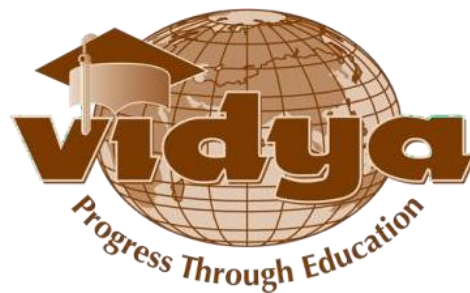


**VIDYA ACADEMY OF SCIENCE AND TECHNOLOGY  
TECHNICAL CAMPUS KILIMANOOR**

*(A Unit of Vidya International Charitable Trust)*

Accredited by NAAC with B++ Grade



**QUESTION BANK- 2019 SCHEME**

**2023-2024: EVEN SEMESTER, S2**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

## Question Bank

### Subject: VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS

Module 1			
Sl. No	Questions	Marks	KU/KTU
1	Find the parametric equation of the tangent vector of the curve $r(t) = t^2 \hat{i} + 2t^3 \hat{j} + 3t \hat{k}$ at $t = 1$ .	3	KTU JUNE 2023
2	Find the directional derivative of $f(x, y) = xe^y$ at $(1,1)$ in the direction of the vector $\hat{i} - \hat{j}$	3	KTU JUNE 2023
3	Show that $F = (\cos y + y \cos x)\hat{i} + (\sin x - x \sin y)\hat{j}$ is a conservative vector field. Hence find a potential function for it?	7	KTU Apr-2018 & Dec-2017, Jun 2023
4	Find the divergence and curl of the vector field $f(x, y, z) = yz\hat{i} + xy^2\hat{j} + yz^2\hat{k}$	7	KTU JUN 2023 ,KTU Dec-2017
5	Show that $\int (3x^2 e^y dx + x^3 e^y dy)$ is independent of the path and hence evaluate the integral from $(0,0)$ to $(3,2)$ .	3	KTU Jun 2023
6	Show that the integral $\int_{(1,1)}^{(3,2)} (e^x \log y - \frac{e^y}{x}) dx + (\frac{e^x}{y} - e^y \log x) dy$ Where $x$ and $y$ are positive, is independent of path and find its value.	5	KTU Dec-20117
7	If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ and $r =  \vec{r} $ , then show that $\nabla f(r) = \frac{f'(r)}{r} \vec{r}$ .	5	KTU Dec-2017
8	Prove that the force field $F = e^y \hat{i} + x e^y \hat{j}$ is conservative in the entire $xy$ - plane	7	KTU Model question
9	Find the work done by the Force field $F(x, y, z) = xy\hat{i} + yz\hat{j} + xz\hat{k}$ along $C$ where $C$ is the curve $r(t) = t\hat{i} + t^2\hat{j} + t^3\hat{k}$	7	KTU Model Question
10	Show that $f(x, y) = (\cos y + y \cos x)\hat{i} + (\sin x - x \sin y)\hat{j}$ is a conservative vector field. Hence find the scalar potential for it.	5	KTU Dec-2017
11	Find the directional derivative of $f(x, y) = x^2 + 3xy + y^2$ at the point $P(2,1)$ in the direction of $\vec{a} = \frac{1}{3}\hat{i} + \frac{2}{3}\hat{j}$	3	KTU-June 2022

12	Evaluate $\int 3xy \, dy$ over the line segment $C$ joining $(0,0)$ and $(1,$	3	KTU-June 2022
13	<p>a) Find the parametric equation of the tangent to the curve</p> $\vec{r}(t) = 2\cos\pi t\vec{i} + 2\sin\pi t\vec{j} + 6t\vec{k} \text{ at } t = \frac{1}{3}$ <p>b) Show that the vector field <math>f^{\rightarrow}(x, y) = 2xy^3\vec{i} + 3y^2x^2\vec{j}</math> is conservative and find <math>\phi</math> such that <math>f^{\rightarrow} = \nabla\phi</math>.</p> <p style="text-align: center;"><math>(-2,0)</math></p> <p>Hence evaluate <math>\int_{(2,-2)}^{(-2,0)} 2xy^3dx + 3y^2x^2dy</math></p>	7	KTU-June 2022
14	<p>a. Find the position and velocity vectors of the particle, given</p> $\vec{a}(t) = (t + 1)^{-2}\vec{j} + e^{-2t}\vec{k}, \vec{v}(0) = 3\vec{i} - \vec{j}, \vec{r}(0) = \vec{k}$ <p>b. If <math>\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}</math>, and let <math>\vec{F}(r) = f(r)\vec{r}</math>, then prove that</p> $\text{div}\vec{F} = 3f(r) + \vec{r}f'(r)$	7	KTU-June 2022
<b>Module 2</b>			
1	Using Green's theorem, evaluate the line integral $\int (xy + y^2) \, dx + x^2 \, dy$ where $C$ is bounded by $y = x$ and $y = x^2$ and positively oriented	5	KTU June 2023, Apr-2018
2	If $\sigma$ is any closed surface enclosing a volume $V$ and $F = xi^{\rightarrow} + 2yj^{\rightarrow} + 3zk^{\rightarrow}$ , using divergence theorem show that $\iint_{\sigma} F \cdot nds = 6V$ .	3	KTU Apr-2018
3	Evaluate $\int_c (x^2 - 3y)dx + 3xdy$ , where $C$ is the circle $x^2 + y^2 = 4$	3	KTU Dec-2017

4	Evaluate the surface integral $\iint z^2 \sigma \, dS$ , where $\sigma$ is the portion of the cone $z = \sqrt{x^2 + y^2}$ between the planes $z=1$ and $z=3$ .	7	KTU JUNE 2023
5	Using Greens theorem evaluate $\int_C (xy + y^2)dx + x^2dy$ , where C is the boundary of the common to the curve $y = x^2$ and $y = x$ .	7	KTU Apr-2018
6	Using stokes theorem evaluate $\int_C f \cdot dr$ where $F = xz \, i + 4x^2y^2j + xy \, k$ , C is the rectangle $0 \leq x \leq 1, 0 \leq y \leq 3$ in the plane $z = y$ .	7	KTU JUNE 2023,KTU DEC-2017
7	Determine whether the vector fields are free of sources and sinks, If it is not locate them. (i) $(y + z)i - xz^3j + x^2siny \, k$ (ii) $xy \, i - 2xyj + y^2 \, k$	5	KTU Dec-2017
8	Evaluate the surface integral $\iint_{\sigma} xz \, ds$ , where $\sigma$ is the part of the plane $x + y + z = 1$ that lies in the first octant.	5	KTU Dec-2017
9	Using divergence theorem evaluate $\iint_S F \cdot nds$ where $F = (x^2 + y)i + z^2j + (e^y - z)k$ and S is the surface of the rectangular solid bounded by the co-ordinate planes $x = 3, y = 1, z = 3$	5	KTU Apr-2018
10	Use stokes theorem to evaluate the integral $\int_C F \cdot dr$ where $\vec{F} = (x^2 - y^2)\vec{i} + 2xy\vec{j}$ and C is the rectangle in the $xy$ - plane bounded by the lines $x = 0, y = 0, x = a$ and $y = b$ .	5	KTU Apr-2018
11	Find the circulation of $F = (x - z)i + (y - x)j + (z - xy)k$ using Stokes theorem around the triangle with the vertices A(1,0,0),B(0,1,0) and C(0,0,1).	7	KTU MODEL QUESTION
12	Use divergence theorem to find the out ward flux of the vector field $F = 2xi + 3yj + z^3k$ across the unit cube bounded by $x = 0, y = 0, z = 0, x = 1, y = 1, z = 1$	7	KTU MODEL question
13	Determine the sources and sinks of the vector field	3	KTU-June 2022



16	<p>a) Let <math>\sigma</math> be the portion of the surface <math>z = 1 - x^2 - y^2</math> that lies above the <math>XY</math> plane and <math>\sigma</math> is oriented upwards.</p> <p>Find the flux of the vector field <math>\vec{F}(x,y,z) = x\vec{i} + y\vec{j} + z\vec{k}</math> across <math>\sigma</math>.</p> <p>b) Use Stoke's theorem to evaluate <math>\oint \vec{F} \cdot d\vec{r}</math> over the circle <math>C: x^2 + y^2 = 1</math> where <math>\vec{F}(x,y,z) = z^2\vec{i} + 3x\vec{j} - y^3\vec{k}</math> and <math>C</math> is the circle in <math>XY</math> plane with counter clockwise orientation looking down the positive <math>Z</math> axis</p>	7  7	KTU-June 2022
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Module 3			
1	Determine whether the vector field $F = 4(x^3 - x)\hat{i} + 4(y^3 - y)\hat{j} + 4(z^3 - z)\hat{k}$ is free of sources and sinks. If not locate them. (3)	3	KTU june 2023
2	Show that the functions $x, x \ln x$ are linearly independent.	3	KTU june 2023
3	Discuss the existence and uniqueness of solution of initial value problem $\frac{dy}{dx} = \frac{y}{\sqrt{x}}, y(1) = 3$	3	KTU JUNE 2023
4	Prove that $y_1(x) = e^x$ and $y_2(x) = e^{4x}$ form a fundamental system (basis) for the differential equation $y'' - 5y' + 4y = 0$ . Can $5e^x - 2e^{4x}$ be a solution (do not use verification code) of the differential equation? Explain.	5	KTU JULY-2018
5	Discuss the existence and uniqueness of solution of the initial value problem $\frac{dy}{dx} = x^2 + y^2, y(0) = 1$ in the rectangle $ x  \leq 1,  y - 1  \leq 1$ .	6	KTU JULY-2018
6	If $y_1(x) = x$ is a solution of $x^2y'' + 2xy' - 2y = 0$ , find the general solution.	5	KTU JULY-2018
7	Examine whether $e^{2x}, e^{3x}$ are linearly independent solutions of the differential equation $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$ in $-\infty < x < \infty$ , What is its general solution?	3	KTU MAY-2017
8	Solve the Cauchy -Euler differential equation $(x^2D^2 - 3xD + 10)y = 0$	3	KTU MAY-2017
9	Solve $(D^3 + 8)y = \sin x \cos x + e^{-2x}$	6	KTU MAY-2017
10	Solve $y'' + y = \sec x$ by the method of variation of parameters	7	KTU JUNE 2023, KTU MODEL QUESTION
11	Solve $y'' + 4y' + 4y = x^2 + e^{-x} \cos x$	7	KTU MODEL QUESTION
12	Solve the initial value problem $y'' + 5y' + 6y = 0, y(0) = 1, y'(0) = 2$	3	KTU-June 2022

13	Solve $y''' - y' = 0$	3	KTU-June 2022
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14	a)Using the method of undetermined coefficients solve, $y''-4y=xe^x$ b) Using the Method of variation of parameters solve, $y''-4y+5y=\frac{e^{-2x}}{\sin x}$	7  7	KTU-June 2022
15	a)Solve the initial value problem, by method of undetermined coefficients $y'' + 4y = 8x^2, y(0) = -3, y'(0) = 0$  b) Solve the initial value problem $x^2y'' + 3xy' + y = 0, y(1) = -3, y'(1) = 1$	7  7	KTU-June 2022
<b>Module 4</b>			
1	Find the inverse Laplace transform of $\frac{5}{(s^2+1)(s^2+25)}$ , using convolution theorem.	7	KTU JUNE 2023,KTU-Dec 2018
2	Find the Laplace transform of i) $\sin^2 t$ ii) $\cos(\omega t + \theta)$	3,7	KTU june 2023,KTU-Dec 2018
3	Solve the initial value problem $y'' - y' - 6y = 0, y(0) = 6, y'(0) = 13$ using Laplace transforms.	7	KTU-March 2017
4	Using Laplace transform solve $y'' + 5y' + 6y = e^{-2t}$ given that $y(0) = y'(0) = 1$	7	KTU JUNE 2023
5	Find the Inverse Laplace Transform of: (i) $\frac{s-4}{s^2-4}$ (ii) $\frac{4}{s^2-2s-3}$	8	KTU JUNE 2023,KTU- April 2018
6	Find the Laplace Transform of : (i) $\sin 3t \cos 2t$ (ii) $e^{-2t} \cos 2t$	8	KTU-April 2018
7	Find the inverse Laplace transform of $\frac{-1}{(s+\sqrt{2})(s-\sqrt{3})}$	7	KTU- July 2017
8	Solve the initial value problem, using Laplace transforms. $y'' + y' + 9y = 0, y(0) = 0.16, y'(0) = 0$	8	KTU-July 2017
9	Find the Laplace transform of (i) $\sinh t \cos t$ (ii) $(t-1)^3$	8	KTU-July 2017
10	Find the Laplace transform of i) $\cos t - t \sin t$ ii) $4te^{-2t}$	8	Ktu- May 2017
11.	Find the inverse laplace transform of $F(s) = \frac{2(e^{-s}-e^{-3s})}{s^2-4}$	7	Model Question KTU
12	Find the Laplace Transform of $(\sin t + \cos t)^2$	3	KTU-June 2022
13	Find the inverse Laplace Transform of $\frac{e^{-3s}}{(s+2)^2}$	3	KTU-June 2022

14	a)Using Laplace Transform solve $y''+5y'+6y=e^{-t}, y(0) = 0$ $y'(0)=1$ b) Using convolution theorem find the Inverse Laplace Transform of $\frac{2}{(s^2+a^2)(s^2+a^2)}$	7 7	KTU-June 2022
15	a)Find the inverse Laplace Transform of $\frac{s+8}{(s^2+4s+5)}$ b) Using Laplace Transform solve $y''+16y=4\delta(t - 3\pi), y(0) = 2, y'(0)=0$	7 7	KTU-June 2022
<b>Module 5</b>			
1	Determine the Fourier sine Transform of $f(x) = 3x, 0 < x < 6.$	3	KTU JUNE 2023
2	Find the complex Fourier sine transform of $f(x) = \begin{cases} \sin x, & 0 < x < \pi \\ 0, & x > \pi \end{cases}$	7	KTU JUNE 2023
3	Find the Fourier transform and integral representation of $f(x) = \begin{cases} 1, & \text{if }  x  < 1 \\ 0, & \text{otherwise} \end{cases}$ . Hence show that $\int_0^\infty \frac{\sin w}{w} = \pi/2$	7	KTU june 2023
4	Use Fourier integral to show that $\int_0^\infty \frac{\cos yx + \omega \sin yx}{1 + \omega^2} d\omega = \begin{cases} 0 & \text{if } x < 0 \\ \frac{\pi}{2} & \text{if } x = 0 \\ \pi e^{-x} & \text{if } x > 0 \end{cases}$	7	KTU-May 2017
5	Represent $f(x) = \begin{cases} x^2, & 0 < x < 1 \\ 0, & x > 1 \end{cases}$ as a Fourier cosine integral	8	KTU-May 2017
6	Find the Fourier sine integral of $f(x) = \sin x$ if $0 < x < \pi$	3	KTU JUNE 2023
7	Express $f(x) = \begin{cases} 1, & 0 < x < \pi \\ 0, & x > \pi, \end{cases}$ a Fourier sine integral and evaluate $\int_0^\infty \frac{1 - \cos \pi \omega}{\omega} \sin x \omega d\omega$	7	KTU-July 2017
8	Find the Fourier Sine Transform of $(x)=e^{- x }$ . Hence evaluate $\int_0^\infty \frac{\omega \sin \omega x}{1 + \omega^2} d\omega$ .	8	KTU-April 2018
9	Find the Fourier Cosine Transform of $f(x)=\sin x; 0 < x < \pi$ .	7 3	KTU-April 2018, KTU-June 2022
10		8	KTU-July 2017

	Using Fourier integral representation show that $\int_0^{\infty} \frac{\sin \omega x - \omega \cos \omega x}{\omega^2} d\omega =$ $\begin{cases} \frac{\pi x}{2}, & \text{if } 0 < x < 1 \\ \frac{\pi}{4}, & \text{if } x = 1 \\ 0, & \text{if } x > 1 \end{cases}$		
11	Does the Fourier sine transform $f(x) = x^{-1} \sin x$ for $0 < x < \infty$ exist? Justify your answer.	4	Ktu model question
13	Find the Fourier sine transform of $e^{-x}$ ( $x > 0$ )	3	KTU-June 2022
14	a) Find the Fourier transformation of $f(x) = \begin{cases} e^{-x}, & 0 < x < a \\ 0, & \text{otherwise} \end{cases}$ b) Find the Fourier cosine Integral of $f(x) = \begin{cases} \cos x, & \text{if } 0 < x < \frac{\pi}{2} \\ 0, & \text{otherwise} \end{cases}$	7 7	KTU-June 2022
15	a) Find the Fourier cosine transformation of $f(x) = \begin{cases} x^2, & \text{if } 0 < x < 1 \\ 0, & x > 1 \end{cases}$ b) Find the Fourier transform of $f(x) = \begin{cases} a -  x , & \text{if }  x  < a \\ 0, & \text{otherwise} \end{cases}$	7 7	KTU JUNE 2023, KTU-June 2022

**PHT 100-ENGINEERING PHYSICS B  
QUESTION BANK**

**PHT 100- ENGINEERING PHYSICS A**

**MODULE 1**

Sl. No	Questions	Marks	KTU, Year
1	Frame and solve the differential equation of a damped harmonic oscillator. Derive the expression of displacement for underdamped, critically damped and over damped conditions and plot the results in a time - displacement graph.	10	KTU AUG 2023 KTU AUG 2022
2	Derive an expression for the fundamental frequency of transverse vibrations of a stretched string.	10	KTU JUNE 2023 KTU AUG 22 KTU AUG 21
3	Write down the differential equation of a forced harmonic oscillator and obtain its solution.	10	KTU DEC 2023 KTU DEC 22
4	The amplitude of an underdamped harmonic oscillator reduces to 1/10th of its initial value after 100 oscillations. Its time period is 1.15s. Calculate the damping constant and relaxation time.	4	KTU DEC 2023 KTU AUG 23
5	The amplitude of an underdamped harmonic oscillator reduces to 1/10th of its initial value after 100 oscillations. Its time period is 1.15s. Calculate the damping constant and relaxation time.	4	KTU JUNE 2022 KTU DEC 23
6	The equation of a wave travelling in a string is given by $y = 3.5 \times 10^{-3} \sin 2\pi(0.2x - 50t)$ where x is measured in meters and t in seconds. Evaluate the amplitude, wavelength, frequency and velocity of propagation	4	KTU AUG 2023 KTU DEC 2023
7	State the laws of transverse vibration of a stretched string.	8	KTU DEC 2023
8	What do you meant by resonance in forced oscillations? Give one example.	3	KTU AUG 2023
9	List any six points to compare electrical oscillator with a mechanical oscillator.	3	KTU AUG 2021
10	Write down the one dimensional wave equation and its solution	3	KTU AUG 2021

**MODULE-2**

1	Explain the formation of Newton's rings and show that the radius of dark ring is proportional to the square root of natural numbers. How can we use Newton's rings experiment to determine the refractive index of a liquid.	3	KTU AUG 2023
2	(a) Derive grating equation with proper diagram. What is the effect of increasing the number of lines on the dispersive power of grating?	10	KTU AUG 2023 KTU AUG 2022 KTU DEC 2022

	(b) At what angle will 650nm light produce a second order maximum when falling on a grating whose grating element is $1.2 \times 10^{-3}$ cm.	4	
3	Describe the experiment to find the refractive index of a liquid using Newtons rings arrangement	8	KTU DEC 2023
4	a) Give the theory of plane transmission grating and explain intensity distribution. b) Explain with neat diagram Rayleigh criterion of resolution.	10 4	KTU AUG 2023
5	With necessary diagram, write the formation of interference pattern in an air wedge and derive an expression for the diameter of a thin wire.	10	KTU AUG 2021
6	A wedge air film is enclosed between glass plate separated at one edge by a wire of $0.06 \times 10^{-3}$ m diameter at a distance of 0.15m from the edge. Calculate the fringe width. The wavelength of light used is $6 \times 10^{-7}$ m.	4	KTU AUG 2022
7	In Newton's ring experiment the radius of the 10th dark ring is 0.75cm. When the air film is replaced by a drop of liquid, the radius reduces to 0.65cm. Find the refractive index of the liquid.	4	KTU JULY 202
8	Why interference fringes of newton's rings arrangement are circular in shape?	3	KTU DEC 2023
9	How can you test the optical planeness of a glass plate by air wedge method?	3	KTU AUG 2023
10	Distinguish between Fresnel and Fraunhofer classes of diffraction	3	KTU AUG 2023 KTU DEC 22
<b>MODULE -3</b>			
1	a) What are matter waves? Obtain an expression for de Broglie wavelength. Derive expressions for the de Broglie wavelength of an electron (i) accelerated from rest through a potential of V volts (ii) having kinetic energy T. b) An electron is confined to one dimensional potential box of width $25 \text{ \AA}$ . Calculate the energies corresponding to the first and second quantum states in eV.	10 4	KTU AUG 2023
2	Explain optical, electrical and mechanical properties of nanomaterials. Write any four applications of nanomaterials in the medical field.	3	KTU DEC 2023 KTU DEC 22

3	<p>a) Write down Schrodinger's time dependent equation and hence derive Schrodinger's time independent equation.</p> <p>b) An electron is moving in a one dimensional box of infinite height and width <math>10A^0</math> . Calculate the first three permitted energy levels.</p>	<p>10</p> <p>4</p>	<p>KTU DEC 2023</p> <p>KTU DEC 22</p>
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4	a) Mention any eight applications of nano materials. b) What are zero dimensional, one dimensional and two dimensional nano structures?	5 9	KTU AUG 2023 KTU DEC 22
5	Write a note on quantum confinement and based on this explain Nano sheets, Nano wire and quantum dots.	10	KTU AUG 2023
6	State Heisenberg's uncertainty principle. Write its mathematical form with different pairs of variables. With the help of it, explain the absence of electrons inside the nucleus of an atom.	10	KTU AUG 2022
7	Calculate the voltage that must be supplied to an electron microscope to produce an electron of wavelength $3 \text{ \AA}$ .	4	KTU DEC 2023
8	Why do nanomaterials exhibit properties different from those of their classical counter parts?	5	KTU DEC 2023
9	What is meant by quantum mechanical tunneling? Name two electronic devices based on this phenomenon	3	KTU AUG 2023
10	An electron and a Proton are moving with same kinetic energy. Which one has shorter wavelength? Why ?	4	KTU DEC 2021

**MODULE -4**

1	Compare the properties of dia, para, and ferro magnetic materials.	3	KTU AUG 2023 KTU AUG 22
2	Derive Maxwell's equations in differential form starting from the fundamental laws in electricity and magnetism. Derive equation of continuity.	3	KTU AUG 2023 KTU AUG 22
3	Differentiate between Magnetic susceptibility and Magnetic permeability. Write the relation between them?	3	KTU AUG 2023
4	Explain the terms (i)Magnetization (ii)Magnetic permeability (iii)Relative permeability and (iv) Susceptibility. Derive the relation between magnetic susceptibility and relative permeability.	10	KTU AUG 2023
5	The magnetic flux through a closed circuit with resistance $2.5\Omega$ varies with time obeying the equation $\phi = 5t^2 + 2t + 6$ . What will be the induced emf and current in it at time = 5 seconds.	4	KTU AUG 2022

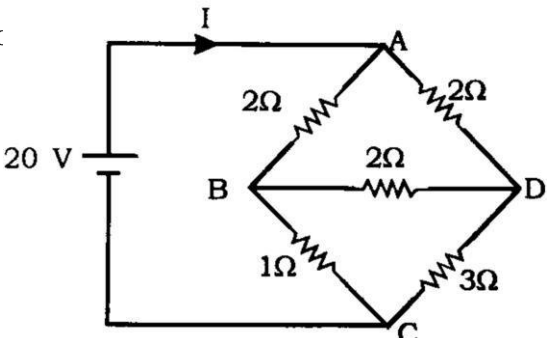
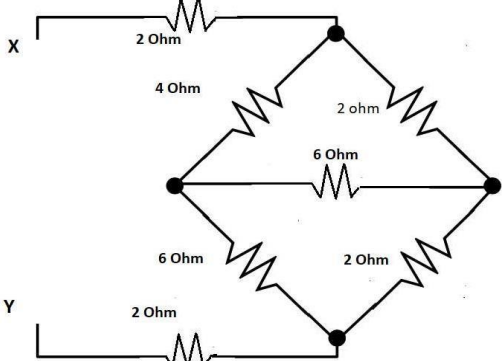
6	Define Divergence of a vector function. Give its physical significance	3	KTU AUG 2022
7	The maximum value of the permeability of the material is $0.126 \text{ N/A}^2$ . What is the relative permeability and magnetic susceptibility?	4	KTU AUG 2023

8	State Faraday's laws of Electromagnetic induction. What is Lenz's law?	4	KTU AUG 2023
9	Differentiate between Magnetic susceptibility and Magnetic permeability. Write the relation between them.	3	KTU AUG 2023
10	The magnetic flux through a closed circuit with resistance $2.5\Omega$ varies with time obeying the equation $\phi = 5t^2 + 2t + 6$ . What will be the induced emf and current in it at time = 5 seconds.	4	KTU AUG 2021
<b>MODULE -5</b>			
1	Explain BCS theory of superconductivity. Describe high temperature superconductors. Write three applications of superconductors.	10	KTU AUG 2023 KTU AUG 2022 KTU AUG 2019
2	a) Explain how light is propagated through an optical fibre. Define numerical aperture of an optical fibre and derive the expression for numerical aperture of a step index fibre.  b) In an optical fibre, the core material has refractive index 1.43 and refractive index of the cladding material is 1.4. Find numerical aperture and acceptance angle.	10  4	KTU AUG 2023 KTU DEC 2022
3	Explain Meissner effect and show that superconductors are perfect diamagnets. Discuss BCS theory of superconductivity.	10	KTU AUG 2022
4	a) Explain construction and working of a solar cell and draw its I-V characteristics. Mention any two applications of solar cells.  b) Explain the working of intensity modulated fibre optic sensor	10  4	KTU AUG 2022
5	Describe fibre optic communication system with a block diagram. List four advantages of fibre optic communication.	10	KTU AUG 2022
6	Mention three advantages of fibre optic communication system.	3	KTU AUG 2023 KTU DEC 2022
7	A light emitting diode is made of GaAsP having a band gap of 1.9eV. Determine the wavelength of the radiation emitted.	4	KTU AUG 2023
8	The numerical aperture of an optic fibre is 0.38. If the difference in the refractive indices of the material of its core and the cladding is 0.05, calculate the refractive index of material of the core.	4	KTU AUG 2022

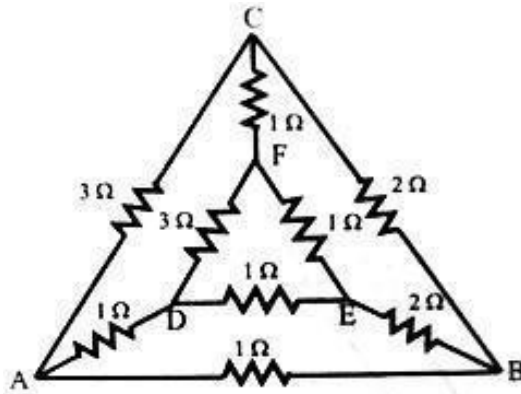
9	Distinguish between Type I and Type II superconductors with appropriate graphs.	8	KTU AUG 2022
10	The numerical aperture of an optic fibre is 0.38. If the difference in the refractive indices of the material of its core and the cladding is 0.05, calculate the refractive index of material of the core.	4	KTU AUG 2022

QUESTION BANK

EST130. BASIC ELECTRICAL ENGINEERING  
(2019 Scheme)

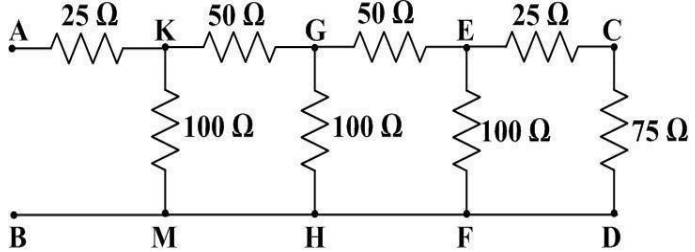
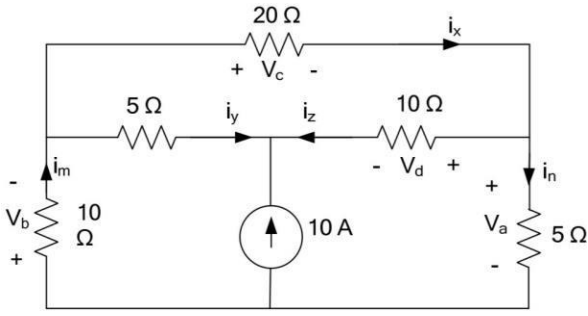
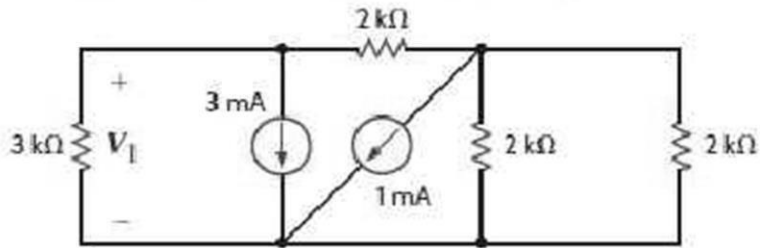
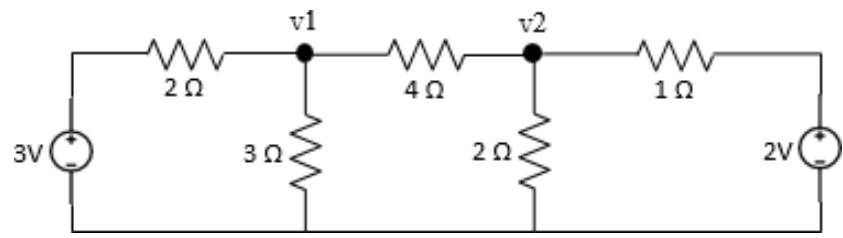
Sl No:	Questions	Marks	Year
<b>Module - 1</b>			
	<p>Find the source current I in the below figure using star-delta transformatic</p> 	10	December 2020 (2019 Scheme)
1.	<p>Find the equivalent resistance between terminal X-Y in the network</p> 	10	December 2021 (2019 Scheme)

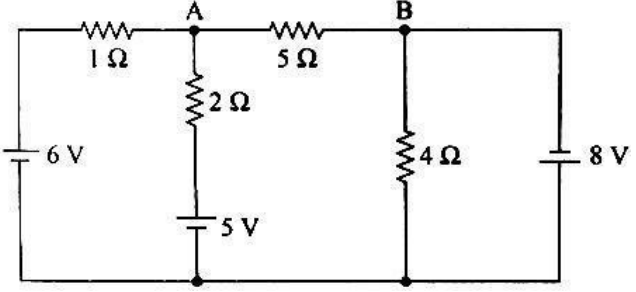
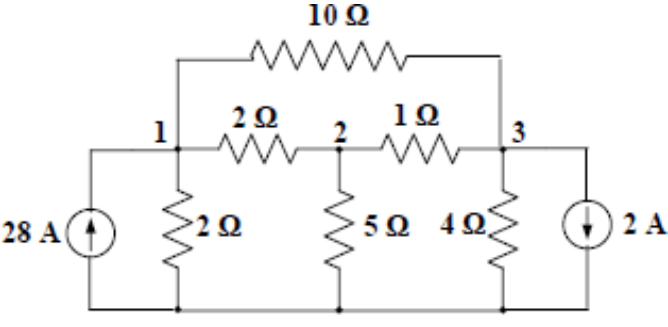
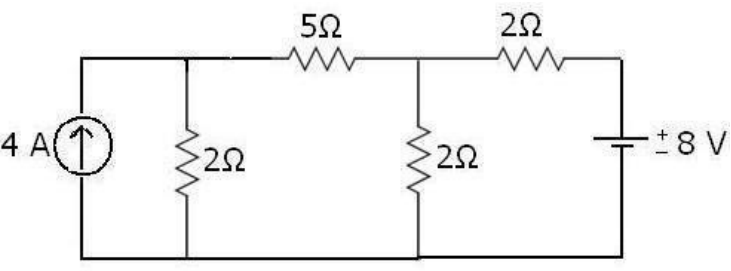
Find the resistance between points A and B in network shown.



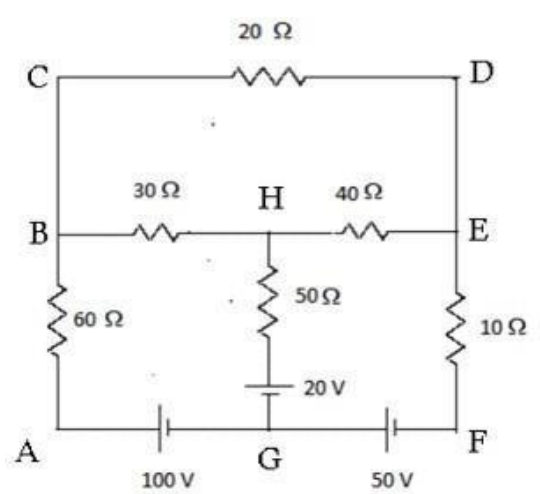
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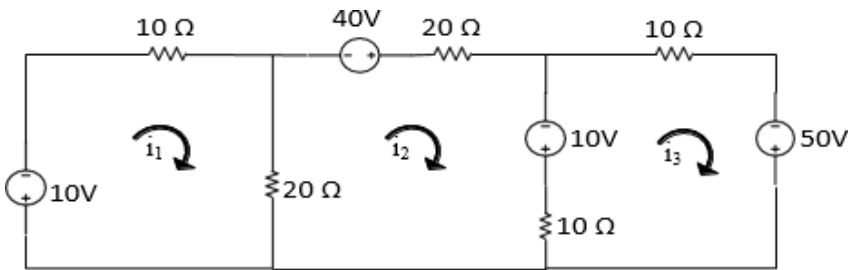
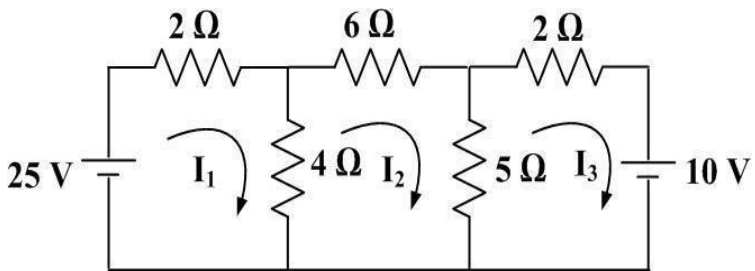
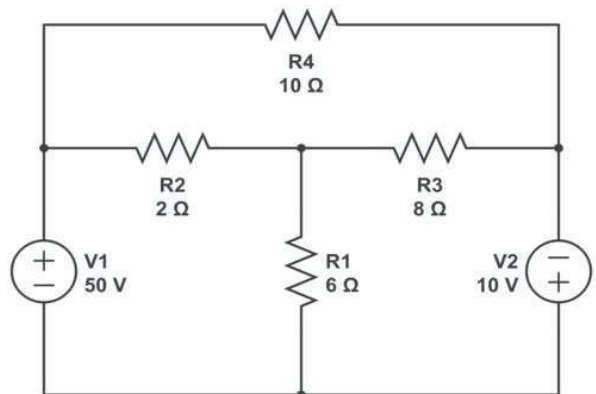
December 2022  
(2019 Scheme)

	<p>Three resistors, <math>6\Omega</math>, <math>10\Omega</math> and <math>15\Omega</math> are connected in star configuration. Obtain the equivalent resistance in a delta configuration.</p>	4	June 2022 (2019 scheme)
	<p>Find the equivalent resistance across AB.</p> 	4	June 2023 (2019 scheme)
	<p>Use the nodal analysis to find voltages <math>V_a</math>, <math>V_b</math>, <math>V_c</math>, <math>V_d</math>.</p> 	10	December 2020 (2019 Scheme) December 2021 (2019 Scheme)
2.	<p>Use nodal analysis to find <math>V_1</math> in the given circuit.</p> 	10	July 2021 (2019 scheme)
	<p>Find the node voltages <math>v_1</math> and <math>v_2</math> in the circuit given in Fig. 2. Also find the power dissipated in the <math>4\Omega</math> resistor.</p>  <p style="text-align: center;">figure 2</p>	10	June 2022 (2019 scheme)

<p>Calculate the current flowing through <math>5\Omega</math> resistor using the nodal method.</p> 	10	December 2022 (2019 Scheme)
<p>Determine the node voltages in the given circuit.</p> 	10	June 2023 (2019 scheme)
<p>Find the current through <math>5\Omega</math> resistor using Nodal Analysis.</p> 	10	December 2023 (2019 Scheme)



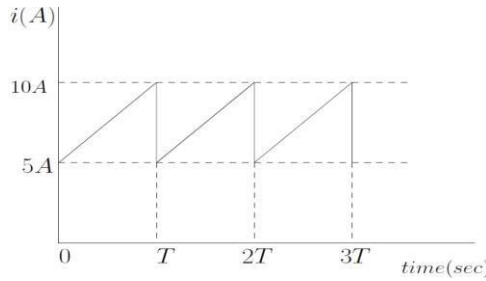
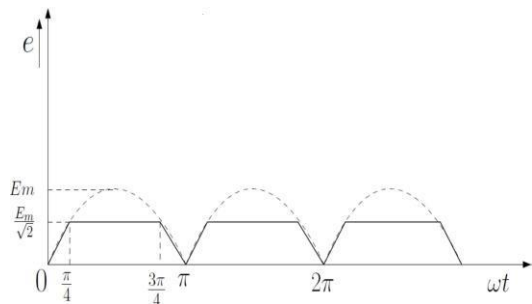
3.	<p>Find the current in each branch of the following circuit using mesh analysis?</p> 	10	July 2021 (2019 scheme)
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	<p>Find the mesh currents <math>i_1, i_2, i_3</math> in the circuit shown in Figure 1 by performing mesh analysis</p>  <p style="text-align: center;"><b>Figure 1</b></p>	10	June 2022 (2019 scheme)
	<p>Solve for the mesh currents in the given circuit.</p> 	10	June 2023 (2019 scheme)
	<p>Find the current through 10 Ω resistor using Mesh Analysis.</p> 	10	December 2023 (2019 Scheme)
4.	State and explain Kirchhoff's laws with examples	4	<p style="text-align: center;">July 2021 (2019 scheme)</p> <hr/> <p style="text-align: center;">December 2022 (2019 Scheme)</p> <hr/> <p style="text-align: center;">June 2023 (2019 Scheme)</p>

5.	Differentiate between ideal and real current sources with circuit representation.	4	December 2022 (2019 Scheme)
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<b>Module - 2</b>			
1.	What are statically and dynamically induced emfs? Explain.  <b>OR</b> Distinguish between statically induced EMF and dynamically induced EMF.	4	December 2020 (2019 Scheme)
			December 2021 (2019 scheme)
			December 2022 (2019 scheme)
			June 2023 (2019 scheme)
	Explain the concept of statically induced emf in a magnetic circuit.	4	December 2023 (2019 Scheme)
2.	Derive an expression for the energy stored in an inductor	4	June 2022 (2019 scheme)
			December 2020 (2019 Scheme)
3.	Derive the expression for average value of a sinusoidal wave form.	4	December 2021 (2019 scheme)
	Define rms value and average value of a time varying wave form.	4	December 2020 (2019 Scheme)
4.	The instantaneous value of an alternating voltage is given by $v=110 \sin 314t$ . Find the angular velocity, frequency, and time period of the voltage.	6	December 2020 (2019 Scheme)
	An alternating current is given by $14.14\sin 377t$ . Find the (a) rms value of current (b) Average value of current (c) frequency (d) form factor (e) peak factor (f) instantaneous value of current when $t=3\text{ms}$ .	6	December 2021 (2019 scheme)
	An alternating current is given by $I = 50 \sin(314t)$ . Find (a) the maximum value (b) frequency (c) time period of the current.	4	December 2022 (2019 scheme)
			June 2023 (2019 Scheme)

Sketch the current and voltage waveform, if $I = I \sin (\omega t - 60)$ , $v = V \cos (\omega t + 30)$ . What is the Phase difference between the two waveforms.	4	December 2023 (2019 scheme)
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	<p>Determine the average value and rms value of the current waveform shown in figure below.</p> 	10	December 2020 (2019 Scheme)
	<p>A full wave rectified sine function is clipped at 0.707 of its maximum value as shown in figure. Find the average and rms values of the function.</p> 	10	July 2021 (2019 scheme)
	<p>Show that for a sinusoidal voltage RMS value is 0.707 times its maximum value.</p>	4	December 2023 (2019 scheme)
	<p>A sinusoidal voltage of <math>V = 325 \sin 314t</math> when applied across an L-R series circuit causes a current of <math>I = 14.14 \sin (314t - 60^\circ)</math> flowing through the circuit. Calculate the value of L and R of the circuit. Also calculate the power consumed.</p>	6	December 2023 (2019 scheme)
5.	<p>A coil of <math>50 \Omega</math> resistance is placed in a magnetic field of <math>1\text{mWb}</math>. The coil has 50 turns and a galvanometer of <math>400 \Omega</math> resistance is connected in series with it. Find the average induced emf and the resulting current if the coil is moved in 0.1 second from the given field to another field of <math>0.2\text{mWb}</math>.</p>	6	December 2020 (2019 Scheme)

<p>Two coils A and B of 500 and 750 turns respectively are connected in series on the same magnetic circuit of reluctance <math>1.55 \times 10^6</math> AT/Wb. Assuming that there is no flux leakage, calculate (i) self-inductance of each coil and (ii) mutual inductance between coils.</p>	4	June 2022 (2019 scheme)
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	A conductor of length 0.5m kept at right angles to a uniform magnetic field of flux density $2\text{Wb/m}^2$ moves with a velocity of 75 m/s at an angle of $60^\circ$ to the field. Calculate the emf induced in the conductor.	4	July 2021 (2019 scheme)
	Define mutual inductance. Two coupled coils of self- inductance 0.8H and 0.35H have a coefficient of coupling 0.9. Find the mutual inductance between the coils.	4	July 2021 (2019 scheme)
	A coil of 180 turns is linked with a flux of 0.03 Wb when carrying a current of 10A. Calculate the inductance of the coil. If the current is uniformly reversed in 0.04 sec, calculate the emf induced in the coil.	4	December 2021 (2019 scheme)
	A coil of 200 turns carries a current of 4A. The magnetic flux linkage with the coil is 0.02Wb. Calculate the self-induced emf in the coil.	4	December 2022 (2019 Scheme)
	Two identical coils 1 and 2 are wound on the same magnetic core. Current in coil 1, which is changing at the rate of 600 A/s, induces emf of 12 V in coil 2. Calculate the mutual inductance between the coils. If the self-inductance of each coil is 50mH, calculate the coefficient of coupling between coils.	7	December 2022 (2019 Scheme)
	A rectangular shaped core wound with a coil of 150 turns and 1.2A is made of mild steel plate $10\text{ mm} \times 20\text{ mm}$ cross-section. The mean length of the magnetic path is 15cm. Calculate i. magnetizing force ii. flux density iii. reluctance iv. flux of magnetic circuit. Assume relative permeability of mild steel as 940.	6	June 2023 (2019 Scheme)
	An air solenoid has 300 turns, its length is 25 cm and cross sectional area of $3\text{ cm}^2$ . Calculate the self-inductance. If the coil current of 10A is completely interrupted in 0.04 s, calculate the induced emf in the coil.	6	June 2023 (2019 Scheme)



<p>A rectangular shape iron core has an air gap of 0.9 cm. The mean length of the flux path through iron is 39.99 cm. The relative permeability of iron is 2000. The coil has 1000 turns. The cross-sectional area of the core is 9 cm<sup>2</sup>. Calculate the current required to produce a flux of 1 mWb in the core.</p>	10	December 2023 (2019 Scheme)
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	An iron ring of cross sectional area $1\text{cm}^2$ is wound with a coil of 2000 turns. Calculate the magnetizing current required to produce a flux of 0.1 mWb in the iron path if mean length of the path is 30cm and relative permeability of iron is 2500. Neglect magnetic leakages and fringing.	10	July 2021 (2019 scheme)
6.	A core forms a closed magnetic loop of path length 32 cm. Half of this path has a cross-sectional area of $2\text{cm}^2$ and relative permeability 800. The other half has a cross-sectional area of $4\text{cm}^2$ and relative permeability 400. Find the current needed to produce a flux of 0.4 Wb in the core if it is wound with 1000 turns of insulated wire. Ignore leakage and fringing effects.	6	June 2022 (2019 scheme)
	An iron ring of cross-sectional area $6\text{cm}^2$ is wound with a wire of 100 turns and has a saw cut of 2 mm. Calculate the magnetising current required to produce a flux of 0.1 mWb. if mean length of magnetic path is 30 cm and relative permeability of iron is 470.	8	June 2022 (2019 scheme)
	An iron ring has a cross section area of $3\text{cm}^2$ and a mean diameter of 25 cm. An air gap of 0.5mm is cut across the section of the ring. The ring is wound with a coil of 200 turns through which a current of 3A is passed. If the total magnetic flux is 0.28 mWb, find the relative permeability of iron, assuming no magnetic leakage.	10	December 2021 (2019 scheme)
7.	Compare electric and magnetic circuits with circuit diagram	4	June 2022 (2019 scheme), December 2022 (2019 Scheme), December 2023 (2019 Scheme)
	Define the terms relative permeability and flux density and give the relation between the two terms.	2	June 2022 (2019 scheme)
8.	Define a) MMF b) Field Strength c) Flux Density	3	December 2022 (2019 Scheme)

	Explain the following terms : a) Reluctance b) Flux Density c) MMF d) Permeability	4	December 2023 (2019 Scheme)
9.	State and explain Faraday's laws of electromagnetic induction.	4	June 2023 (2019 Scheme)

<b>Module - 3</b>			
1.	Prove that in a purely capacitive circuit the current leads the applied voltage by 90degrees and the power consumed is zero.	4	December 2020 (2019 Scheme)
	Explain with phasor diagram instantaneous power when alternating current is supplied through a series R-L circuit. Also draw the impedance triangle and write an expression for active, reactive and apparent power in R-L circuit.	10	June 2022 (2019 scheme)
	Derive the expression for the current in an ac series RLC circuit.	4	December 2021 (2019 scheme)
	Explain the phasor diagram and impedance triangle of a series resistive inductive circuit excited by an AC source.	4	June 2023 (2019 scheme)
2.	Derive the relation between line and phase currents in a 3 phase delta connected system.	4	December 2020 (2019 Scheme)
			June 2022 (2019 scheme)
3.	Show that the power consumed by three identical single-phase loads connected in delta is equal to three times the power consumed when the phase loads are connected in star.	10	December 2022 (2019 Scheme)
4.	A resistor of $50\Omega$ , an inductor of $0.1H$ and a capacitor of $40\mu F$ are connected in series and the combination is connected across $220V$ , $50\text{ Hz}$ supply. Calculate (i)the circuit impedance (ii) resulting current (iii) power factor (iv) phase angle and (v) power consumed by the circuit.	10	December 2020 (2019 Scheme)
	A sinusoidal voltage $V=230\angle 15^\circ$ of frequency $50\text{ Hz}$ is applied to a series RL circuit consisting of $R=5\ \Omega$ and $L=0.1\text{ H}$ . Calculate (i) rms current and its phase angle (ii) power factor (iii) average power (iv) reactive power and (v) apparent power drawn by the circuit.	10	July 2021 (2019 scheme)

An alternating current is represented by $i(t)=14.14 \sin (377t)$ . Find (i)rms value (ii) frequency (iii)time period and (iv)instantaneous value of the current at $t=3\text{ms}$ .	4	December 2021 (2019 scheme)
A resistance of $10\Omega$ , an inductance of $0.3 \text{ H}$ , and a capacitance of $100\mu\text{F}$ are connected in series across $230\text{V}$ , $50 \text{ Hz}$ single phase	10	December 2021 (2019 scheme)

	power supply. Calculate the (i)impedance (ii) current through the circuit (iii) power factor of the circuit (iv) Voltage across R, L and C (v) Power consumed by the circuit.		
	A capacitor having a capacitance of $20\mu\text{F}$ is connected in series with a non – inductive resistance of $200\Omega$ across $220\text{V}$ , $50\text{ Hz}$ supply. Calculate the following 1) Impedance 2) Current 3) Power Factor 4) Power drawn from supply.	10	December 2022 (2019 scheme)
	A resistor of $10\Omega$ , an inductor of $0.3\text{ H}$ and a capacitor of $100\ \mu\text{F}$ are connected in series across a $230\text{ V}$ , $50\text{ Hz}$ , single phase ac supply. Determine (a) impedance (b) current (c) power in watts (d) circuit power factor.	10	June 2023 (2019 scheme)
	Two impedances $Z_1$ and $Z_2$ when connected separately across $220\text{ V}$ , $50\text{Hz}$ supply, consume $300\text{W}$ and $150\text{W}$ at a power factor of $0.4$ lagging and $0.7$ leading respectively. When the two impedances are connected in series across the same supply, find total power consumed and overall power factor.	10	December 2023 (2019 scheme)
	The impedance of an R-L series circuit is $50 + j100\ \Omega$ . When the supply frequency is increased from $50\text{ Hz}$ to $100\text{ Hz}$ , what will be the value of impedance?	4	December 2023 (2019 scheme)
5.	Three inductive coils, each with a resistance of $22\ \Omega$ and an inductance of $0.05\text{ H}$ are connected in first in star and then in delta, to a 3 phase $415\text{ V}$ , $50\text{ Hz}$ supply. Calculate for both star and delta connections, (i) phase current and line current and (ii) total power absorbed.	10	December 2020 (2019 Scheme)
	A balanced 3 phase load consists of 3 coils each of resistance $6\ \Omega$ and inductive reactance of $8\ \Omega$ . Determine the line current and power absorbed when the coils are (i) star connected (ii) delta connected across $400\text{V}$ , 3 phase supply	10	July 2021 (2019 scheme)

	A balanced three phase load has per phase impedance of $(30 + j50)$ ohm. if the load is connected across 400 V, 3 phase supply, find (i) Phase current (ii) line current (iii) power supplied to the load when it is connected in (a) star (b) delta.	10	June 2022 (2019 scheme)
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	A balanced delta connected 3 phase load is fed from a 3 phase, 400 V, 50 Hz power supply. The line current is 20A and the total power absorbed by the load is 10kW. Calculate (i) the impedance in each branch (ii) the power factor and (iii) the total power consumed if the same impedances are star connected.	10	December 2021 (2019 scheme)
	A delta-connected load of $12\Omega$ resistance and $16\text{-}\Omega$ reactance are connected across a 100V, 50 Hz supply. Find line current, phase current and power factor.	4	December 2022 (2019 scheme)
	Three impedances each having resistance $20\Omega$ and an inductive reactance of $15\Omega$ are connected in star across a 400V, 3 phase, AC supply. Calculate (a) the line current (b) power factor (c) total power. If the load is connected in delta, determine the total power consumed by the load.	10	June 2023 (2019 scheme)
	Three similar coils each having a resistance of $5\Omega$ and an inductance of $0.02\text{H}$ are connected across 440V, 3-phase, 50Hz supply. Calculate the line current and total power absorbed when connected in (a)star and (b) Delta	10	December 2023 (2019 scheme)
6.	Find the trigonometrical, exponential and polar forms of the vector $8+j6$ .	4	July 2021 (2019 scheme)
	Two impedances, $Z_1 = (4+j3)\Omega$ , $Z_2 = (6 - j9)\Omega$ are connected in series. Find the equivalent impedance in polar form.	4	June 2023 (2019 scheme)
7.	Define (i) active power, (ii) reactive power, (iii) apparent power and (iv) powerfactor of an ac circuit.	4	July 2021 (2019 scheme)
	Define the following terms with an example: a) Phase b) Phase difference	4	June 2022 (2019 scheme)



BASICS OF ELECTRONICS ENGINEERING (EST 130 PART-2)			
QUESTION BANK			
Qn. No	MODULE – 4	Marks	Year
1	What are the merits and demerits of resistor colour coding schemes?	4	KTU JUN 2023
2	Draw and explain the VI characteristics of a PN junction diode under forward and reverse bias	4	KTU JUN 2023
3	a) What do you mean by permeability tuning? Identify and sketch any one electronic component which employs permeability tuning and explain the tuning mechanism.  b) Discuss the parameters ‘alpha’ and ‘beta’ of a transistor and quote the relationship between them. OR Derive the relation between common base current gain and common emitter current gain. The collector current of a transistor varies by 1.987 mA when its emitter current is varied by 2 mA. Compute alpha and beta of the transistor.	4  6	KTU JUN 2023
4	Draw and explain the circuit diagram, input and output characteristics of a transistor in common emitter configuration. With a neat diagram, mention any one application of transistor in common emitter configuration.	10	KTU JUN 2023
5	Draw the symbol of the resistor and explain any three specifications.	4	KTU DEC 2022
6	Compare the three transistor configurations.	4	KTU DEC 2022
7	What is an inductor? How does an inductor work What are the different types of inductors? Give two typical applications of inductor	5	KTU DEC 2022
8	For an NPN transistor, $\alpha=0.95$ and $I_E=10\text{mA}$ . Find $I_B$ and $I_C$ .	4	KTU JUN 2022
9	Write the significance of specifying tolerance value of a component . Find the capacitance values for the following codes (i) 2n2 (ii)104K (iii)103J	4	KTU DEC 2021
10	a) In a 4 band resistor the last colour in the colour band is gold. If the upper range of resistance is $3.465\Omega$ find its colour code. b) Write down the color code for a given resistor of 47-Kilo-ohms with a tolerance of 10%.	4  4	KTU JUL 2021

11	Distinguish between active and passive electronic components with examples for each	4	KTU DEC 2020
	Describe the principle of operation of an NPN transistor.	5	KTU DEC 2022

Qn. No	MODULE – 5	Marks	Year
1	Draw the circuit of voltage divider biasing arrangement and mention the functions of various components used in the circuit.	4	KTU JUN 2023
2	Explain the block diagram of an instrumentation system.	4	KTU JUN 2023
3	a) Draw the circuit diagram of a simple zener voltage regulator and explain its working. Define the terms line regulation and load regulation.	6	KTU JUN 2023
	OR		
	b) Draw and explain the block diagram of a public address system.	6	
4	a) Sketch and explain the working of a full wave bridge rectifier with capacitor filter. Suggest methods to reduce the ripple content of the output.	6	KTU JUN 2023
	OR		
	b) Plot the frequency response of a RC coupled amplifier and justify the shape of the curve.	6	
5	a) Draw the block diagram of DC power supply and explain the function of each block	10	KTU JUN 2022
	OR		
	b) Give the circuit diagram of an RC coupled amplifier. Explain its working and its frequency response	10	
6	What is the role of emitter resistor in an RC coupled amplifier?	3	KTU DEC 2021
7	Give reasons for decrease in transistor amplifier voltage gain at low frequencies and high frequencies	4	KTU DEC 2022
8	Describe gain and bandwidth of an RC coupled amplifier	4	KTU DEC 2020
9	Draw the circuit diagram of a CE amplifier and discuss the role of each component used in it.	6	KTU DEC 2020
10	Discuss the role of coupling and bypass capacitors in a single stage RC coupled amplifier.	4	MODEL

Qn. No	MODULE - 6	Marks	Year
1	Compare AM and FM.	4	KTU JUN 2023
2	a) Explain the term 'modulation index' in a radio communication system. An AM modulated carrier wave has maximum and minimum amplitudes of 600 mV and 450 mV respectively. Find the modulation index. b) Discuss the concepts of cell splitting and frequency reuse in a cellular communication system.	4 6	KTU JUN 2023
3	What is the basic principle of cellular communication?	4	KTU DEC 2022
4	With necessary block diagram explain the principle of super heterodyne receiver or AM Super heterodyne receiver. Explain the relevance of intermediate frequency in a super heterodyne receiver	5	KTU DEC 2022
5	Describe the principle and working of an antenna	6	KTU JUN 2022
6	Write the frequency range and typical applications of VHF and UHF frequency bands	4	KTU JUN 2022
7	State the merits and demerits of Amplitude Modulation.	4	KTU JUN 2022
8	Draw the frequency spectrum of an amplitude-modulated (AM) wave. Given that the modulating signal is of frequency $f_m$ and amplitude $V_m$ and the carrier is of frequency $f_c$ and amplitude $V_c$ . Take the modulation index as $m$ . What is the bandwidth requirement of this AM wave?	5	KTU JUL 2021
9	Write the expression for an AM wave and comment on the bandwidth requirement and modulation index.	5	KTU DEC 2020
10	Draw the block diagram of a GSM system and explain its working principle.	10	KTU JUN 2023

**Course Code: EST 102**

**Course Name: PROGRAMMING IN C**

**(Common for all branches)**

<b>Module I</b>			
<b>Sl. No</b>	<b>Questions</b>	<b>Marks</b>	<b>Years</b>
1.	With the help of a neat diagram explain the functional units of a computer	8	July 2021
2.	List five important registers in CPU. Also state the purpose of each register.	6	July 2021 June 2022
3.	Write algorithm and draw flowchart to perform swapping of two numbers	8	July 2021
4.	What are the functions of ALU and CU?	3	June 2022
5.	Draw a flowchart to find the sum of first N numbers.	3	June 2022
6.	Explain linear search with an example. Draw a flowchart and write pseudo code to perform linear search on an array of numbers	14	June 2022
7.	Differentiate among compiler, interpreter and assembler.	3	June 2023
8.	What is a flowchart? Draw the flow chart to check whether the given number is positive or negative.		June 2023
9.	Write the algorithm and draw the flow chart to calculate the roots of a quadratic equation, take the coefficients as inputs	10	June 2023
10.	Differentiate between system software and application software.	4	June 2023
	Explain bubble sort algorithm with an example	10	June 2023
11.	Explain different types of memories used in a computer	4	June 2023
<b>Module II</b>			
1.	Write C program to convert the given decimal number into binary number	7	July 2021
2.	What do you mean by Formatted Input? Explain in detail the prototype of 'scanf()' function in C including its argument list and return type	7	July 2021
3.	Differentiate between while and do-while loops using an example.	3	June 2022
4.	Why is the use of goto statements discouraged in C programs?	3	June 2022
5.	Explain formatted and Unformatted I/O functions of C language with syntax and example	7	June 2022
6.	Write a C program to read a character from the user and check whether it is a vowel or consonant	7	June 2022

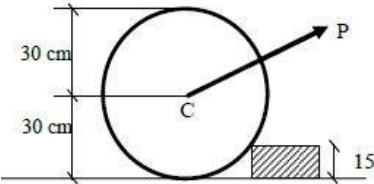
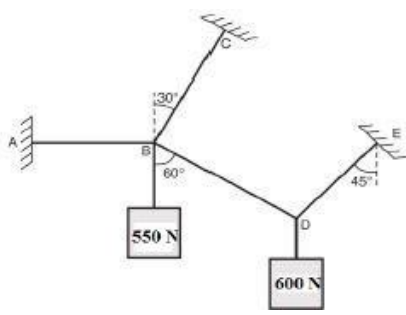
7.	Write the difference between 'while' and 'do -while' statements.	3	June 2023
8.	Explain various formatted I/O statements in C.	3	June 2023
9.	Write a menu driven program to find the area of square, triangle, circle and rectangle according to the choice given.	10	June 2023
10.	Differentiate between break and continue statements using an example.	4	June 2023
11.	Explain any four types of operators used in C	7	June 2023
12.	Write a program to generate the following pattern 1 1 2 1 2 3 1 2 3 4	7	June 2023
<b>Module III</b>			
1.	Explain any 4 string handling functions in C programming.	7	July 2021 June 2022
2.	Write a C program to find second largest element in an array	7	July 2021
3.	Write a C program to check whether a string is palindrome or not without using string handling functions	7	July 2021
4.	Write a C program to compare any two strings using string handling functions	3	June 2022
5.	Write a C program to find the largest element in an array	3	June 2022
6.	Write a C program to sort an array of numbers using bubble sort	7	June 2022
7.	What are the different ways of declaring and initialising a single dimensional array?	3	June 2023
8.	Write a C program to check whether the given number is Armstrong or not. (A number is Armstrong if the sum of the cubes of the digits equals to the number)	3	June 2023
9.	Implement string concatenation without using built in functions.	8	June 2023
10.	Write a C program to accept a 2-D integer matrix and check whether it is symmetric or not ( A matrix 'A' is symmetric if $A=A^T$ ).	6	June 2023
11.	Explain any four string handling functions used in C using example. Write the syntax also.	6	June 2023
12.	Write a program to print the product of two matrices	8	June 2023
<b>Module IV</b>			
1.	Write a C program to: (i) Create a structure with fields: Name, Address, Date of birth. (ii) Read the above details for five students from user and display the details	7	July 2021

2.	What is recursion? Write a C program to display Fibonacci series using recursive function	7	July 2021 June 2022
3.	Write a C program to sort N numbers using functions	7	July 2021
4.	Name the different types of parameter passing. Illustrate each of them with an example	3	June 2022
5.	What are the advantages of modular programming?	3	June 2022
6.	What are the main differences between structures and unions? Which is preferred in what situation? Give examples.	7	June 2022
7.	Define function prototype. Why is it used? Differentiate formal and actual parameters.	3	June 2023
8.	Mention the difference between structure and union using suitable examples	3	June 2023
9.	Explain different storage classes used in C by providing suitable examples.	8	June 2023
10.	What is meant by recursion? Write a program to find the factorial of a number using recursion.	6	June 2023
11.	Implement linear search using function. Reading the inputs and printing the result must be done in the main function.	10	June 2023
12.	Compare User defined functions with library functions.	4	June 2023
<b>Module V</b>			
1.	Write a C program to reverse a string using pointers	7	July 2021
2.	Differentiate between array of pointers and pointer to an array	7	July 2021
3.	Write a C program to count number of lines in a text file	7	July 2021
4.	Distinguish between text mode and binary mode operation of a file	3	June 2022
5.	What do you mean by a pointer variable? How is it initialized?	3	June 2022
6.	Write a C program to replace vowels in a text file with character 'x'	7	June 2022
7.	Write a C program to print the elements of an array in reverse order using pointers	7	June 2022
8.	What is meant by the scale factor of a pointer variable? Explain using examples.	3	June 2023
9.	List out the various modes of opening a file in C language.	3	June 2023
10.	Write a program to read and store the details (the name, employee code (integer) and salary) of 'n' employees in a company into a file using structure. Print the details of the employee whose employee code is given as input	14	June 2023
11.	What is meant by passing arguments into a function by reference? Write a program to swap two numbers using pass by reference.	8	June 2023
12.	Write a program to copy the content of a file to another.	6	June 2023

## QUESTION BANK

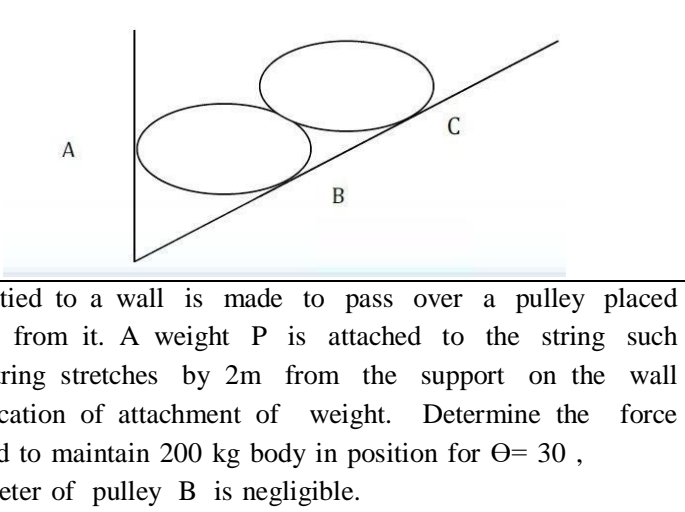
### EST 100 ENGINEERING MECHANICS

#### MODULE 1

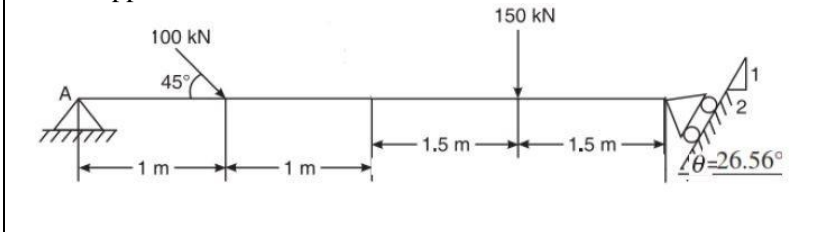
1	Define a free body diagram with sketches	3 marks	KTU July 2021
2	State and explain Lami's theorem.	3 marks	KTU July 2021
3	<p>A uniform wheel 60 cm diameter weighing 1000 N rests against a rectangular obstacle 15 cm height as shown in fig. Determine the least force required which when acting through the centre of the wheel will just turn the wheel over the corner of the block</p> 	5 marks	KTU Dec 2022
4	<p>The system of connected flexible cables shown in Fig.is supporting two loads of 550 N and 600 N at points B and D, respectively. Determine the tensions in the various segments of the cable.</p> 	9 marks	KTU Dec 2019
5	<p>Concurrent forces of 1,3,5,7,9,11 N are applied to the center of a regular hexagon acting towards its vertices as shown in fig . Determine the magnitude and direction of the resultant.</p>	9 marks	KTU Dec 2022



6	<p>A rope 9m long is connected at A and B, two points on the same level, 8 m apart. A load of 300 N is suspended from a point C on the rope 3m from A. Calculate load connected to a point D on the rope 2 m from B is necessary to keep portion CD parallel to AB.</p>	5 marks	KTU July 2021
7	<p>The resultant of a system of four forces is 5 KN directed towards right along x direction. Calculate the force P and its direction <math>\Phi</math></p>	9 marks	KTU July 2022
8	<p>Three cylinders are piled in a rectangular ditch as shown in fig. Neglecting friction, determine the reaction between cylinder A and vertical wall</p>	14 marks	KTU July 2021
9	<p>Two identical rollers each of weight 100 N are supported by an inclined plane, making an angle of <math>30^\circ</math> with the vertical, and a vertical wall. Find the reaction at the points of contact A, B, C. Assume all the surfaces to be smooth</p>	14 marks	KTU July 2022

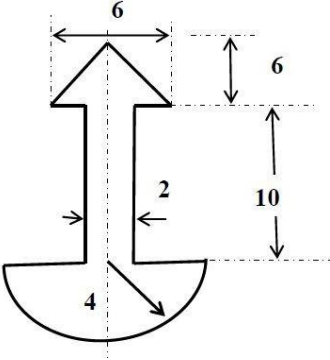
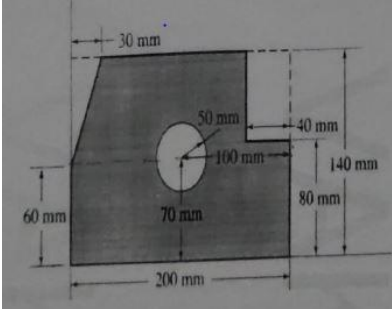
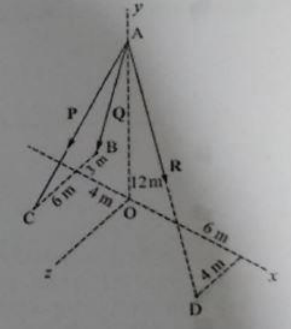
			
10	<p>A string tied to a wall is made to pass over a pulley placed 2m away from it. A weight P is attached to the string such that the string stretches by 2m from the support on the wall to the location of attachment of weight. Determine the force P required to maintain 200 kg body in position for <math>\Theta = 30^\circ</math>, The diameter of pulley B is negligible.</p>	14 marks	KTU July 2022

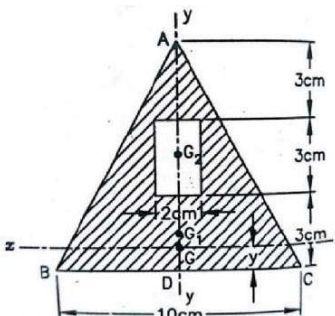
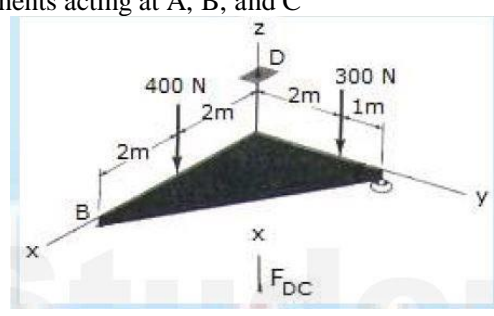
**MODULE II**

1	<p>A uniform ladder 4 m long weighs 200 N. It is placed against a wall making an angle of <math>60^\circ</math> with the floor. The coefficient of friction between the wall and the ladder is 0.25 and that between the ground and the ladder is 0.35. The ladder in addition to its own weight, has to support a man of 1000 N at the top at B. Calculate: (i) The horizontal force P to be applied to the ladder at the ground level to prevent slipping. (ii) If the force P is not applied, what should be the minimum inclination of the ladder with the horizontal, so that it does not slip with the man at the top?</p>	14 marks	KTU Dec 2019
2	<p>Find the force required to move a load of 30N up a rough inclined plane, applied parallel to the plane. The inclination of the plane is such that when the same body is kept on a perfectly smooth plane inclined at an angle, a force of 6N applied at an inclination of <math>30^\circ</math> to the plane keeps the same in equilibrium. Assume coefficient of friction between the rough plane and the load is equal to 0.3.</p>	7 marks	KTU Dec 2019
3	<p>For the beam with loading shown in Fig., determine the reactions at the supports</p> 	7 marks	KTU Dec 2019
4	<p>Briefly explain the analysis of forces acting on a wedge with a suitable example</p>	3 marks	KTU dec 2021

5	Distinguish static and dynamic friction.	3 marks	KTU July2022
6	Two blocks A & B are resting against a wall and the floor as shown in figure below. Find the value of horizontal force P applied to the lower block that will hold the system in equilibrium. Coefficient of friction are : 0.25 at the floor, 0.3 at the wall and 0.2 between the blocks.	14 marks	KTU July2022
7	A beam is hinged at A and roller supported at B. It is acted upon by loads as shown below. Find the reactions at A & B	14 marks	KTU July2022
8	A rough inclined plane, rises 1 cm for every 5 cm along the inclined length. Calculate the effort required to drag a body weighing 100 N up the plane, when the effort is applied parallel to the plane ( $\mu = 0.25$ ).	7 marks	KTU July 2021
9	A beam 6 m long is loaded as shown in fig. Calculate the reaction at A and B	7 marks	KTU July 2021
10	The uniform ladder is of mass 10Kg and 2m long leaning against a vertical wall. The coefficient of static friction at A(wall) is 0.6 and at B (floor) is 0.4. Determine the smallest angle for which ladder can remain in the equilibrium	7 marks	KTU July 2021

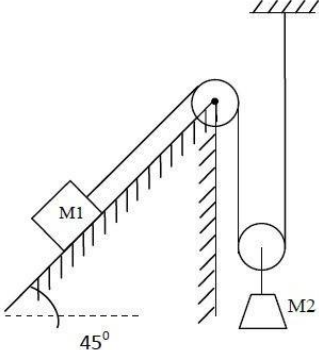
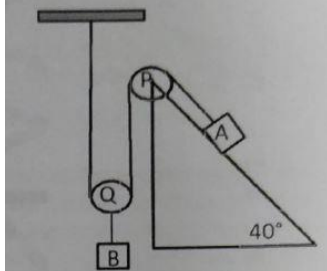
**MODULE III**

1	<p>Find the moment of inertia of shaded area about the horizontal and vertical centroidal axis. All dimensions in cm</p> 	14 Marks	KTU Dec 2019
2	<p>A force P is directed from a point A(4,1,4) meters towards a point B (-3,4,1)metres.Determine the moment of force P about x and y axis if it produces a moment of 1000Nm about z axis</p>	14 Marks	KTU Dec 2019
3	<p>A force <math>2i+4j-3k</math> is applied at the point A(1,1,-2). Find the moment of the force about the point (2,-1,2)</p>	3 marks	KTU Dec 2019
4	<p>Calculate the area moment of inertia of a rectangular cross-section of breadth 'b' and depth 'd' about the centroidal horizontal axis</p>	3 marks	KTU Dec 2019
5	<p>Find the centroid of the shaded area shown</p> 	14 marks	KTU July 2021
6	<p>State Pappus Guldinus theorems.</p>	3 marks	KTU July 2021
7	<p>Find the resultant of the force system shown in fig in which P= 280N,Q= 260 N and R= 210 N</p> 	14 Marks	KTU July 2021

8	<p>A rectangular hole is made in a triangular section as shown. Find moment of inertia about the section x-x passing through the CG of the section and parallel to BC</p> 	14 Marks	KTU July2022
9	<p>Support A has ball and socket connection. Roller support at B prevents motion in the - z direction. Corner C is tied to D by a rope. The triangle is weightless. Determine the unknown force components acting at A, B, and C</p> 	14 Marks	KTU July2022
10	State and explain perpendicular axis theorem	3 marks	K KTU July 2022

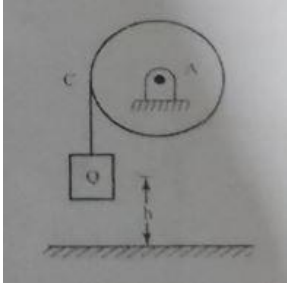
**MODULE IV**

1	<p>An object of mass 5 kg is projected with a velocity of 20m/s at an angle of 60° to the horizontal. At the highest point of its path the projectile explodes and breaks up into two fragments of masses 1kg and 4kg. The fragments separate horizontally after explosion. The explosion releases internal energy such that KE of the system at the highest point is doubled. Calculate the separation distance between two fragments when they reach the ground</p>	14 Marks	KTU Dec 2019
2	<p>A block of mass M<sub>1</sub> resting on an inclined plane is connected by a string and pulleys to another block of mass M<sub>2</sub> as shown in Fig. Find the tension in the string and acceleration of the</p>	14 Marks	KTU Dec 2019

	<p>blocks. Assume the coefficient of friction between the blocks <math>M_1</math> and the plane to be 0.2. <math>M_1 = 1500\text{N}</math>, <math>M_2 = 1000\text{N}</math>. Angle of inclined plane = <math>45^\circ</math>.</p> 		
3	<p>Determine the tension in the inextensible string and the acceleration of the masses. Consider the pulley as massless and coefficient of friction as 0.20. Block A = 200kg and block B = 100 Kg.</p> 	14 marks	KTU July 2021
4	<p>A glass ball is dropped on to a smooth horizontal floor from which it bounces to height of 9 m. On the second bounce, it rises to a height of 6m. From what height the ball was dropped and what is the coefficient of restitution between the glass and the floor</p>	5 marks	KTU July 2021
5	<p>Two cars A and B travelling in same direction get stopped at a traffic signal. When signal turns green, car A accelerates at <math>0.75\text{m/s}^2</math> and 1.75 seconds later, car B starts and accelerates at <math>1.1\text{m/s}^2</math>, Determine i) when and where B will overtake and ii) the speed of each car at that time</p>	9 marks	KTU July 2021
6	<p>Differentiate between curvilinear motion and Projectile motion</p>	3 marks	KTU July 2021
7	<p>A body is projected at an angle such that the horizontal displacement is 3 times that of maximum height. Find the angle of projection</p>	3 marks	KTU July 2021
8	<p>A cricket ball is thrown by a fielder from a height of 2 m at an angle of <math>30^\circ</math> to the horizontal with an initial velocity of 20 m/s, hits the wickets at a height of 0.5 m from the ground. How far was the fielder from the wicket?</p>	14 marks	KTU July 2022

9	An engine of weight 500 kN pull a train weighing 1500 kN up an incline of 1 in 100. The train starts from rest and moves with constant acceleration against a resistance of 5 N/kN.It attains a maximum speed of 36 kmph in 1 km distance. Determine the tension in the coupling between train and engine and the traction force developed by the engine.	14 marks	KTU July 2022
10	Explain D'Alembert's principle	3 marks	KTU July 2022

**MODULE V**

1	A rotor of an electric motor is uniformly accelerated to a speed of 1800 rpm from rest for 5 seconds and then immediately power is switched off and the motor decelerates uniformly. If the total time elapsed from start to stop is 12.5 second determine the number of revolutions made while (a) acceleration (b) deceleration. Also find the value of deceleration.	14 marks	KTU Dec 2019
2	A spring stretches by 0.015m when a 1.75kg object is suspended from its end. How much mass should be attached to the spring so that its frequency of vibration is 3 Hz	5 marks	KTU Dec 2019
3	A particle moving with simple harmonic motion has velocities 8m/s and 4m/s when at the distance of 1m and 2m from the mean position. Determine (a) amplitude (b) period (c) maximum velocity, and (d) maximum acceleration of the particle.	9 Marks	KTU Dec 2019
4	A Circular disc of radius $r = 30\text{cm}$ and weight $W = 145\text{N}$ is free to rotate about its geometric axis. A flexible cord carrying a weight of $Q = 45\text{N}$ is wound around the circumference of the disc as shown in fig. If the weight $Q$ is released from rest, find a) the time $t$ required for it to fall through the height $h = 300\text{cm}$ , b) with what velocity $v$ will it strike the floor	14 marks	KTU July 2021
			
5	A 50N weight is suspended from a spring of constant $K = 8\text{ N/cm}$ . Neglecting the mass of spring, find the period for small amplitudes of vertical oscillations	5 marks	KTU July 2021
6	A particle performing simple harmonic motion . When it is at	9	KTU

	distances of 10.0 cm and 20.0cm from the mean position, its velocities are 1.2 m/s and 0.8 m/s respectively. Find a) amplitude of oscillations b) time period of oscillation c) maximum velocity and d)its maximum acceleration	marks	July 2021
7	A motor car is uniformly accelerated from 40 kmph to 50kmph over a distance of 300 m. If the wheels are 1 m diameter find the angular acceleration of wheels	3 marks	KTU July 2021
8	A cylindrical disc, 50 cm diameter and 10 cm thickness having mass of 10 kg, is in contact with a horizontal conveyor belt running at uniform speeds of 5 m/s. Assuming there is no slip at points of contact determine ( i) angular velocity of disc ( ii) Angular acceleration of disc if velocity of conveyor changes to 8 m/s in 10 seconds. Also compute the moment acting about the axis of the disc in both cases.	14 marks	KTU July2022
9	A wheel rotating about fixed axis at 20 rpm is uniformly accelerated for 70 seconds during which time it makes 50 revolutions. Find the ( i) angular velocity at the end of this interval and (ii) time required for the velocity to reach 100 revolutions per minute	14 marks	KTU July2022
10	Compare damped and undamped free vibrations	3 marks	KTU July2022



**HUN 102 PROFESSIONAL COMMUNICATION**

<b>Module 1</b>			
<b>Sl No</b>	<b>Questions</b>	<b>Marks</b>	<b>KTU,Year</b>
1	Find the misspelt words from each set of words given here. a.Accidentally,Acidentally,Accidentaly,Accedentially b.Mischieves,Mischievous,Mischievous,Mischivious c.Voluntiers,Volenteers,Volunteers,Volantiers d.Nuisanse,Nuisense,Nooisense,Nooisanse	4	July 2023
2	Write the definition of the compound words of the following. A.Swimming pool B.Paddle boat C. Neck tie D.Black bird E. Footprint F. Sunset	3	July 2021
3	Choose the right answer. I. TEN: DECIMAL a. SEVEN: SEPTET b. FOUR: QUARTET c. TWO: BINARY d. FIVE: QUINCE 2. ARMY: LOGISTICS a. BUSINESS: STRATEGY b. SOLDIER: STUDENTS c. WAR: LOGIC d. TEAM: INDIVIDUAL 3. CORPOREAL: SPIRITUAL a. MESA: PLATEAU	3	June 2023

	<p>b. MORON: SAVANT</p> <p>c. FOREIGNER: IMMIGRANT</p> <p>d-PEDAGOGUE: TEACHER</p>		
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3	<p>Fill in the blanks with suitable form of the words given in brackets.4</p> <p>[because, really, is, laugh, 4t, too, interesting, should]</p> <p>One of my favourite vacation places (a) _ Mexico. I really like the weather there (b) it never gets cold. The people are very nice too. They never(c)- at my bad Spanish. The food is (d)- good. Mexico City is a very(e)_ place to visit. It has some great museums and lots of fascinating old buildings. The hotels are (f) _expensive to stay but there are more affordable options. 'For example, you can stay (g) _ one of the beach resorts like Acapulco. If you are planning to visit Mexico, you (h)_ definitely see the Mayan temples near Merida. '</p>	4	June 2023
4	<p>a) Describe in detail the basic elements of an effective presentation.</p>	4	June 2023
5	<p>Find the misspelt words from each set of words given.</p> <p>1.a) acomodate b) accommadate c) acommodate d) accommodate</p> <p>2.a) deductible b) deductable c) deductuble d) deductabe</p> <p>3.a) license b) licence c) licens d) lisence</p>	3	June 2022
6	<p>Write the definition for the following compound words.</p> <p>a) Wild life b) Son-in- law</p>	1	June 2022
7	<p>Write the correct sequence words and fill in the blanks. (First, Next, Then, Finally, First, After that)</p> <p>a.____, I heard a loud boom. ; the lights went out. I tried to use my TV, but it was dead. I wondered what was happening._____, I realized I had forgotten to pay my electricity bill.</p> <p>b. Let me tell you about how terrible last night was.- _____, I lost my wallet. I was so upset I almost cried. _____, I spilled a drink on my favourite shirt. The night got even worse.</p>	6	June 2022

8	Write down two numerical adjectives and use it in a sentence	2	June 2022
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9	Rewrite as directed.  a.She said: "They had left the place when I arrived" (Change into indirect speech.) b.A sound outside woke us all up (Change the voice)	2	June 2022
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**Module 2**

SI No	Questions	Marks	KTU,Year
1	Help your friend by suggesting and explain SQ3R methods and PQRS method to improve his reading skills?	6	July 2021 (FN)
2	What is reading and what are the four kinds of reading styles. When these styles are used?	6	June 2022, June 2023
3	Explain different techniques for speed reading.	4	June 2023

**Module 3**

SI No	Questions	Marks	KTU,Year
1	Explain Brain storming.	2	June 2023
2	Describe in detail the basic elements of an effective presentation.	4	July 2023
3	How body language could help you in a group discussion. Write down 6 points.	3	July 2021
4	Differentiate Group Discussion (GD) and debate	3	June 2022

5	Explain the etiquettes one must follow in GD?	4	June 2022
6	You need to make a Project presentation as a part of your internal evaluation.	4	June 2022
7	What preparation do you need to make for presenting visuals effectively?	4	June 2022
<b>Module 4</b>			
Sl No	Questions	Marks	KTU,Year
1	Differentiate active listening and passive listening.	4	June 2023,july 2022

2	Explain any two types of interview.	4	June 2023
3	What are the advantages and disadvantages of telephonic or video interviews?	5	July 2021
4	Explain various Note making strategies.	3	June 2023
5	List the barriers in listening	3	June 2022
<b>Module 5</b>			
Sl No	Questions	Marks	KTU,Year
1	Write a letter to your Principal to grant you permission to attend a seminar on Climate Change at IIT Madras. Give all the information regarding the programme and benefits of attending the same.	6	July 2023
2	Bring out the differences among CV, Resume and Biodata.	6	June 2023

3	What are the different types of reports?	2	July 2021 (FN)
4	What is a report? Explain its structure and types.	6	June 2022
5	You are required to apply for a job and submit your details to a firm. In what context you decide to submit a CV or Biodata or Resume. Write your answer explaining the structure of each and focusing on the differences between them.	6	June 2022