explain the types of rotors of three phase Induction motor. (06 Marks)  
 c. A 3 phase induction motor has 6 poles and runs at 960 rpm on full load. It is supplied from an alternator having 4 poles and running at 1500 rpm. Calculate the full load slip and frequency of rotor currents of Induction motor. (06 Marks)

OR

- 8 a. Develop the expression for frequency of induced emf and hence derive the emf equation of synchronous generator. (08 Marks)  
 b. With neat sketch, explain the two types of rotors of synchronous generator. (06 Marks)  
 c. A 6 pole, 3 phase star connected alternator has an armature with 90 slots and 8 conductors per slot. It revolves at 1000 rpm, the flux being 50 mwb. Given the value of distribution factor is 0.97 and pitch factor is unity. Determine i) Frequency ii) Emf generated per phase iii) Line emf. (06 Marks)

### Module-5

- 9 a. With a neat single line diagram of a typical AC power supply system, discuss about electric power supply system. (08 Marks)  
 b. Explain briefly the desirable characteristics of tariff and explain two part tariff. (06 Marks)  
 c. A consumer has maximum demand of 300 kW at 35% load factor. If tariff is Rs 125 per kW of maximum demand plus 15 paise per kwh, calculate overall cost per kwh. (06 Marks)

OR

- 10 a. Explain working principle of fuse and MCB with relevant circuit diagrams. (07 Marks)  
 b. What is Earthing? With a neat diagram, explain Pipe - earthing. (07 Marks)  
 c. Discuss about electric shock and precaution to be taken against it. (06 Marks)

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21PSP13/23

## First/Second Semester B.E. Degree Examination, June/July 2023 Problems Solving through Programming

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Define computer. Explain the generations of computer. (08 Marks)
- b. Differentiate between primary memory and secondary memory. (04 Marks)
- c. Define operator. Explain any 06 operators with suitable example. (08 Marks)

**OR**

- 2 a. Define network Topology. List and explain the different types of network Topology. (06 Marks)
- b. Convert the following mathematical expression into 'C' equivalent statement:
  - (i)  $m = \frac{1}{(x^2 + y^2)}$  (04 Marks)
  - (ii)  $n = \sqrt{b^2 - 4ac}$  (04 Marks)
- c. Write the basic structure of 'C' program. Explain each sections briefly with suitable example. (10 Marks)

### Module-2

- 3 a. With examples how would describe the formatted input and formatted output statements in C language. (08 Marks)
- b. What are different types of conditional statements? Explain if, if-else and nested if with syntax and examples. (08 Marks)
- c. Evaluate :
 

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i = 1 ;
L : if (i > 2)
{
    printf("Saturday");
    i = i + 1 ;
    goto < ;
}
printf("Sunday");
      
```

 Explain your result briefly. (04 Marks)

**OR**

- 4 a. How the while loop differs from do-while loop? (06 Marks)
- b. Write a 'C' program to check whether a given integer is palindrome or not. (06 Marks)
- c. Write a C program to plot Pascal's triangle. (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.

**Module-3**

- 5 a. What is an array? Write syntax for declaring two dimensional array and initialize the same with suitable example. (08 Marks)
- b. Write a C program to find transpose of a given matrix. (06 Marks)
- c. List the difference between linear and binary search. (06 Marks)

**OR**

- 6 a. Define string. List out all string manipulation function. Explain any two with examples. (10 Marks)
- b. Write a C program to copy a string (combination of digits and alphabets) to another string (only alphabets). (10 Marks)

**Module-4**

- 7 a. Write a C program for evaluating the binomial coefficient using a function Factorial (n). (10 Marks)
- b. Define the following :
- (i) Actual parameter.
  - (ii) Formal parameter.
  - (iii) Global variable.
  - (iv) Local variable. (04 Marks)
- c. Write a C program to generate Fibonacci series using recursive function. (06 Marks)

**OR**

- 8 a. Define a function. List and explain the categories of user defined functions. (10 Marks)
- b. Differentiate (i) User defined and built-in function (ii) Recursion and iteration. (10 Marks)

**Module-5**

- 9 a. What is a structure? Explain the syntax of structure declaration in C with example. (04 Marks)
- b. Write a C program that accepts a structure variable as a parameter to a function from a function call. (10 Marks)
- c. Define a pointer. How the pointers are declared and initialized. (06 Marks)

**OR**

- 10 a. Differentiate between structures and unions. (04 Marks)
- b. What is preprocessor directive? Explain #define and #include preprocessor directive. (06 Marks)
- c. Write a C program to find sum and mean of all elements in an array using pointer. (10 Marks)

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# CBCS SCHEME

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21ELN14/24

## First/Second Semester B.E. Degree Examination, June/July 2023 Basic Electronics and Communication Engineering

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. With neat block diagram, explain the working of a DC power supply. Also mention the principal components used in each block. (08 Marks)
- b. Mention advantages of negative feedback in amplifiers circuits. With relevant equations and diagram, explain the concept of negative feedback. (06 Marks)
- c. With circuit diagram and waveform show how operational amplifier work as inverting amplifier. (06 Marks)

OR

- 2 a. Explain the working of Bi-phase Full wave rectifier circuit with neat diagram. (08 Marks)
- b. Explain the operation of a simple Zener voltage regulator. (06 Marks)
- c. With the circuit diagram, explain the voltage doubler. (06 Marks)

### Module-2

- 3 a. With the help of truth table, explain full adder using logic gates. (08 Marks)
- b. Design a 3 to 8 Decoder and show its implementation using basic gates. (06 Marks)
- c. Write a note on different data types mentioning the bit size and range of values supported. (06 Marks)

OR

- 4 a. Design a  $4 \times 1$  multiplexer using basic gates. (08 Marks)
- b. Discuss the design of a 3-bit asynchronous up-counter. (06 Marks)
- c. Design a 4-stage shift register using J-K bistables. (06 Marks)

### Module-3

- 5 a. Compare Embedded systems and general computing systems. Also provide major application areas of Embedded systems. (08 Marks)
- b. Define sensors and give its classification with examples. (06 Marks)
- c. Explain the following external communication interfaces : USB, Wi-Fi (06 Marks)

OR

- 6 a. Explain the working principle of operation and applications of stepper motor. (08 Marks)
- b. Bringout the differences between RISC and CISC, Harvard and Neumann. (06 Marks)
- c. Write a note on classification of embedded systems. (06 Marks)

### Module-4

- 7 a. Describe the blocks of the basic communication systems. (08 Marks)
- b. Describe the classification of RF (Radio Frequency) spectrum with applications in communication systems. (06 Marks)
- c. Discuss the various Multiple Access Techniques used in cellular network. (06 Marks)

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

OR

- 8 a. Define and explain SNR, Noise Figure channel types, amplitude modulation. (08 Marks)  
b. Explain different types of radio wave propagation with a neat diagram. (06 Marks)  
c. Present the architecture of a wireless communication transmitter and its modulation scheme QPSK with waveforms. (06 Marks)

**Module-5**

- 9 a. Bring out the features of FM transmitter FM receiver and repeaters in microwave communication. (08 Marks)  
b. Draw the schematic diagram of a cellular telephone system and define its basic components. (06 Marks)  
c. List the requirement identified for the 4G technology. (06 Marks)

OR

- 10 a. With the help of diagram, discuss the following types of network topologies. Ad – Hoc network Topology, Infrastructure Network Topology. (08 Marks)  
b. Draw the block diagram, showing the basic elements of a satellite communication system and briefly explain them. (06 Marks)  
c. Explain the optical fiber communication system with a block diagram. (06 Marks)

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# CBCS SCHEME

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21CIV14/24

## First/Second Semester B.E. Degree Examination, June/July 2023 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

- a. Explain the following branches of civil engineering  
i) Structural Engineering (10 Marks)  
ii) Transportation Engineering (10 Marks)  
b. Write a brief note on role of civil engineering in Socio-economic development of the country. (10 Marks)

OR

- a. Discuss the requirements of good building stones. (10 Marks)  
b. Explain the classification of bricks. (10 Marks)

### Module-2

- a. State and explain with an example  
i) Principle of transmissibility of forces ii) Principles of super position of forces. (10 Marks)  
b. Determine the magnitude, direction of the resultant force for the system shown in Fig Q3(b). Also determine the X-intercepts a Y-intercepts of the resultant force with respect to point 'O'

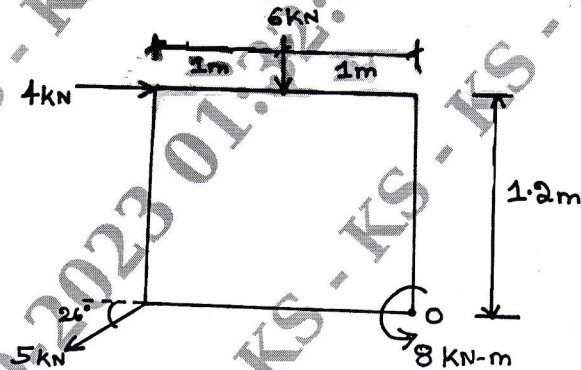


Fig Q3(b)

(10 Marks)

OR

- a. Explain the following with an example  
i) Coplanar concurrent force system  
ii) Coplanar non concurrent force system  
iii) Non-Coplanar concurrent force system  
iv) Non-Coplanar non-concurrent force system (10 Marks)  
b. Two blocks weighing 5 kN × 2.5 kN are connected up by a string over a frictionless pulley as shown in Fig Q4(b). Find the minimum value of force 'T' to generate an impending motion to the right. The coefficient of friction for the surface of contact for block 'A' × 'B' are 0.2 × 0.3 respectively.

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.



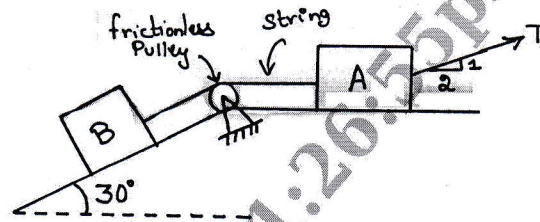


Fig Q4(b)

(10 Marks)

**Module-3**

- 5 a. Distinguish between centroid and centre of gravity. (04 Marks)
- b. Determine the centroid of a triangle from first principles. (06 Marks)
- c. Find the centroid of the shaded composite area with respect to the given axis as shown in Fig Q5(c).

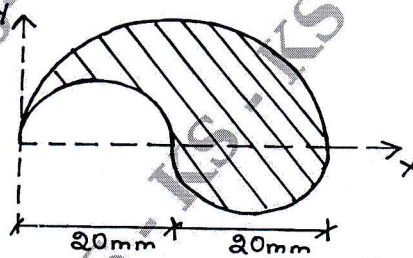


Fig Q5(c)

(10 Marks)

OR

- 6 a. State and prove parallel axis theorem. (06 Marks)
- b. Determine the second moment of the area about the horizontal centroidal axis as shown in Fig Q6 (b). Also find radius of gyration about the same axis. All dimensions in Fig.Q6(b) are in mm.

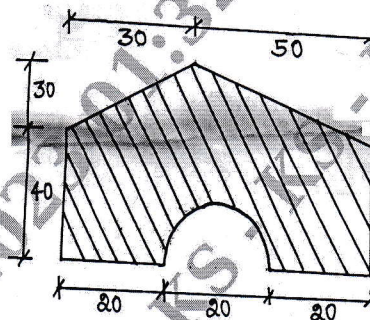


Fig Q6(b)

(14 Marks)

**Module-4**

- 7 a. Mention the different types of supports and its support reactions with a neat sketch. (08 Marks)
- b. Determine the support reactions for the beam as shown in Fig Q7(b).

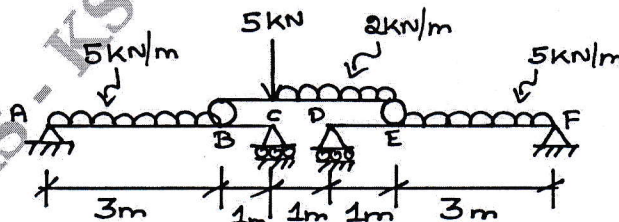


Fig Q7(b)

(12 Marks)

OR

- 8 a. Find the forces in all the members of the truss shown in Fig Q8(a). Indicate the forces on the truss with their nature. Use method of joints. (10 Marks)

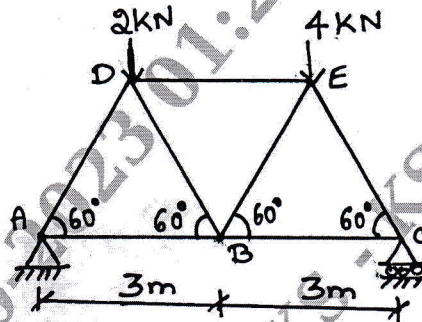


Fig Q8(a)

(10 Marks)

- b. Find the forces in the members of CD, KD, KJ of the truss shown in Fig Q8(b). Use method of sections. (10 Marks)

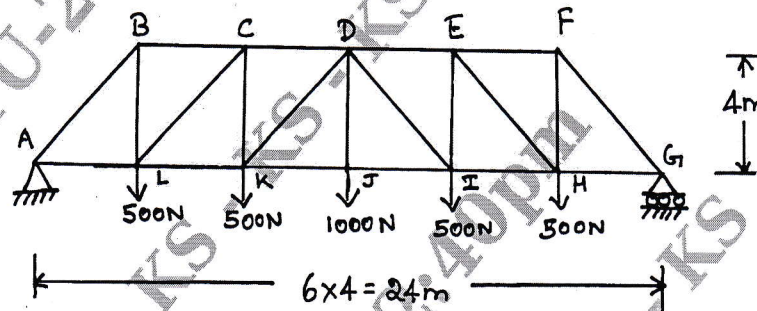


Fig Q8(b)

(10 Marks)

**Module-5**

- 9 a. Define the following :  
 i) Kinematics ii) Kinetics iii) Motion iv) Acceleration v) Path (05 Marks)  
 b. What is super elevation and what is its necessity? (05 Marks)  
 c. Car 'A' acceleration uniformly from rest on a straight level road, Car 'B' starting from the same point 6 seconds later with zero initial velocity, accelerates at  $6\text{m/s}^2$ . It overtakes the Car 'A' at 400m from the starting point. What is the acceleration of the Car 'A'? (10 Marks)

OR

- 10 a. What is a Projectile? Define the following terms briefly  
 i) Angle of projection ii) Horizontal range iii) Vertical height iv) Time of flight (10 Marks)  
 b. A cricket ball thrown from a height of 1.8m above ground level at an angle of  $30^\circ$  with the horizontal with a velocity of 12m/s is caught by a fielder at a height of 0.6m above the ground. Determine the distance between the two players. (10 Marks)

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21EME15/25

## First/Second Semester B.E. Degree Examination, June/July 2023 Elements of Mechanical Engineering

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Use of Steam table is permitted

### Module-1

- 1 a. Enumerate the roles of mechanical engineering in industries and society. (04 Marks)  
b. Define : i) Sensible heat ii) latent heat iii) Dry steam v) Wet steam vi) Dryness fraction. (10 Marks)  
c. Find the enthalpy of 1kg of steam at 12 bar when,  
i) Steam is dry saturated  
ii) Steam is 22% wet  
iii) Super heated to 250°C  
Assume the specific heat of the super heated steam as 2.25 kJ/KgK. (06 Marks)

OR

- 2 a. Differentiate between Renewable and Non-renewable energy sources. (04 Marks)  
b. With a neat sketch, explain the working principle of Hydel power plant. (08 Marks)  
c. Explain with neat sketch Pelton Wheel. (08 Marks)

### Module-2

- 3 a. Write a note on smart materials and shape memory alloys. (06 Marks)  
b. Differentiate between ferrous and Non ferrous metals. (06 Marks)  
c. What is Composite? List the applications of composite materials. (08 Marks)

OR

- 4 a. With a neat sketch, explain Arc Welding. (08 Marks)  
b. Differentiate between soldering and brazing. (06 Marks)  
c. Define three modes of heat transfer. (06 Marks)

### Module-3

- 5 a. Differentiate between 2-stroke and 4-stroke engine. (06 Marks)  
b. With neat sketch, explain working principle of 4-stroke Diesel engine. (08 Marks)  
c. What are the advantages and disadvantages of electric vehicles? (06 Marks)

OR

- 6 a. Define the following :  
i) Refrigeration effect  
ii) Ton of Refrigeration  
iii) Unit of Refrigeration  
iv) Coefficient of Performance (COP)  
v) Ice making capacity (10 Marks)  
b. With neat sketch, explain the working of vapour compression refrigeration spectrum. (10 Marks)

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

**Module-4**

- 7 a. Explain with neat sketches,  
i) Spur gear  
ii) Helical gear  
iii) Bevel gear (08 Marks)  
b. Derive the length of the belt in open drive. (08 Marks)  
c. What are the advantages and disadvantages of gear drive? (04 Marks)

OR

- 8 a. Explain with neat sketch loading and unloading mechanism. (10 Marks)  
b. Explain with neat sketch Robot configurations. (10 Marks)

**Module-5**

- 9 a. Explain with neat sketches, the following operations  
i) Plain Turning  
ii) Facing  
iii) Taper-Turning  
iv) Knurling (10 Marks)  
b. With neat sketch, explain working of Horizontal Milling Machine. (10 Marks)

OR

- 10 a. Explain the components of CNC with neat block diagram. (08 Marks)  
b. What are the Advantages and Disadvantages of CNC? (08 Marks)  
c. Differentiate between open loop and closed loop control system. (04 Marks)

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7. Psychosis is characterized by,  
 a) Loss of touch with reality.  
 b) Prolonged emotional reaction to a given stress.  
 c) Anxiety, fear, sadness, Vague aches and pains.  
 d) All the above
8. The following are the characteristics of positive stress.  
 a) It improves performance  
 b) It feels exciting  
 c) It motivates  
 d) All of these
9. According to WHO a person is called obese when the BMI is above,  
 a) 20  
 b) 30  
 c) 10  
 d) None of these
10. The calories required to keep your body functioning at rest is called,  
 a) Basal metabolic rate  
 b) Body mass index  
 c) both a and b  
 d) None of these
11. Type of fat that should be completely avoided from consumption as it is formed by hydrogenation,  
 a) Saturated fats  
 b) Trans fats  
 c) Monosaturated fats  
 d) Polysaturated fats
12. Eating disorder is caused due to,  
 a) Extreme body dissatisfaction  
 b) Low self esteem  
 c) Sensitivity to criticisms  
 d) All of these
13. The condition in which excess amount of fat is accumulated in one's body causing,  
 a) Obesity  
 b) Heart failure  
 c) Brain hemorrhage  
 d) Diabetes
14. Communication process includes,  
 a) Sender  
 b) Communication channel  
 c) Decoding and Encoding  
 d) All of these
15. Good communication skill includes,  
 a) Being judgemental  
 b) Listening  
 c) Multitasking  
 d) All the above
16. Friendship in education leads to,  
 a) Problem solving  
 b) Skill development  
 c) Better communication  
 d) All of the above
17. Communication is a part of \_\_\_\_\_ skills.  
 a) soft  
 b) hard  
 c) rough  
 d) short
18. Letter, e-mail, telephone are examples of,  
 a) message  
 b) feed back  
 c) channel  
 d) encoding
19. Goal of communication are,  
 a) To inform, to persuade  
 b) To inform, fear of offending  
 c) To persuade, fear of offending  
 d) None of these

20. Eating disorder includes,  
 a) Anorexia  
 b) Bulimia nervosa  
 c) Bingeing  
 d) All of the above
21. The feature common to both anorexia and bulimia nervosa is,  
 a) Refusal to maintain normal body weight.  
 b) Fear of gaining weight  
 c) Purging to prevent weight gain  
 d) None of these
22. Wellness dimensions are,  
 a) 4  
 b) 2  
 c) 6  
 d) 8
23. Drinking enough water aids as,  
 a) Fatigue buster  
 b) Productivity booster  
 c) Joints greaser  
 d) All the above
24. Physical activity and food intake ratio for healthy living and to be physically fit is,  
 a) 50% food, 50% activity  
 b) 30% food, 70% activity  
 c) 70% food, 30% activity  
 d) None of these
25. Following influences health,  
 a) Age  
 b) Lifestyle  
 c) Social network  
 d) All of these
26. Wellness refers to,  
 a) Positive approach to living  
 b) Both positive and negative approach  
 c) Absence of disease  
 d) None of these
27. Social wellness includes,  
 a) Problem solving  
 b) Improving natural environment  
 c) Maintaining relationship with family and friends  
 d) None of these
28. Emotional well being includes,  
 a) Stress situation management  
 b) Smoking  
 c) Drinking alcohol  
 d) None of these
29. Intellectual wellness includes,  
 a) Eating balanced diet  
 b) Drinking sufficient water  
 c) Having good nutrition  
 d) Mental exercise
30. Risk factors that increases person's illness or injury due to,  
 a) Smoking  
 b) Extreme physical activity  
 c) Alcohol drinking  
 d) All of the above
31. What are the reasons for taking drugs?  
 a) To feel good  
 b) To feel better  
 c) To do better  
 d) All of these
32. What factors increase the risk of addiction?  
 a) Mental illness  
 b) Early use  
 c) Both (a) and (b)  
 d) None of these

33. Types of addictive behavior,  
 a) Alcoholism  
 c) Video gaming  
 b) Drugs-opium  
 d) All of these
34. Communication barriers involves,  
 a) Jumping into conclusion  
 c) No interest in conversation  
 b) Fear of offending  
 d) All of these
35. Which can be used to overcome the communication barrier,  
 a) Using a translator  
 c) Not communicating at all  
 b) By writing a letter  
 d) Using your own language
36. What is the goal of social engineering,  
 a) Sabotage a person's social media  
 b) To gain Vital personal information  
 c) To catfish someone  
 d) To build trust
37. Recognizing and avoiding addictions include,  
 a) Identify Triggers  
 c) Reach out  
 b) Avoid stress  
 d) All the above
38. Which are intimately related?  
 a) Disease and health  
 c) Body and mind  
 b) Body and health  
 d) Body and spiritual values
39. Symptoms of substance use disorder is,  
 a) Impaired control  
 c) Risky use  
 b) Social problems  
 d) All of the above
40. What are signs and symptoms of depression,  
 a) Loss of interest or pleasure in hobbies and activities  
 b) Thoughts of death or suicide  
 c) Body aches, Low energy, fatigue  
 d) All the above
41. When people of your age try to influence you to believe or act like them it is called,  
 a) Communication  
 b) Peer pressure  
 c) Friendship  
 d) Negotiation
42. What is defined to be a regular and excessive use of a substance in spite of dangers?  
 a) Use  
 b) Abuse  
 c) Addiction  
 d) Dependence
43. Which of the following is not a symptom of mental illness?  
 a) Insomnia  
 c) Positive attitude  
 b) Depression  
 d) Delusions and hallucinations
44. Which of the following was a major reason for the development of Drugs?  
 a) For clinical purposes  
 c) Adventure  
 b) To experience hallucinations  
 d) For curiosity



45. Social health hazards includes,  
a) Stigma  
b) Antisocial behavior  
c) Higher crime records  
d) All of the above
46. Mental health is state of development of one's,  
a) Personality  
b) Emotional attitude  
c) Both (a) and (b)  
d) Intellect
47. When calorie burned in a day is more than calorie consumed it leads to,  
a) Weight gain  
b) Weight maintenance  
c) Weight loss  
d) None of the above
48. Health supporting behavior usually includes,  
a) Adequate exercise, optimal nutrition  
b) Calorie balanced diet  
c) Appropriate sleep regime  
d) All of the above
49. WHO principles includes,  
a) Development of child  
b) Health is one of the fundamental right  
c) Promotion and protection of health  
d) All of the above
50. Psychological health means,  
a) Feeling comfortable  
b) Enjoying life  
c) Both (a) and (b)  
d) None of the above

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Question Paper Version : A

**First/Second Semester B.E./B.Tech. Degree Examination, June/July 2023**  
**Innovation and Design Thinking**

Time: 1 hr.]

[Max. Marks: 50

### INSTRUCTIONS TO THE CANDIDATES

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

- 
1. The main goal of Design Thinking is \_\_\_\_\_  
a) To create new products or services      b) To improve existing products or services  
c) To solve problems      d) All of the above
  2. \_\_\_\_\_ is the main focus of Design Thinking.  
a) The designer      b) The user      c) The business      d) The technology
  3. Empathizing in Design Thinking refers to \_\_\_\_\_  
a) Understanding the problem      b) Generating ideas  
c) Identifying user needs      d) Building prototypes
  4. The main objective of the prototype stage in Design thinking \_\_\_\_\_  
a) Understanding the problem      b) Generating ideas  
c) Identifying user needs      d) Building prototypes
  5. The major characteristics of Design Thinking is \_\_\_\_\_  
a) Being creative      b) Being open minded  
c) Being critical      d) All of the above.
  6. Ideate in Design Thinking refers to \_\_\_\_\_  
a) Understanding the problem      b) Generating the ideas  
c) Identifying the user needs      d) Building prototypes
  7. What is the main objectives of the test stage in Design Thinking?  
a) Understanding the problem      b) Generating the ideas  
c) Identifying the user needs  
d) Building prototypes and validating the solution with user feedback.

8. Implementing stage in Design thinking means
  - a) Making the solution available to user
  - b) Continuously improving the solution
  - c) Identifying the user needs
  - d) Both (a) and (b)
9. The main characteristic of Design thinking
  - a) Being creative
  - b) Being open minded
  - c) Being critical
  - d) All the above
10. The sole purpose of shared model in team based design
  - a) To ensure effective communication and collaboration
  - b) To validate assumption about the solution
  - c) To test the final product
  - d) To create a polished final product
11. How can a shared model be created in team based design?
  - a) Conducting a team alignment meeting
  - b) Creating a visual representation of the solution
  - c) Encouraging team members to share their individual perspectives and ideas
  - d) All of the above
12. Who should be involved in creating a shared model in team based design?
  - a) Only the Design team
  - b) Only business team
  - c) Only the user team
  - d) All the stake holders concerned
13. What is the main goal of the shared model in terms of the user?
  - a) To satisfy the user
  - b) To test the solution with the user
  - c) To generate the revenue
  - d) To validate the design
14. Which of the following is not a common technique used in the empathize stage
  - a) User interviews
  - b) Surveys
  - c) Brain Storming
  - d) User observation
15. The empathize stage in Design Thinking is also known as \_\_\_\_\_
  - a) Observe stage
  - b) Ideate stage
  - c) Understand stage
  - d) Empathies stage
16. \_\_\_\_\_ is the output of design stage in Design thinking
  - a) A list of potential solution
  - b) A clear problem statement and user needs
  - c) A working prototype
  - d) User feedback and data analysis
17. The design stage in Design thinking is typically the \_\_\_\_\_ step in the process.
  - a) First
  - b) Second
  - c) Third
  - d) Fourth
18. The ideate stage in Design thinking is also known as \_\_\_\_\_ stage.
  - a) Diverge stage
  - b) Prototype stage
  - c) Understand stage
  - d) Ideate stage
19. "How might we" questions are need for
  - a) Identification of problems
  - b) Finding solutions
  - c) Both (a) and (b)
  - d) Neither (a) nor (b)
20. What is the output of the prototype stage in Design thinking
  - a) A list of potential solutions
  - b) A clear problem statement and user needs
  - c) A working prototype
  - d) A deep understanding of the user's emotions and perspectives.
21. How do professional presentation designers typically deliver their presentations?
  - a) Imperson
  - b) Online
  - c) Both
  - d) None of the above

22. The main goal of MVP \_\_\_\_\_.
- To create fully featured product
  - To validate the product idea and gather feedback
  - To release a product to the market
  - To generate the revenue.
23. Which of the following is an example of an MVP
- A fully featured mobile app
  - A landing page with a sign up form
  - A wireframe of website
  - A working model of a car
24. What tool often used to brainstorm and organize ideas?
- Mind maps
  - Gantt charts
  - Flow charts
  - PERT diagram
25. Which tool is used to create interactive prototypes of design?
- Wireframes
  - Mockups
  - Clickable prototypes
  - Story boards
26. What tool is used to prioritize design elements and features?
- Affinity diagrams
  - Kano analysis
  - Value proposition canvas
  - Cost benefit analysis
27. Tool used to create a visual representation of process or workflow.
- Flow charts
  - PERT diagrams
  - Gantt charts
  - Mind maps
28. \_\_\_\_\_ is used to understand and map out the customer journey.
- Customer Journey Map
  - Empathy Map
  - User flow
  - User research
29. \_\_\_\_\_ tool is used to understand and organize user feedback and research.
- Affinity diagrams
  - Kano analysis
  - User research
  - Empathy Map
30. \_\_\_\_\_ is used to create a visual representations of a project tasks and timelines.
- Gantt charts
  - PERT diagram
  - Mind maps
  - Flow charts
31. What technology uses a device to track the movement of user's eye as they interact with a design?
- Session replay software
  - Eye tracking technology
  - Heat map and click tracking software
  - User testing platform.
32. \_\_\_\_\_ is an example for Project Management Software.
- Invision
  - Trello
  - Google meet
  - Adobe XD
33. \_\_\_\_\_ is the example of design collaboration software.
- Trello
  - Invision
  - Google meet
  - Adobe XD
34. \_\_\_\_\_ are essentials to collect research information.
- A/B testing
  - Usability testing
  - Design sprints
  - Surveys
35. What is the main focus of Design Thinking in IT.
- Efficiency
  - Cost effectiveness
  - User centeredness
  - Innovation
36. How can design thinking in IT improve products, services and processes?
- By identifying user needs and pain points
  - By considering different perspectives
  - By rapid prototyping and testing
  - All of the above

37. What stage in design thinking allows for the collaboration between designers, developers and stakeholders?  
 a) Empathize                      b) Ideate                      c) Define                      d) Test
38. What is the main benefits of using design thinking approach in IT?  
 a) Efficiency                      b) Cost effectiveness  
 c) Improved user satisfaction                      d) Innovation
39. What is the main goal of business process modeling?  
 a) Understanding the process                      b) Improving the process  
 c) Documenting the process                      d) All of the above
40. Agile methodology commonly used for  
 a) S/w development                      b) Project management  
 c) Marketing strategy                      d) Both (a) & (b)
41. What is the key advantage of Agile in virtual collaboration environment?  
 a) Speed                      b) Efficiency                      c) Adaptability                      d) Innovation
42. What type of prototypes can be created using scenario based prototyping?  
 a) Physical models                      b) Computer simulation  
 c) Working prototypes                      d) All of the above
43. Design thinking can be used to achieve \_\_\_\_\_ of the following.  
 a) Innovation                      b) Growth  
 c) Change within organization                      d) All of the above
44. Which of the following is not a stage in Design thinking?  
 a) Test                      b) Plan                      c) Implement                      d) Act
45. Story telling in strategic foresight represents.  
 a) To communicate complex information in a simple and relatable way  
 b) To inspire innovation and creativity  
 c) To predict future trends and events                      d) To improve organizational efficiency.
46. The key element of Design Thinking \_\_\_\_\_  
 a) Ideation                      b) Empathy                      c) Innovation                      d) Creativity
47. The prime target of Design Thinking.  
 a) The designer                      b) The user                      c) The business                      d) The technology
48. The main objective of creativity \_\_\_\_\_  
 a) To generate new ideas                      b) To improve existing ideas  
 c) To solve problems                      d) All of the above
49. The main objective of innovation \_\_\_\_\_  
 a) To improve existing product of services                      b) To create new products or services  
 c) To generate the instant revenue                      d) All of the above
50. What is the main objective of the implementation stage in Design Thinking?  
 a) Making the solution available to the user  
 b) Continuously improving the solution  
 c) Identifying the user needs                      d) Both (a) & (b)

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