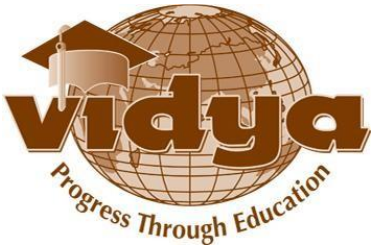
S2 CSE QUESTION BANK 2023
COMPUTER SCIENCE & ENGINEERING



VIDYA ACADEMY OF SCIENCE AND TECHNOLOGY TECHNICAL CAMPUS, KILIMANOOR

ACCREDITED BY NAAC WITH B++ GRADE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

INDEX

SUBJECT CODE	SUBJECT NAME
MAT 102	Vector Calculus, Differential Equations and Transforms
PHT 110	Engineering Physics
EST 100	Engineering Mechanics
EST 130	Basics of Electronics and Electrical Engineering
HUN 102	Professional Communication
EST 102	Programming In C

Question Bank

Subject: VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS

Module 1			
Sl. No	Questions	Marks	KU/KTU
1	A particle moves along a circular helix in 3-space so that its position vector at any time 't' is $r(t) = (4cos\pi t)\vec{i} + (4sin\pi t)\vec{j} + t\vec{k}$. Find the displacement of the particle during the interval $1 \leq t \leq 5$.	7	KTU Feb-2017
2	If $f(x, y, z) = x^2 i - 3j + yz^2 k$ find div F	2	KTU Apr-2018
3	Find the work done by the force field $F = xy\, i + yz\, j + zx\, k$ on a particle that moves along the curve C: $x = t, y = t^2, z = t^3, 0 \leq t \leq 1$	3	KTU Apr-2018 & Dec-2017
4	Find the divergence and curl of the vector field $f(x, y, z) = yz\vec{i} + xy^2\vec{j} + yz^2\vec{k}$	2	KTU Dec-2017
5	Evaluate $\int_c (3x^2 + y^2)\, dx + 2xy dy$ along the circular arc C given by $x = cost, y = sint$ for $0 \leq t \leq \frac{\pi}{2}$	3	KTU Dec-2017
6	Show that the integral $\int_{)1,1)}^{(3,3)} (e^x logy - \frac{e^y}{x})dx + (\frac{e^x}{y} - e^y logx)\, dy$ Where x and y are positive, is independent of path and find its value.	5	KTU Dec-20117
7	If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ and $r = \lvert\vec{r}\rvert$, then show that $\nabla f(r) = \frac{f'(r)}{r}\vec{r}$.	5	KTU Dec-2017
8	Prove that the force field F= e^yi+ x $e^y j$ is conservative in the entire xy- plane	7	KTU Model question
9	Find the work done by the Force field $F(x, y, z) = xy\vec{i} + yz\vec{j} + xz\vec{k}$ along C where C is the curve $r(t) = t\vec{i} + t^2\vec{j} + t^3\vec{k}$	7	KTU Model Question
10	Show that $f(x, y) = (cosy + ycosx)\vec{i} + (sinx - xsiny)\vec{j}$ is a conservative vector field. Hence find the scalar potential for it.	5	KTU Dec-2017
11	$Find\ the\ directional\ derivative\ of\ f(x, y) = x^2 = 3xy + y^2$ $at\ the\ point\ P(2,1) in\ the\ direction\ of\ \vec{a} = \frac{1}{3}\vec{i} + \frac{2}{3}\vec{j}$	3	KTU-June 2022
12	$Evaluate\ \int 3xy\, dy\ \ over\ the\ line\ segment\ C\ joining\ (0,0)\ and\ (1,2)$	3	KTU-June 2022

13	$a)$*Find the parametric equation of the tangent to the curve* $\vec{r}(t) = 2cos\pi t\vec{i} + 2sin\pi t\vec{j} + 6t\vec{k}$ *at* $t = \frac{1}{3}$ $b)$ *Show that the vector field* $\vec{f}(x,y) = 2xy^3\vec{i} + 3y^2x^2\vec{j}$ *is conservative and find* ϕ *such that* $\vec{f} = \nabla\phi$. *Hence evaluate* $\int_{(2,-2)}^{(-2,0)} 2xy^3dx + 3y^2x^2dy$	7 7	KTU-June 2022
14	$a.$*Find the position and velocity vectors of the particle, given* $\vec{a}(t) = (t+1)^{-2}\vec{j} + e^{-2t}\vec{k}$, $\vec{v}(0) = 3\vec{i} - \vec{j}, \vec{r}(0) = \vec{k}$ $b.$*If* $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$, *and let* $\vec{F}(r) = f(r)\vec{r}$, *then prove that* $div\vec{F} = 3f(r) + \vec{r}f'(\vec{r})$	7 7	KTU-June 2022
	Module 2		
1	Using Greens theorem, find the work done by the force field $\vec{f}(x,y) = (e^x - y^3)\vec{i} + (cosy + x^3)\vec{j}$ on a particle that travels once around the unit circle $x^2 + y^2 = 1$ in the counter clockwise direction	5	KTU Apr-2018
2	If σ is any closed surface enclosing a volume V and $F = x\vec{i} + 2y\vec{j} + 3z\vec{k}$, using divergence theorem show that $\iint_\sigma F.nds = 6\,V$.	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	Using line integral evaluate the area enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$	2	KTU Dec-2017
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 $= x$.	5	KTU Apr-2018

6	Using stokes theorem evaluate $\int_c f.dr$ where $F = xz\,i + 4x^2y^2j + xy\,k$, C is the rectangle $0 \le x \le 1, 0 \le y \le 3$ in the plane $z = y$.	5	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 $\iint_\sigma xzds$, where σ 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 $\iint_S F.nds$ 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 $\int_C F.dr$ 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 $F = 2xi + 3yj + z^3$k across the unit cube bounded by $x = 0, y = 0, z = 0, x = 1, y = 1, z = 1$	7	KTU MODEL question
13	$Determine\ the\ sources\ and\ sinks\ of\ the\ vector\ field$ $\vec{f}(x,y) = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$	3	KTU-June 2022
14	$Use\ divergence\ theorem\ to\ evaluate\ \iint \vec{f}.\vec{n}\,dS\ where$ $\vec{f} = 2x\vec{i} + 4y\vec{j} - 3z\vec{k}\ and\ S\ is\ the\ surface\ of\ the\ sphere$ $x^2 + y^2 + z^2 = 1$	3	KTU-June 2022

15	$a)$ *Use Green's theorem to find the work done by the force field* $\vec{f}(x,y) = xy\vec{i} + (\frac{x^2}{2} + xy)\vec{j}$ *on a particle that starts at* $(4,0)$ *transverse the upper semicircle* $x^2 + y^2 = 16$ *and returns to the starting point along X axis.* $b)$ *Find the mass of the lamina that is the portion of the cone* $z = \sqrt{x^2 + y^2}$ *that lies between the planes* $z = 1$ *and* $z = 3$, *if the density is* $\phi(x,y,z) = x^2z$.	7 7	KTU-June 2022
16	$a)$ *Let* σ *be the portion of the surface* $z = 1 - x^2 - y^2$ *that lies above the XY plane and* σ *is oriented upwards. Find the flex of the vector field* $\vec{F}(x,y,z) = x\vec{i} + y\vec{j} + z\vec{k}$ *across* σ. $b)$ *Use Stoke's theorem to evaluate* $\oint \vec{F}.d\vec{r}$ *over the circle* $C: x^2 + y^2 = 1$ *where* $\vec{F}(x,y,z) = z^2\vec{i} + 3x\vec{j} - y^3\vec{k}$ *and C is the circle in XY plane with counter clockwise orientation looking down the positive Z axis*	7 7	KTU-June 2022
	Module 3		
1	Consider the initial value problem $y'' - x^3y' + 6x = sinx$, $y(0) = 3, y'(0)$ =-1.Can this problem have unique solution in an interval containing zero? Explain	3	KTU JULY-2018
2	Find any three independent solutions of the differential equation $y''' - y' = 0$	3	KTU JULY-2018
3	Discuss the existence and uniqueness of solution of initial value problem $\frac{dy}{dx} = \frac{y}{\sqrt{x}}, y(1) = 3$	3	KTU JULY-2018
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 $\lvert x\rvert \leq 1, \lvert y - 1\rvert \leq 1$.	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	Find the particular integral of $(D^2+4D+10)y = e^x \sin 3x$	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 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
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=$\frac{e^{2x}}{sinx}$	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
Module 4			
1	Find the inverse Laplace transform of $\frac{5}{(s^2+1)(s^2+25)}$, using convolution theorem.	7	KTU-Dec 2018
2	Find the Laplace transform of i) ii) $\cos(\omega t + \theta)$	7	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	Solve, by using Laplace Transform: $y"+y=3cos\ 2t$; $(0)=0$, $y'(0)=0$.	8	KTU- Apr 2018
5	Find the Inverse Laplace Transform of: $(i)\ \frac{S-4}{S^2-4}$ $(ii)\ \frac{4}{S^2-2s-3}$	8	KTU- April 2018
6	Find the Laplace Transform of : $(i)\ sin3tcos2t$ $(ii)\ e^{-2t}cos^2t$	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) $cost - tsint$ 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$(sint + cost)^2$	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 $\frac{s^2}{(s^2+a^2)(s^2+a^2)}$	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
Module 5			
1	Using Fourier cosine integral, show that $\int_0^\infty \frac{cos\omega x}{1+\omega^2} d\omega = \frac{\pi}{2} e^{-x}, if x > 0$	7	KTU-Dec 2018
2	Find the Fourier sine transform of $f(x) = \begin{cases} sinx, 0 < x < \pi \\ 0, \quad x > \pi \end{cases}$	8	KTU-Dec 2018
3	Find the Fourier transform of $f(x) = \begin{cases} e^{kx}, x < 0 \\ 0, \quad x > 0 \end{cases}$	7	KTU-Dec 2018

4	Use Fourier integral to show that $\int_0^{\infty} \frac{cosx\omega+\omega sinx\omega}{1+\omega^2}\, d\omega = \begin{cases} 0 \; if \; x<0 \\ \frac{\pi}{2} if \; x=0 \\ \pi e^{-x} \; if x>0 \end{cases}$	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 transform of $f(x) = \begin{cases} 1, & \lvert x\rvert < 1 \\ 0, & otherwise \end{cases}$	7	KTU-May 2017
7	Express f(x) = 1, $0 < x < \pi$ 0, $x > \pi$, a Fourier sine integral and evaluate $\int_0^{\infty} \frac{1-cos\pi\omega}{\omega} \, sinx\omega \, d\omega$	7	KTU-July 2017
8	Find the Fourier Sine Transform of $(x)=e^{-\lvert x\rvert}$. Hence evaluate $\int_0^{\infty} \frac{\omega sin\omega x}{1+w^2} \, d\omega$.	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	Using Fourier integral representation show that $\int_0^{\infty} \frac{sin\omega-\omega cos\omega}{\omega^2} =$ $\begin{cases} \frac{\pi x}{2}, & if \; 0<x<1 \\ \frac{\pi}{4}, & if \; x=1 \\ 0, & if \; x>1 \end{cases}$	8	KTU-July 2017
11	Does the Fourier sine transform$f(x) = x^{-1}sinx$ for o<x<∞ 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)= $\begin{cases} e^{-x}, if \; -a<x<a \\ 0, otherwise \end{cases}$ b))Find the Fourier cosine Integral of f(x)=$\begin{cases} cosx, if 0<x<\frac{\pi}{2} \\ 0, otherwise \end{cases}$	7 7	KTU-June 2022
15	a)Find the Fourier cosine transformation of f(x)=$\begin{cases} x^2, if 0<x<1 \\ 0, x>1 \end{cases}$ b))Find the Fourier transform of f(x)=$\begin{cases} a-\lvert x\rvert, if \; \lvert x\rvert<a \\ 0, otherwise \end{cases}$	7 7	KTU-June 2022

SUB CODE	PHT 100	SUBJECT NAME	ENGINEERING PHYSICS - A (2019 SCHEME)

ENGINEERING PHYSICS -A			
MODULE 1 **HARMONIC OSCILLATIONS & WAVES**		Marks	Year
1	List any six points to compare electrical oscillator with a mechanical oscillator.	3	Dec '19 KTU
2	Distinguish between transverse and longitudinal waves. Give one example for each.	3	Dec '19 KTU
3	What is amplitude resonance? Give two examples.	3	Dec '20 KTU
4	What is the relation between path difference and phase difference in wave motion?	3	Dec '20 KTU
5a)	Set up the differential equation for a forced harmonic oscillator and solve it.	10	Dec '19 KTU
b)	A transverse wave on a stretched string is described by $y(x,t)=2\sin(20t+0.021x+\pi/6)$ where x and y are in cm and t is in second. Obtain (1) Amplitude (2) Initial phase (3) speed (4) frequency	4	Dec '19 June 2022
6a)	Derive an expression for the fundamental frequency of a transverse wave in a stretched string. Also state laws transverse vibration.	10	Dec '19 KTU
b)	A sitar wire is under tension of 40 N and length of the bridge is 80cm. A 10m sample of that wire has mass 1.2g. Find the speed and fundamental frequency of transverse wave on the wire.	4	Dec'19 KTU
7a)	Frame the differential equation of a damped harmonic oscillator and deduce its solution. Compare the time-displacement curve in three cases.	10	Dec '20 Jan 2021/ June2022
b)	The frequency of a tuning fork is 200Hz. If its quality factor is 8×10^4 , find the time after which its energy becomes 1/10th of its initial value.	4	Dec '20 KTU

8a)	Derive the differential equation for transverse wave in a stretched string and hence obtain the expression for fundamental frequency.	10	Dec '20 June2022
b)	Calculate the fundamental frequency of a string of 1 m long & mass 2g when stretched by a weight of 4 kg.	4	Dec '20 KTU
9a)	Write down the differential equation of a forced harmonic oscillator and obtain its solution. Derive the expressions for amplitude and phase difference.	10	Jan '21 KTU
b)	A transverse wave on a stretched string is described byy(x,t)=5 sin(25t+0.016x+n/2) where x and y are in cm and t is in second. Obtain (1) Speed (2) Amplitude (3)Frequency and (4) Initial phase of the wave	4	Jan '21 KTU
10	A piece of wire 60 cm long and mass 1.2 g. is stretched by a load of 3 kg. Find the frequency of the second harmonic.	4	Jan '21 KTU
MODULE 3			
1	When a medium of $\mu \neq 1$ is introduced in the Newton's ring set up, what happens to the diameter of interference pattern? Explain it with the help of relevant equation.	3	Dec '19 KTU
2	Give 3 differences between interference and diffraction	3	Dec '21 KTU
3	Newton's rings are circular but air wedge fringes are straight. Why?	3	Dec 20 KTU
4	Give 3 differences between Fresnel and Fraunhofer classes of diffraction	3	Dec 20 KTU
5(a)	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	Dec 21 KTU
(b)	A monochromatic light of wavelength 5893 Å is incident normally on a soap film of $\mu = 1.42$. What is the least thickness of the film that will appear dark by reflection?	4	Dec 21 KTU
6	A grating has 6000 lines/cm. Find angular separation between two wavelengths 577nm and 579 nm in the second order.	4	Dec 21 KTU/ June 22

7(a)	Derive Cosine law and obtain the conditions of brightness and darkness for a thin film in reflected system.	10	Dec 20 KTU
(b)	In Newton's ring arrangement using a light of wavelength 546 nm, the radius of the n^{th} and $(n+20)^{th}$ dark rings are found to be 0.162cm and 0.368cm respectively. Calculate the radius of curvature of the lens.	4	Dec 19 KTU
8(a)	How many lines per meter are there in a plane diffraction grating which gives an angle of diffraction 30° in the second order for light of wavelength 520 nm incident normally on it?	4	Dec 20 KTU
(b)	Starting from the expression of radius of nth dark ring in Newton's rings pattern, describe an experiment to determine the refractive index of a transparent liquid.	10	Jan '21 KTU/ June 2022
9	Derive grating equation for a plane transmission grating. Explain resolving power and dispersive power of grating with expressions.	10	Dec 20/Jan 21 / June 22 KTU
	MODULE 4		
1	State Heisenberg's Uncertainty principle and write the three uncertainty relations	3	Dec '19 KTU
2	What is meant by quantum mechanical tunneling? Name two electronic devices based on this phenomenon.	3	Dec '19 KTU
3(a)	Derive an expression for energy Eigen values and normalized wave function for a particle in a box of width L.	10	Dec '19 KTU
(b)	Calculate the separation between the two lowest energy levels of an electron in a one-dimensional box of width 4Å in joules. Given me = 9.1 x 10-31 kg; h=6.625 x 10-34 Js	4	Dec '19 KTU
4(a)	Write a note on quantum confinement and based on this explain Nano sheets, Nano wire and quantum dots.	10	Dec '20 KTU
(b)	Mention any four applications of nanotechnology	4	Dec '19 KTU
5	Starting from the wave equation derive Schrodinger's time dependent equation and hence deduce Schrodinger's time independent equation	10	Dec 20 &21/ June 22
6(a)	Explain the optical, electrical and mechanical properties of nanomaterials. Give two medical applications of nanotechnology.	10	Dec 20/ June 22
(b)	Explain surface to volume ratio of nanomaterials	4	Dec 20

MODULE 4			
1	Distinguish between magnetic induction and magnetizing field.	3	Dec '19 KTU
2	Distinguish between magnetic induction and magnetizing field.	3	Dec '19 KTU
3	Define magnetic flux density and magnetic field intensity. Give the relation between them.	3	Dec '20 KTU
4	Compare displacement current and conduction current	3	Dec '20 KTU
5a)	State Gauss' law in magnetism, Ampere's circuital law, faraday's laws of electromagnetic induction and Lenz's law. Give their equations	10	Dec '19 KTU
b)	A magnetizing field of 1800 A/m produces a magnetic flux of 3 x 10 -5 Wb in an iron bar of cross – sectional area 0.2 cm^2. Calculate the permeability.	4	Dec '19 KTU
6a)	Starting from Maxwell's equations derive the expression for the velocity of electromagnetic waves in vacuum.	10	Dec '19 KTU/ Jan 21 / June 22
b)	State and explain Poynting's theorem.	4	Dec '19 KTU/ June 22
7a)	Distinguish between paramagnetic and ferromagnetic substances with two examples for each	10	Dec '20 KTU
b)	Calculate the magnetic susceptibility of a paramagnetic substance at 600 K, if its susceptibility at 200 K is 3.756 x 10-4	4	Dec '20 KTU
8a)	Starting from Maxwell's equations show that velocity of electromagnetic waves in free space is $1/(\mu 0 \varepsilon 0)$ 1/2 .	10	Dec '20 KTU
b)	State Gauss' divergence theorem and Stokes' theorem.	4	Dec '20 KTU
9a)	Compare the properties of paramagnetic, diamagnetic and ferromagnetic materials.	10	Jan '21 KTU

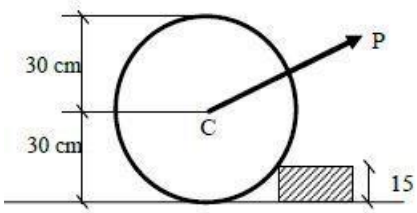
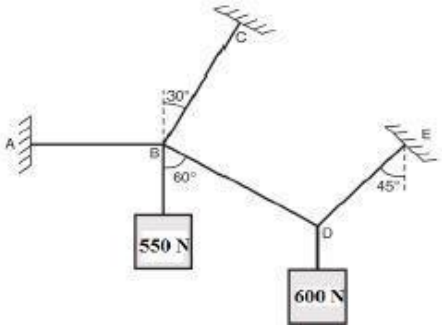
b)	Find the relative permeability of a ferromagnetic material if a field strength of 200 A/m produces a magnetization of 3100 A/m.	4	Jan '21 KTU
10 a)	Starting from Maxwell's equations show that electromagnetic waves are existing in free space and find an expression for velocity.	10	Jan '21 KTU/June 22
b)	Calculate the value of Poynting's vector at the surface of the sun if the power radiated by sun is 3.8×10^{26} Watts and its radius is 7×10^{8}m.	4	Jan '21 KTU
	MODULE 5		
1	Show that superconductors are perfect diamantes	3	Dec '19 KTU
2	Distinguish between step index and graded index fibers.	3	Dec '19 KTU
3	Give a qualitative account of BCS theory.	3	Dec '20 KTU/
4	Explain the working of a Photo diode	3	Dec '20 KTU
5a)	Explain the characteristics of Type I and Type II superconductors with appropriate diagrams and examples	10	Dec '19 KTU
b)	Discuss BCS theory of superconductivity. Give any four applications of superconductivity.	4	Dec '19/ June 22
6a)	Explain construction and working of a solar cell and draw its I-V characteristics. Mention any two applications of solar cells.	7	Dec '19 KTU
b)	The numerical aperture of an optic fiber is 0.295 and refractive index of core is 1.54. Calculate refractive index of cladding and acceptance angle.	7	Dec '19 KTU/ June 22

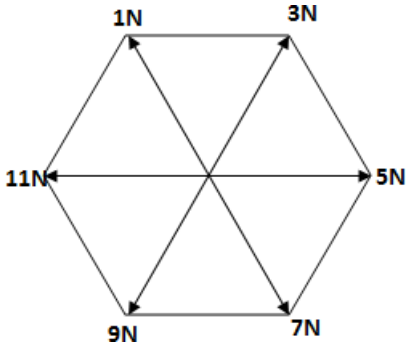
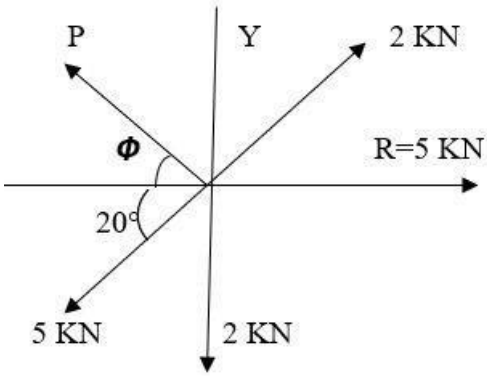
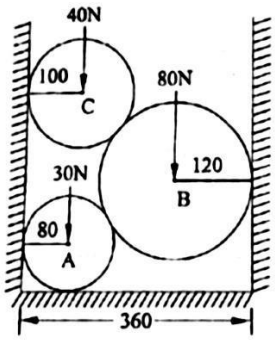
7a)	Explain Meissner effect and show that superconductors are perfect diamantes. Distinguish between Type I and Type II superconductors with appropriate graphs.	10	Dec 20/ June22
b)	Explain high temperature superconductors with two examples.	4	Dec '20 KTU
8a)	Define numerical aperture and acceptance angle of an optical fiber and derive the expression for numerical aperture of a step index fiber with a neat diagram.	10	Dec '20 KTU/June 22

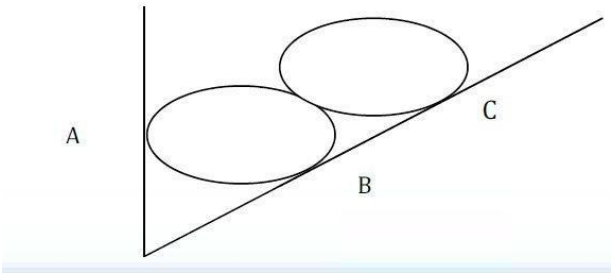
QUESTION BANK

EST 100 ENGINEERING MECHANICS

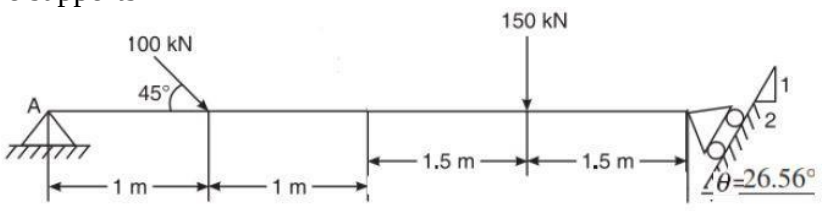
MODULE 1

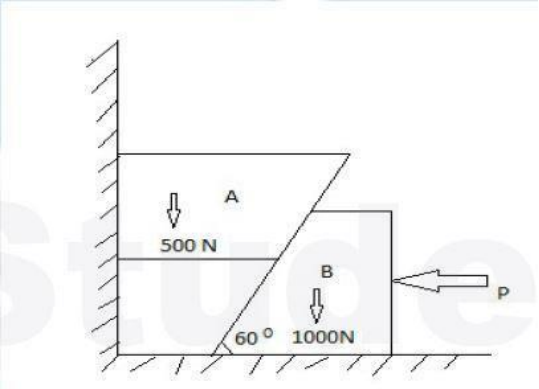
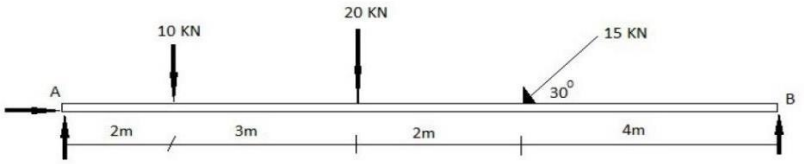
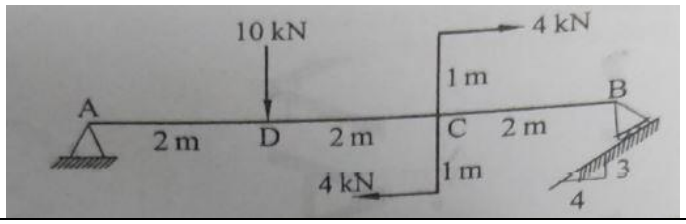
1	Define a free body diagram with sketches	3 marks	KTU July 2021
2	State and explain Lami's theorem.	3 marks	KTU July 2021
3	A uniform wheel 60 cm diameter weighing 1000 N rests against a rectangular obstacle 15 cm height as shown in fig. Determine the least force required which when acting through the centre of the wheel will just turn the wheel over the corner of the block 	5 marks	KTU Dec 2019
4	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. 	9 marks	KTU Dec 2019
5	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.	9 marks	KTU Dec 2019

			
6	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.	5 marks	KTU July 2021
7	The resultant of a system of four forces is 5 KN directed towards right along x direction. Calculate the force P and its direction $\boldsymbol{\Phi}$ 	9 marks	KTU July 2021
8	Three cylinders are piled in a rectangular ditch as shown in fig. Neglecting friction, determine the reaction between cylinder A and vertical wall 	14 marks	KTU July 2021
9	Two identical rollers each of weight 100 N are supported by an inclined plane, making an angle of 30° 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	14 marks	KTU Model question paper

			
10	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 Θ= 30 , The diameter of pulley B is negligible.	14 marks	KTU Model question paper
11	Explain Principles of superposition and transmissibility	5 marks	Model question paper
12	State and prove Varignon's Theorem of moments.	6 marks	Model question paper

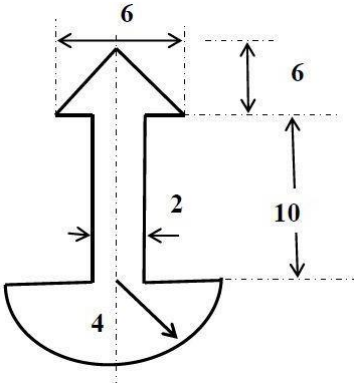
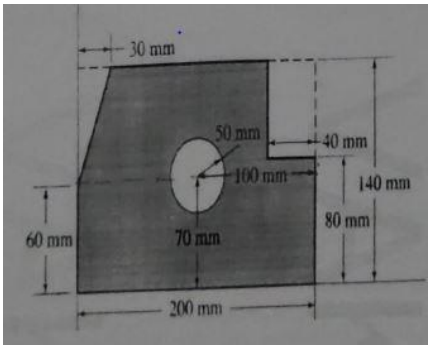
MODULE II

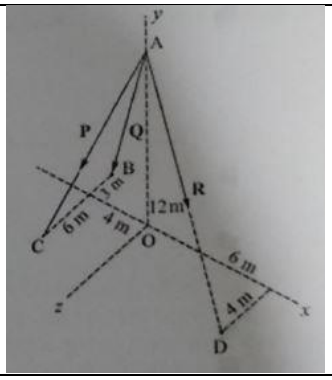
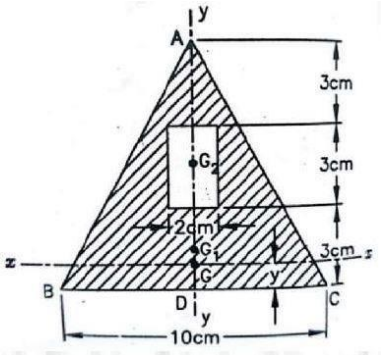
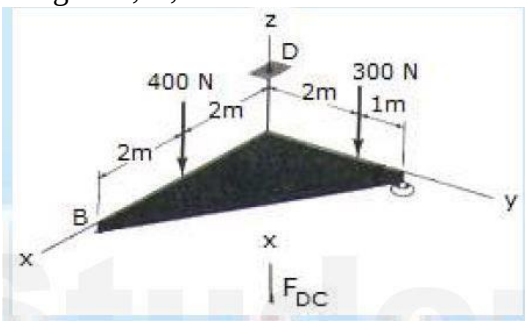
1	A uniform ladder 4 m long weighs 200 N. It is placed against a wall making an angle of 60° with the floor. The coefficient of friction between the wall and the ladder is 0.25 and that between the ground and the ladder is 0.35. The ladder in addition to its own weight, has to support a man of 1000 N 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?	14 marks	KTU Dec 2019
2	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 30° to the plane keeps the same in equilibrium. Assume coefficient of friction between the rough plane and the load is equal to 0.3.	7 marks	KTU Dec 2019
3	For the beam with loading shown in Fig., determine the reactions at the supports 	7 marks	KTU Dec 2019

4	Briefly explain the analysis of forces acting on a wedge with a suitable example	3marks	KTU dec 2021
5	Distinguish static and dynamic friction.	3 marks	KTU Model Question Paper
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 Model Question Paper
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 Model Question Paper
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
11	Define angle of friction and cone of friction.	3 marks	Model Question

12	Define and explain angle of friction, Angle of repose and derive the relation between both with the help of a figure.	5 marks	Model Question
13	Define couple. State the properties of couple	3 marks	Model Question

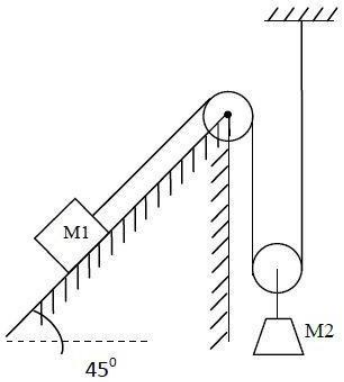
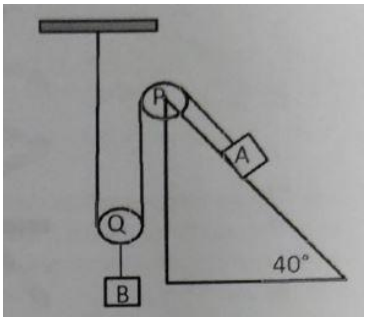
MODULE III

1	Find the moment of inertia of shaded area about the horizontal and vertical centroidal axis. All dimensions in cm 	14 Marks	KTU Dec 2019
2	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	14 Marks	KTU Dec 2019
3	A force 2i+4j-3k is applied at the point A(1,1,-2). Find the moment of the force about the point (2,-1,2)	3 marks	KTU Dec 2019
4	Calculate the area moment of inertia of a rectangular cross-section of breadth 'b' and depth 'd' about the centroidal horizontal axis	3 marks	KTU Dec 2019
5	Find the centroid of the shaded area shown 	14 marks	KTU July 2021
6	State Pappus Guldinus theorems.	3 marks	KTU July 2021
7	Find the resultant of the force system shown in fig in which P= 280N,Q= 260 N and R= 210 N	14 Marks	KTU July 2021

			
8	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 	14 Marks	KTU Model Question Paper
9	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 	14 Marks	KTU Model Question Paper
10	State and explain perpendicular axis theorem	3 marks	KTU Model Question Paper
11	State and explain parallel axis theorem	3 marks	KTU Model Question Paper
12	Briefly explain second moment of inertia and area moment of inertia.	3 marks	KTU Model Question Paper

MODULE IV

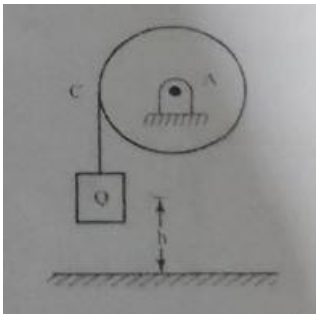
1	An object of mass 5 kg is projected with a velocity of 20m/s at an angle of 600 to the horizontal. At the highest point of its path the	14 Marks	KTU Dec 2019

	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		
2	A block of mass M1 resting on an inclined plane is connected by a string and pulleys to another block of mass M2 as shown in Fig. Find the tension in the string and acceleration of the blocks. Assume the coefficient of friction between the blocks M1 and the plane to be 0.2. M1 =1500N, M2 = 1000N. Angle of inclined plane = 45°. 	14 Marks	KTU Dec 2019
3	Determine the tension in the inextensible string and the acceleration of the masses. Consider the pulley as massless and co efficient of friction as 0.20.Block A= 200kg and block B=100 Kg. 	14 marks	KTU July 2021
4	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 co efficient of restitution between the glass and the floor	5 marks	KTU July 2021
5	Two cars A and B travelling in same direction get stopped at a traffic signal. When signal turns green ,car A accelerates at $0.75 m/s^2$ and 1.75 seconds later, car B starts and accelerates at 1.1 m/s^2, Determine i) when and where B will overtake and ii) the speed of each car at that time	9 marks	KTU July 2021

6	Differentiate between curvilinear motion and Projectile motion	3 marks	KTU July 2021
7	A body is projected at an angle such that the horizontal displacement is 3 times that of maximum height. Find the angle of projection	3 marks	KTU July 2021
8	A cricket ball is thrown by a fielder from a height of 2 m at an angle of 300 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?	14 marks	KTU model question paper
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 model question paper
10	Explain D'Alembert's principle	3 marks	KTU Model question paper
11	Define the terms a)Projectile b)Trajectory path c)angular momentum	3 marks	KTU Model question paper
12	State and explain work energy principle.	3 marks	KTU Model question paper
13	State and explain impulse momentum equation.	3 marks	KTU Model question paper

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. Determmine (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= 30cm and weight W= 145N is free to rotate about its geometric axis. A flexible cord carrying a weight of Q=45N is wound around the circumference of the disc as shown in fig. If the weight Qis released from rest, find a) the time t	14 marks	KTU July 2021

	required fot it to fall through the height h= 300cm, b) with what velocity v will it strike the floor 		
5	A 50N weight is suspended from a spring of constant K= 8 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 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 ocillations b) time period of oscillation c) maximum velocity and d)its maximum acceleration	9 marks	KTU 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 Model Question Paper
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 Model Question Paper
10	Compare damped and undamped free vibrations	3 marks	KTU Model Question Paper
11	What is a spring-mass system? Explain with figure.	3 marks	KTU Model Question Paper
12	Define Stiffness of spring	3 marks	KTU Model Question Paper
13	Define Stiffness of spring	3 marks	KTU Model Question Paper

BASICS OF ELECTRONICS ENGINEERING
(EST 130 PART-2)

BASICS OF ELECTRONICS ENGINEERING (EST 130 PART-2)

QUESTION BANK

Qn. No	MODULE – 4	Marks	Year
1	Draw the symbol of the resistor and explain any three specifications.	4 5	KTU JUN 2022 KTU DEC 2020
2	For an NPN Transistor, α = 0.98, IB =100 μA, Find IE and IC.	4	KTU JUN 2022
3	a) Explain with necessary diagrams, the principle of operation of NPN transistor b) Describe the colour coding of a resistor with example.	5 5 4	KTU JUN 2022 KTU DEC 2020
4	a) Draw the circuit diagram of a common emitter amplifier. b) Explain the input and output characteristics of common emitter configuration with neat diagrams	3 7	KTU JUN 2022
5	Find the capacitance values for the following codes (i) 2n2 (ii) 104K.	4	KTU DEC 2021
6	What do you mean by majority and minority carriers in a semiconductor	4	KTU DEC 2021
7	a) Explain the formation of potential barrier in a P-N junction diode. b) Draw and explain the VI characteristics of a PN junction diode under forward and reverse bias	54 5 56 5	KTU DEC 2021 KTU DEC 2019 MODEL KTU DEC 2021 KTU JUL 2021 MODEL

8	a) Explain the working of an NPN transistor mentioning all current. b) The dc current gain of a transistor in common emitter configuration is 100. Find its dc current gain in common base configuration.	6 5 4	KTU DEC 2021 MODEL KTU DEC 2021
9	In a 4 band resistor the last colour in the colour band is gold. If the upper range of resistance is 3.465Ω find its colour code.	4	KTU JUL 2021
10	Differentiate between Avalanche breakdown and Zener breakdown?	4	KTU JUL 2021
11	What are the different types of inductors? Give two typical applications of inductor	5	KTU JUL 2021
12	Derive the relation between common base current gain and common emitter current gain,	4	KTU JUL 2021
13	Sketch the output characteristic of a transistor and explain different regions of operation.	6	KTU JUL 2021
14	Distinguish between active and passive electronic components with examples for each	4	KTU DEC 2020
15	Explain Avalanche breakdown?	4	KTU DEC 2020 MODEL
16	What do you understand by depletion region?	5	KTU DEC 2020
17	Explain the VI characteristics of a diode with relevant sketches.	6	KTU DEC 2020
18	What are the different types of capacitors? Give any two applications of capacitors.	4	KTU DEC 2019
19	Describe the forward characteristics of a diode?	4	KTU DEC 2019
20	Explain the working of an NPN transistor. Describe with suitable sketches the input-output characteristics of an NPN transistor.	10	KTU DEC 2019
21	What do you understand by Avalanche breakdown? Draw and explain the reverse V-I characteristics of a diode.	6	KTU DEC 2019
22	What are passive components? Mention at least three components with symbol.	4	KTU DEC 2019

23	Give the specifications of a resistor. The color bands marked on a resistor are Blue, Grey, Yellow and Gold. What are the minimum and maximum resistance values expected from that resistance?	4	KTU MODEL
24	Explain the Different types of Variable resistors? Mention their applications.	5	KTU DEC 2018
25	Write down the color code for a given resistor of 47-Kilo-ohms with a tolerance of 10%.	4	KTU DEC 2018
26	Write the significance of specifying tolerance value of a component. A ceramic capacitor has got the following code marked on its surface. Identify the capacitance value. (i) 103J (ii) 2n2	5	KTU DEC 2017

Qn. No	**MODULE – 5**	**Marks**	**Year**
1	Explain the action of shunt capacitor filter.	4	KTU JUN 2022
2	Explain the working principle of Zener voltage regulator.	4 6 5	KTU JUN 2022 KTU JUL 2021 KTU DEC 2019 KTU DEC 2018
3	Describe the components of a DC power supply using a neat block diagram.	10 5 5	KTU JUN 2022 KTU DEC 2021 KTU DEC 2017
4	Explain the working of RC coupled amplifier with circuit diagram and relevant waveforms. Also explain the frequency response of RC coupled amplifier.	10 6	KTU JUN 2022 KTU JUL 2021 MODEL
5	Draw and explain the block diagram of a public address system.	4	KTU DEC 2021 KTU JUL 2021 KTU DEC 2019
6	Narrate the working of a capacitor filter.	4	KTU DEC

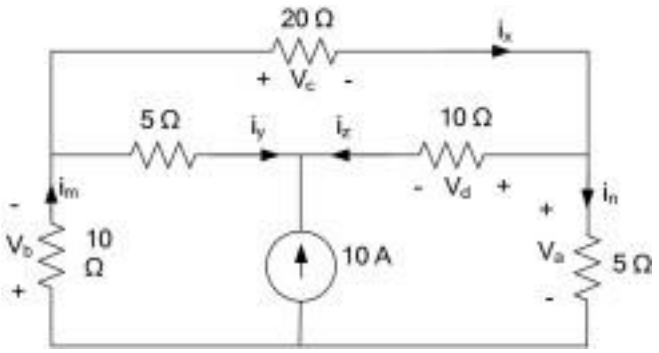
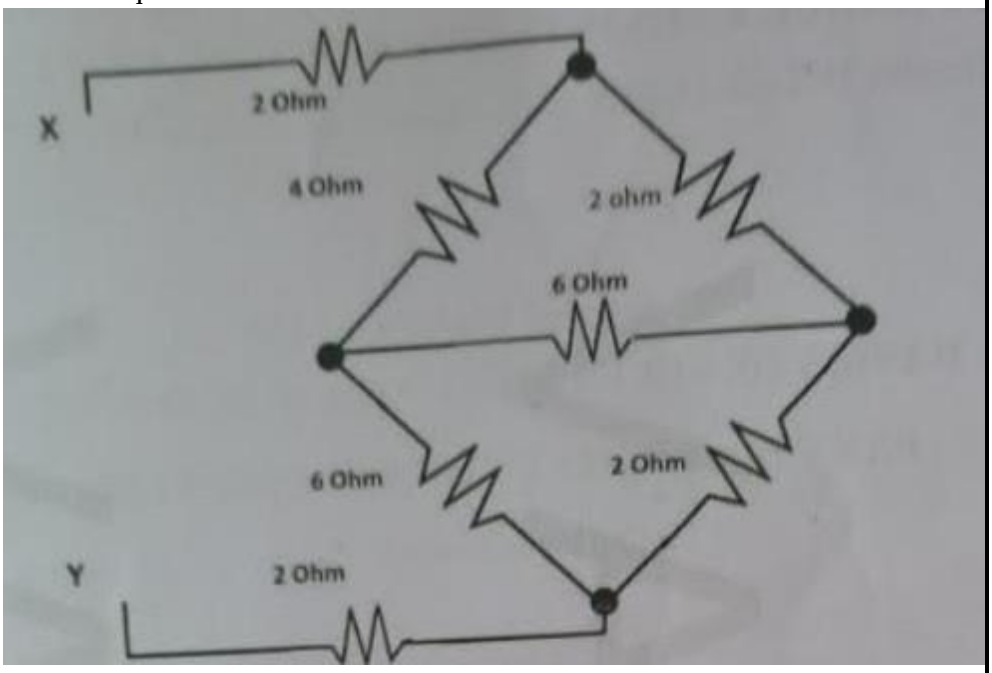
		6	2021 KTU DEC 2019
7	Explain the working of a full wave bridge rectifier.	5 4 7	KTU DEC 2021 KTU JUL 2021 KTU DEC 2019 KTU DEC 2018
8	a) Sketch the frequency response of a transistor amplifier and comment on the shape of the curve b) What is the role of emitter resistor in an RC coupled amplifier?	7 3	KTU DEC 2021
9	Give reasons for decrease in transistor amplifier gain at low frequencies and high frequencies	4	KTU JUL 2021 MODEL
10	Write a note on potential divider biasing	4	KTU DEC 2020
11	Describe gain and bandwidth of an RC coupled amplifier	4	KTU DEC 2020
12	Explain the working of a full wave bridge rectifier with capacitor filter.	7	KTU DEC 2020
13	With a neat sketch explain the block diagram of an instrumentation system	3 6	KTU DEC 2020 MODEL
14	Define line regulation and load regulation	4	KTU DEC 2020
15	Draw the circuit diagram of a CE amplifier and discuss the role of each component used in it.	6	KTU DEC 2020
16	What is the need of biasing? Draw the potential divider biasing circuit?	4	KTU DEC 2019
17	Discuss the role of coupling and bypass capacitors in a single stage RC coupled amplifier.	4	MODEL

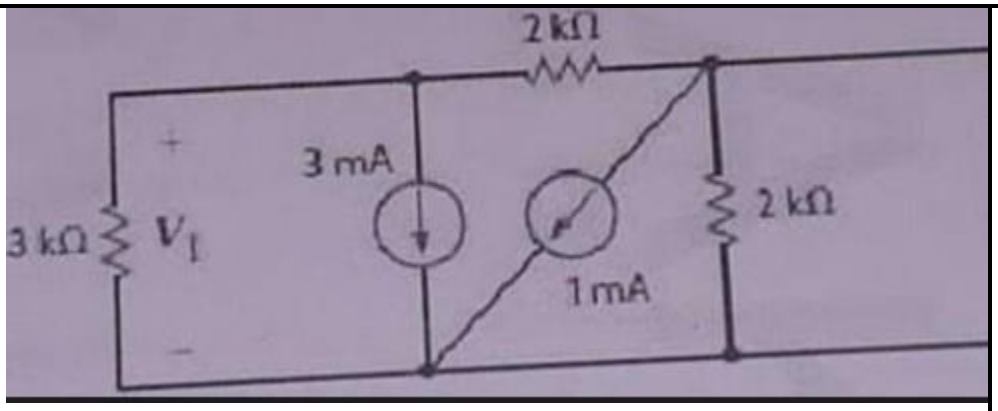
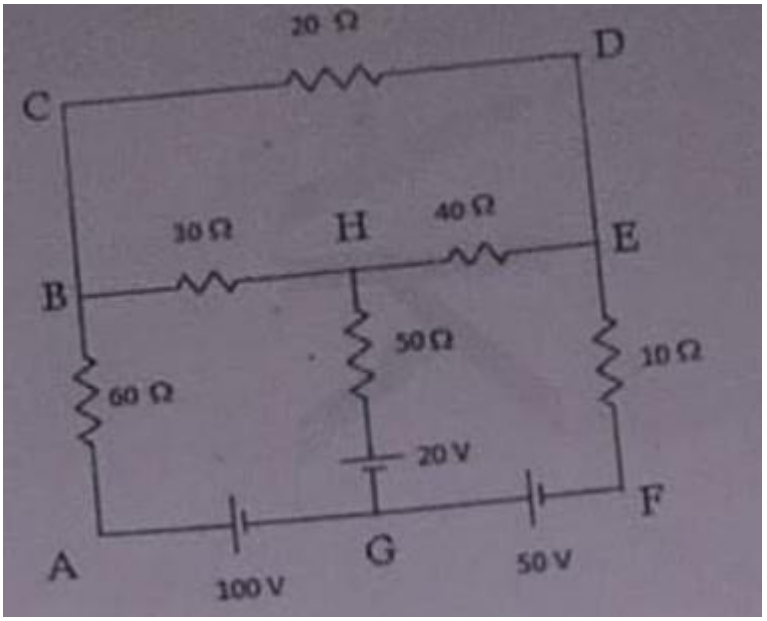
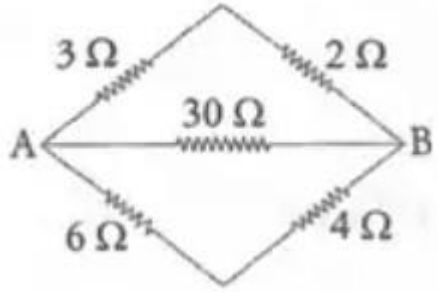
Qn. No	**MODULE – 6**	**Marks**	**Year**

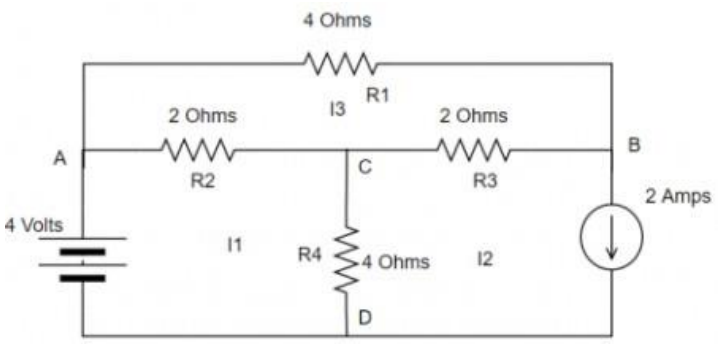
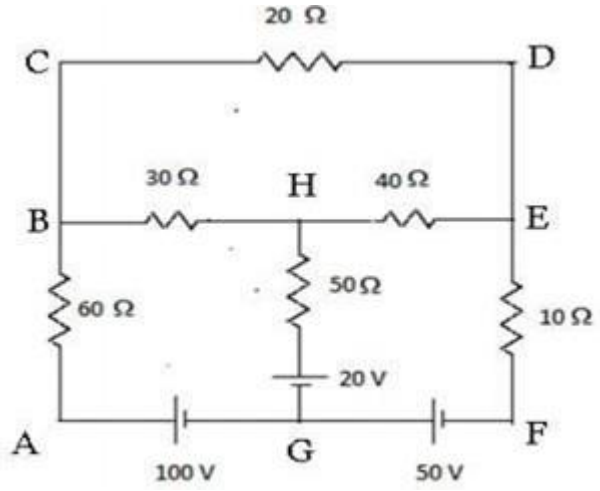
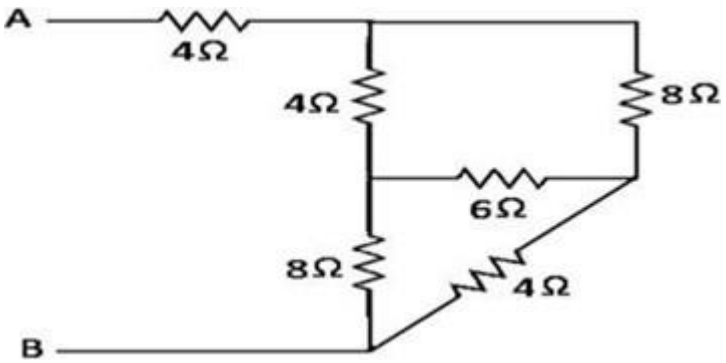
1	Differentiate between amplitude modulation (AM) and frequency modulation (FM).	4 3 5	KTU JUN 2022 KTU DEC 2020 KTU DEC 2019 MODEL
2	a) Explain the concept of cells in cellular communication. b) Draw the block diagram of GSM and explain the principle of operation.	3 4 5 7 7 7 5	KTU JUN 2022 KTU DEC 2019 MODEL KTU JUN 2022 KTU DEC 2019 KTU DEC 2020 MODEL
3	a) Describe the principle and working of an antenna. b) What is frequency reuse? Explain with a diagram.	6 3 3 4 4	KTU JUN 2022 KTU DEC 2020 KTU DEC 2019 MODEL KTU JUN 2022
4	Write the frequency range and typical applications of VHF and UHF frequency bands	4	KTU JUN 2022
5	a) State the merits and demerits of Amplitude Modulation. b) Sketch the block diagram of a superheterodyne receiver and explain its working.	4 5 6	KTU JUN 2022 KTU DEC 2019 MODEL
6	Explain the relevance of Intermediate Frequency in a superheterodyne receiver	4	KTU JUL 2021
7	Draw the frequency spectrum of an amplitude modulated (AM) wave. Given that modulating signal is of frequency fm and amplitude Vm and carrier is of frequency fc and amplitude Vc. Take modulation index as m. What is the bandwidth requirement of this AM wave?	5	KTU JUL 2021
8	With a neat sketch explain AM super heterodyne receiver	5	KTU JUL 2021
9	Explain the concept of cells and frequency reuse in cellular communication	5	KTU JUL 2021 KTU DEC 2020

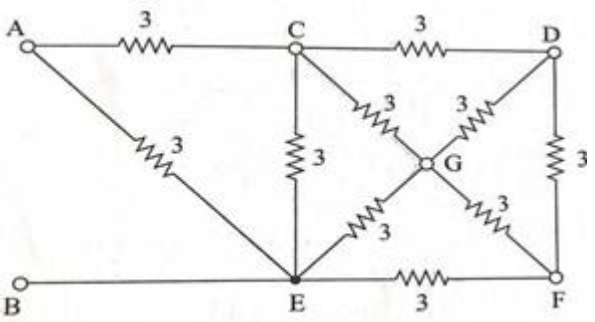
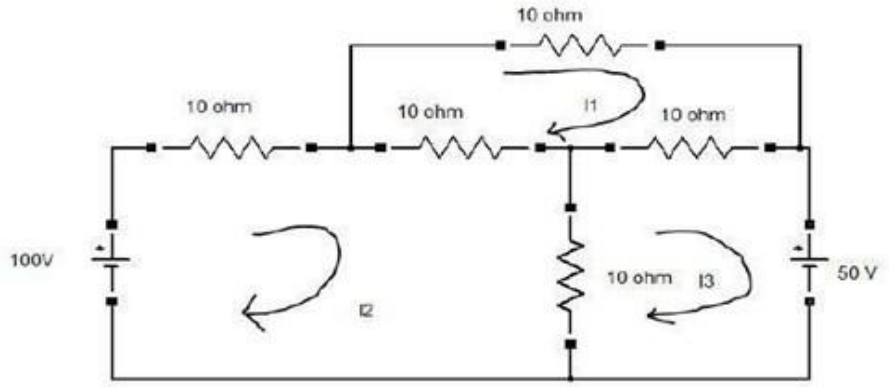
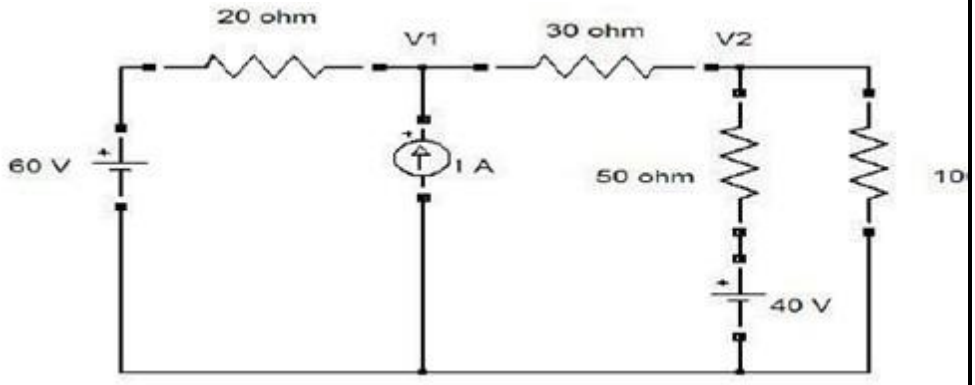
10	Write the expression for an AM wave and comment on the bandwidth requirement and modulation index.	5	KTU DEC 2020
11	What are the merits of AM compared to FM. The carrier amplitude of a given AM wave is 5V and the message signal amplitude is 3V. Find the modulationindex.	5 5	KTUDEC 2019
12	Draw and explain functional block diagram of cellular communication system.	10	KTUDEC 2018
13	Write the principle of frequency modulation and list the advantages of FM over AM.	5	KTUDEC 2017

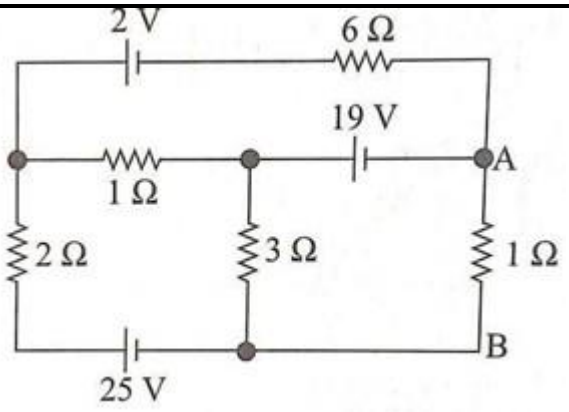
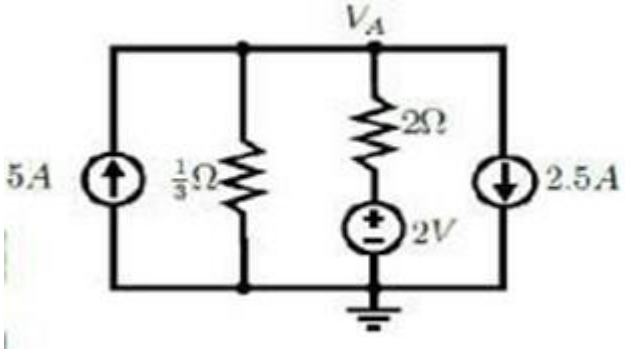
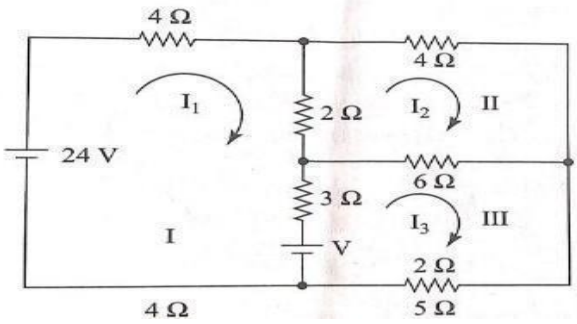
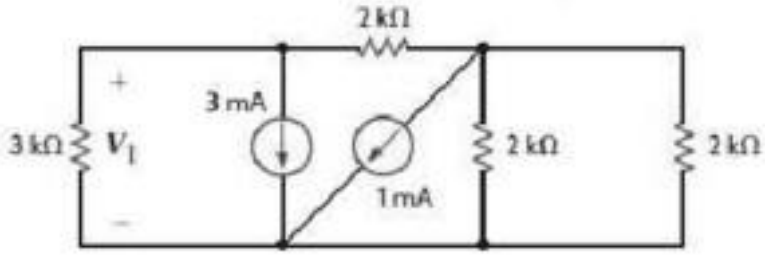
BASICS OF ELECTRICAL ENGINEERING (EST130 PART-1)

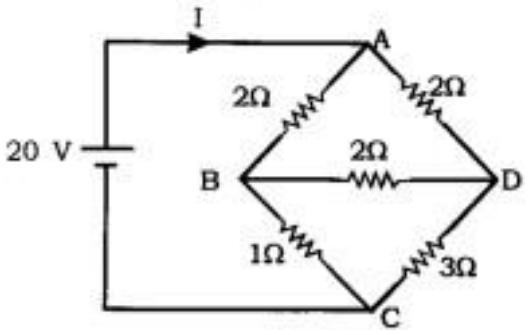
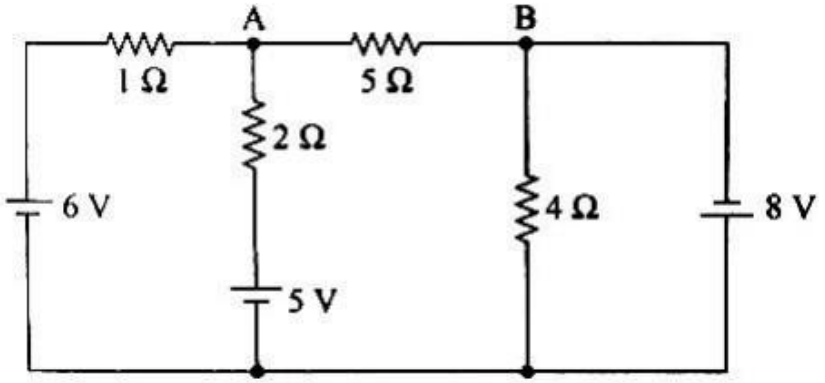
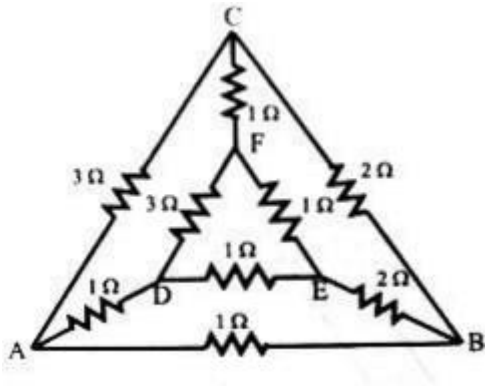
MODULE 1			
Sl No		**Marks**	**KTU, Year**
1	Use nodal analysis to find voltages Va, Vb,Vc and Vd 	10	KTU-DEC 2021
2	Find the equivalent resistance between the terminals X and Y 	10	KTU-DEC 2021
3	Use nodal analysis to find V1 in the given circuit	**10**	KTU-JULY 2021

			
4	**Find the currents in each of the following circuit using mesh analysis** 	**10**	KTU-JULY 2021
5	Find the current through the circuit shown below if the voltage applied is 50V 	10	KTU-DEC 2020
6	Find the current in R2 using mesh analysis	10	KTU-DEC 2020

			
7	State and explain Kirchhoff's laws with examples	4	KTU-DEC 2019
8	Calculate the current in each branch of the following circuit using mesh analysis? 	10	KTU-DEC 2019
9	Using star-delta transformation, determine the equivalent resistance R_{AB} 	10	KTU-DEC 2019
10	Calculate equivalent resistance across B and A		

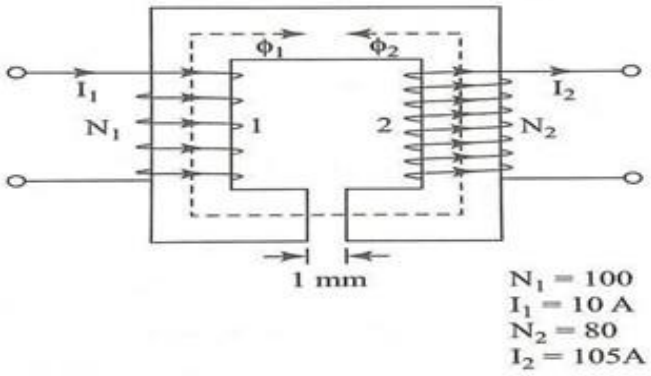
		4	KTU MAY 2016
11	A resistor of 5Ωis connected in parallel with a resistor of R1Ω. This combination is connected in series with an unknown resistor of R2Ω and the complete circuit is then connected to 50 V dc supply. Calculate the values of R1 and R2, if the power dissipated by the unknown resistor R1 is 150W with 5A passing through it.	4	KTU MAY 2017
12	Find mesh currents in the figure shown by mesh analysis 	10	KTU MAY 2017
13	Find current in 100 ohm resistor using node analysis 	10	KTU-DEC-2018
14	By applying Kirchhoff's laws calculate current flowing through the 6Ω resistor in the network shown	10	KTU-DEC-2016

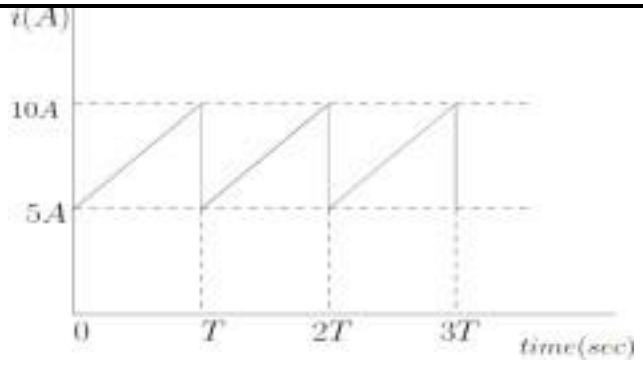
			
15	From the figure use node voltage analysis to find voltage V_A 	10	KTU-DEC-2016
16	A network with three meshes is shown. Apply mesh current method to determine the value of unknown voltage V, for which mesh current I_1=0. 	10	KTU-DEC-2016
17	Use nodal analysis to find V_1 in the given circuit. 	10	KTU JULY 2021

18	Find the source current I in the below figure using star-delta transformation. 	10	KTU DEC 2020
19	Calculate the current flowing through 5Ω resistor using the nodal method. 	10	KTU FEB 2022
20	Find the resistance between points A and B in network shown. 	10	KTU FEB 2022

21	State and explain Kirchhoff's laws.	4	KTU FEB 2022

	MODULE 2		
	Questions	**Marks**	**KTU, Year**
1	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	KTU DEC 2021
2	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=3ms.	4	KTU-DEC 2021
3	An iron ring has a cross section area of 3 cm2 and a mean diameter of 25 cm. An 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 mWb, find the relative permeability of iron, assuming no magnetic leakage	10	KTU-DEC 2021
4	The instantaneous value of an alternating voltage is given by y v=110 sin 314t Find a) the angular velocity, frequency, and time period of b) Differentiate between statically and dynamically induced emfs.	10	KTU-DEC 2021
6	Define the terms i) mmf ii) magnetic field strength iii) magnetic flux and iv) magnetic flux density	4	KTU-DEC 2019
7	State and explain i) Faraday's laws and ii) Lenz's law.	4	KTU-DEC 2019
8	An alternating current varying sinusoidally with a frequency of 50Hz has an rms value of 20A. i) Write down the equation for the instantaneous current ii) Find the instantaneous value of current at 0.0025s. iii) Find the instantaneous value of current 0.125s after passing through a positive maximum value iv) At what time, measured from a positive maximum value, will the instantaneous current be 14.14 A?	10	KTU-DEC 2019

9	Determine the average and rms values of the triangular voltage wave having maximum value Em volt	10	KTU-DEC 2019
10	Compare Electric and Magnetic Circuit	4	KTU-DEC 2018
11	Calculate the flux produced in the air gap in the magnetic circuit shown in figure which is excited by the MMF of two windings. The mean length of the flux path is 40 cm. The permeability of iron is 2000. The uniform cross sectional area is 10 cm²  	10	KTU-DEC 2018
12	Draw the circuit of a series parallel magnetic circuit. Show its electrical equivalent	4	KTU DEC 2016
13	A ring shaped electromagnet has an air gap of 6mm and cross sectional area of 12 cm². The mean length of the core (excluding air gap) is 60cm. Calculate the mmf required to produce a flux density of 0.4 Wb/m²in the gap. Take the relative permeability of the material as 400	10	KTU-DEC 2018
14	A steel ring of 25 cm diameter and of circular section 3 cm in diameter has an air gap of 1.5mm length. It is uniformly wound with 1000 turns of wire carrying a current of 2A. Calculate i) Magneto motive force ii) magnetic flux density in air gap iii) magnetic flux iv) relative permeability of steel ring. Assume that iron path takes about 40% of the total mmf.	10	KTU-MAY 2019
15	Determine the RMS, Average and Form Factor of the waveform shown below	10	KTU-DEC 2018

			
16	A conductor of length 0.5m kept at right angles to a uniform magnetic field of flux density 2Wb/m2 moves with a velocity of 75 m/s at an angle of 600 to the field. Calculate the emf induced in the conductor.	4	KTU JULY 2021
17	a) A coil of 50 Ω resistance is placed in a magnetic field of 1mWb. The coil has 50 turns and a galvanometer of 400 Ω 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 0.2mWb. b) Define rms value and average value of a time varying waveform.	6 4	KTU DEC 2020
18	a). 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. b). Differentiate between statically and dynamically induced emfs.	6 4	KTU DEC 2021
19	An alternating current is given by 14.14Sin377t. 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=3ms.	6	KTU FEB 2022
20	Explain the terms statically induced emf and dynamically induced emf.	4	KTU FEB 2022
21	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	KTU FEB 2022
22	Define a) MMF b) Field Strength c) Flux Density	3	KTU FEB 2022
23	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	KTU FEB 2022

	MODULE 3		
	Questions	**Marks**	**KTU, Year**
1	Derive an expression for the energy stored in an inductor.	4	KTU-DEC 2021
2	Derive the expression for the current in an ac series RLC *circuit*	10	KTU-DEC 2021
3	A resistance of 10Ω, an inductance of 0.3 H, and a capacitance of 100μF are connected in series across 230V, 50 Hz single phase power supply. Calculate the impedance, current through te circuit (iii) voltage across R,L &C and(d) power factor of the circuit	10	KTU-DEC 2021
4	A balanced delta connected 3 phase load is fed from a 3 phase, 400 V 50 Hz 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 in the network (10)	10	KTU-DEC 2021
5	Explain the advantage of three phase system of power supply compared to single phase system of power supply	4	KTU MAY 2019
6	When an alternating voltage of (80+j60) V is applied to a circuit, the resulting current flow is (-4+j10)A. Find the impedance, power consumed and the phase angle of the circuit.	4	KTU-DEC 2019
7	Two impedances Z1 and Z2 when connected separately across a 220V, 50 Hz supply, consume 300W and 150W 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	KTU-DEC 2019
8	A balanced three phase load has per phase impedance of (30+j50) Ω. If the load is connected across 400V, 3 phase supply, find (i) phase current (ii) line current and (iii) power supplied to load when it is connected in (a) star (b) delta	10	KTU-DEC 2019
9	. In a single phase ac circuit consisting of an impedance of 10Ω, the RMS value of applied voltage is 230V. i. Write down the expression for instantaneous voltage ii. If the current lags the applied voltage by 30º write down the expression for instantaneous current Calculate the power consumed in the circuit	4	KTU MAY 2019

10	A balanced three phase load consists of three coils each having resistance of 4Ω and inductance 0.02H. It is connected to a 415V, 50Hz, 3-phase ac supply. Determine the phase voltage, phase current, power factor and active power when the loads are connected in (i) star (ii) delta	10	KTU MAY 2019
11	A coil of resistance 10 Ω and inductance 0.1 H is connected in series with a 150 μF capacitor across 200V, 50 Hz supply. Calculate (i) Inductive reactance, Capacitance reactance, impedance, current and power factor. (ii) The voltage across the coil and capacitor respectively.	10	KTU-DEC 2017
12	i) An alternating voltage of (80 + j60) V is applied to a circuit and the current flowing is (-4 + j10) A. Find (i) the impedance of the circuit, (b) the power consumed and (c) the phase angle. ii) Each phase of a delta connected load has a resistance of 25Ωand an inductanceof0.15 H. The load is connected across a 400 V, 50 Hz, three phase supply. Determine the line current, power factor and power consumed.	10	KTU-DEC 2017
13	Two impedences, 10|_-30 and 20 |_60 are connected in parallel. Evaluate the equivalent impedance. What is the nature (capacitive or inductive) of the equivalent impedence? If a current of 10|_45 is passing through the parallel combination, calculate the voltage across the combination and express it in rectangular form. Evaluate the currents in each of the impedences. Draw the phasor diagram showing this voltage and all three currents i) Define peak factor and form factor. Consider v(t) = 500cos(100t), a sinusoidal voltage. Evaluate the rms value and peak factor of the voltage form.	10	KTU-DEC 2016
14	An alternating voltage is defined as v=100 sin α $0<\alpha<\pi$ v=0V $\pi<\alpha<2\pi$ What is the RMS value of this voltage	4	KTU-DEC 2017
15	A balanced 3 phase load consists of 3 coils each of resistance 6 Ω and inductive reactance of 8 Ω. Determine the line current and power absorbed when the coils are (i) star connected (ii) delta connected across 400V, 3 phase supply.	10	KTU JULY 2021
16	Derive the relation between line and phase currents in a 3 phase delta connected system	4	KTU DEC 2020
17	Three inductive coils, each with a resistance of 22 Ω and an inductance of 0.05 H are connected in first in star and then in delta, to a 3 phase 415 V, 50 Hz supply. Calculate for both star and delta connections, (i) phase current and line current and (ii) total power absorbed.	10	KTU DEC 2020

18	A capacitor having a capacitance of 20μF is connected in series with a non – inductive resistance of 200Ω across 220V, 50 Hz supply. Calculate the following 1) Impedance 2) Current 3) Power Factor 4) Power drawn from supply.	10	KTU FEB 2022
19	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	KTU FEB 2022
20	A delta-connected load of 12Ω resistance and 16-Ω reactance are connected across a 100V, 50 Hz supply. Find line current, phase current and power factor.	4	KTU FEB 2022

HUN 102 PROFESSIONAL COMMUNICATION

Module 1			
Sl No	**Questions**	**Marks**	**KTU,Year**
1	Find the misspelt words from each set of words given here. a) Defendant, defendant, difendent, defandent b) Assumption, assumption, assumption, accumption c) Appreciation, appreciation, appreciation, appreciation d) Superintendent, superantendant, superintendent, superintendent	4	July 2021 (FN)
2	Write the definition of the compound words of the following. a) Swimming pool b) Paddle boat c) Neck tie d) Black bird e) Foo t print f)Sunset	3	July 2021 (FN)
3	In each of the following sentences there are two blank spaces. Find out which pair of words from the options can be filled up in the blanks in the sentence in the same sequence to make the sentence meaningfully complete. (i) A committee has been ---------- to --- the transformation of the city into an International Finance Center. a) Constituted, convert b)appointed, oversee c) Convergent , evaluate d)inaugurated, determent (ii) Keeping in mind the --------- to develop the sector the Govt has ---- --solicited foreign investment. a) Importance, never b) proposal, forcibly c) objective, wanted d) need, actively (iii) In his speech he vowed to the four billion unbanked individuals across the world into the of financial inclusion. a) Represent, sphere b) Target, area c) bring, realm d) convince, era (iv) Although he puts in of overtime and takes few holidays, he cannot support his family. a) Sufficient, however b) Lot, besides	5	July 2021 (FN)

	c) Plenty, still d) Frequency, yet (v) They have been ------ on incentives to these practices are implemented at grass root level. a) Relying, ensure b) Improving, secure c) advocating, confirm d) debating, necessitate		
4	Complete the sentence as directed. a) He said, " I shall go as soon as it is possible." (Change into Indirect speech) b) He proposed that they should wait for the award. (Change into Direct speech) c) The guard refused him admittance. (Rewrite the sentence using "Admittance….")	3	July 2021 (FN)
5	Find the misspelt words from each set of words given. 1) a) acomodate b) accommadate c) acommodate d) accommodate 2) a) deductible b) deductable c) deductuble d) deductabe 3) a) license b) licence c) licens d) lisence	3	June 2022
6	Write the definition for the following compound words. a) Wild life b) Son-in- law	1	June 2022
7	Write the correct sequence words and fill in the blanks. (First, Next, Then, Finally, First, After that) 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. 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.	6	June 2022
8	Find the error in the sentences given below. He drank once again (a)/ as he was (b)/ feeling thirsty (c)/ No error (d)	1	June 2022
9	Write down two numerical adjectives and use it in a sentence	2	June 2022

10	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

Module 2

Sl No	Questions	Marks	KTU,Year
1	Help your friend by suggesting and explain SQ3R methods and PQRST 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

Module 3

Sl No	Questions	Marks	KTU,Year
1	You are asked to make a presentation on a tough subject to 10th standard school students. Share your strategies to make your presentation interesting and effective?	4	July 2021 (FN)
2a	Point out the differences between debate and group discussion?	2	July 2021 (FN)
2b	How body language could help you in a group discussion. Write down 6 points.	3	July 2021 (FN)
3a	Differentiate Group Discussion (GD) and debate	3	June 2022
3b	Explain the etiquettes one must follow in GD?	4	June 2022
4	You need to make a Project presentation as a part of your internal evaluation. What preparation do you need to make for presenting visuals effectively?	4	June 2022

Module 4

Sl No	Questions	Marks	KTU,Year
1a	How we can develop effective listening skills?	3	July 2021 (FN)

1b	How active listening plays an important role in communication?	3	July 2021 (FN)
2	What are the advantages and disadvantages of telephonic or video interviews?	5	July 2021 (FN)
3	Differentiate between active and passive listening.	3	June 2022
4	List the barriers in listening	3	June 2022

Module 5

Sl No	Questions	Marks	KTU,Year
1	Write a letter to the HR manager of a leading company, requesting permission to do two-weeks internship at his company as a part of your academic curriculum.	6	July 2021 (FN)
2a	What is technical communication?	1	July 2021 (FN)
2b	What are the different types of reports?	2	July 2021 (FN)
3	What is a report? Explain its structure and types.	6	June 2022
4	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

Course Code: EST 102

Course Name: Programming in C

Module I			
Sl. No	**Questions**	**Marks**	**Years**
1.	Differentiate between system software and application software	**3**	July 2021 (AN&FN)
2.	Write an algorithm to find the largest of three numbers	**3**	July 2021(AN)
3.	Differentiate between compiler and interpreter	**3**	July 2021(FN)
4.	Write an algorithm to find the sum of digits of a number.	**7/8**	July 2021(FN) June 2022
5.	Explain bubble sort with an example. Draw a flowchart and write pseudo code to perform bubble sort on an array of numbers.	**14**	July 2021(FN)
6.	Explain different types of memory used in a computer.	**7**	July 2021(FN)
7.	Draw a flowchart to find the factorial of a number.	**6**	July 2021(FN)
8.	With the help of a neat diagram explain the functional units of a computer	8	July 2021(FN)
9.	List five important registers in CPU. Also state the purpose of each register.	**6**	July 2021(FN) June 2022
10.	Write algorithm and draw flowchart to perform swapping of two numbers	**8**	July 2021(FN)
11.	What are the functions of ALU and CU?	**3**	June 2022
12.	Draw a flowchart to find the sum of first N numbers.	**3**	June 2022
13	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
Module II			
1.	What is the importance of precedence and associativity? Write the table for operator precedence	**3**	July 2021(FN)
2.	Discuss the differences between break and continue statements in C.	**3**	July 2021(FN)
3.	Write a C program to find the sum of first and last digit of a number	**7**	July 2021(FN)
4.	Write a C program to check if a number is present in a given list of numbers. If present, give location of the number otherwise	**7**	July 2021(FN) June 2022

	insert the number in the list at the end.		
5.	What is type casting? Name the inbuilt typecasting functions available in C language. What is the difference between type casting and type conversion?	**7**	July 2021(FN)
6.	Explain different data types supported by the C language with their memory requirements.	**7**	July 2021(FN) June 2022
7.	What is the difference between assignment and equality operators?	**3**	July 2021(AN)
8.	What is a static variable? When should it be used?	**3**	July 2021(AN)
9.	Explain arithmetic, logical and bitwise operators with examples.	**7**	July 2021(AN)
10.	Write a C Program to check if a given number is a strong number or not. A strong number is a number in which the sum of the factorial of the digits is equal to the number itself. Eg:- I 45:1 !+4 !+5 !:l +24+120=1 45	**7**	July 2021(AN)
11.	Write C program to convert the given decimal number into binary number	**7**	July 2021(AN)
12.	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(AN)
13.	Differentiate between while and do-while loops using an example.	**3**	June 2022
14.	Why is the use of goto statements discouraged in C programs?	**3**	June 2022
15	Explain formatted and Unformatted I/O functions of C language with syntax and example	**7**	June 2022
16	Write a C program to read a character from the user and check whether it is a vowel or consonant	**7**	June 2022
Module III			
1.	Explain any 3 string handling functions using examples	**3**	July 2021(FN)
2.	Write a C program to find the occurrence of each element in an array.	**3**	July 2021(FN)
3.	Write a C program to reverse a string without using string handling functions	**7**	July 2021(FN) June 2022
4.	Write a C program to perform linear search on an array of numbers.	**7**	July 2021 (FN & AN)
5.	Write a C program to print the number of vowels and consonants in a string.	**7**	July 2021(FN)

6.	Write a C program to find the transpose of a matrix.	**7**	July 2021(AN) June 2022
7.	Write a C program to find length of a string without using string handling functions.	**3**	July 2021(AN)
8	What is an array? Illustrate using an example, how a single dimensional array is initialized	**3**	July 2021(AN)
9.	Explain any 4 string handling functions in C programming.	**7**	July 2021(AN) June 2022
10	Write a C program to find second largest element in an array	**7**	July 2021(AN)
11	Write a C program to check whether a string is palindrome or not without using string handling functions	**7**	July 2021(AN)
12	Write a C program to compare any two strings using string handling functions	**3**	**June 2022**
13	Write a C program to find the largest element in an array	**3**	**June 2022**
14	Write a C program to sort an array of numbers using bubble sort	**7**	**June 2022**
Module IV			
1.	Define formal parameters and actual parameters. Illustrate with an example.	**3**	July 2021(FN)
2.	With examples show how: (i) an array is passed as an argument of a function. (ii) individual elements of an array are passed as arguments of a function.	**3**	July 2021(FN)
3.	What are different storage classes in C? Give examples for each	**7**	July 2021 (FN & AN) June 2022
4.	Write a C program to find sum and average of an array of integers using user defined functions	**7**	July 2021(FN)
5.	Write a C program to : (i) Create a structure containing the fields: Name, Price, Quantity, Total Amount. (ii) Use separate functions to read and print the data	**7**	July 2021(FN) June 2022
6.	What is the purpose of function declaration and function definition and function call? With examples illustrate their syntax	**7**	July 2021(FN)
7.	Differentiate between structure and union using an example	**3**	July 2021(AN)
8.	Illustrate the purpose of return statement using an example	**3**	July 2021(AN)
9.	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	**7**	July 2021(AN)

	the details		
10.	What is recursion? Write a C program to display Fibonacci series using recursive function	**7**	July 2021(AN) June 2022
11.	Write a C program to sort N numbers using functions	**7**	July 2021(AN)
12.	Name the different types of parameter passing. Illustrate each of them with an example	**3**	**June 2022**
13.	What are the advantages of modular programming?	**3**	**June 2022**
14.	What are the main differences between structures and unions? Which is preferred in what situation? Give examples.	**7**	**June 2022**
Module V			
1.	Explain the different modes of operations performed on a file in C language.	**7**	July 2021(FN)
2.	Explain how pointers can be passed to functions in C	**7**	July 2021(FN) June 2022
3.	Write any three/five file handling functions in C.	**3/7**	July 2021 (FN & AN) June 2022
4.	Differentiate between address operator(&) and indirection(*) operator..	**3**	July 2021(FN)
5.	Explain any 5 file handling functions in C?	**7**	July 2021(FN)
6.	Write a program in C to copy the contents of one file into another.	**7**	July 2021(FN)
7.	Differentiate between char name[] and char *name in C	**3**	July 2021(AN)
8.	Explain the use of fseek0 function	**3**	July 2021(AN)
9.	Write a C program to reverse a string using pointers	**7**	July 2021(AN)
10.	Differentiate between array of pointers and pointer to an array	**7**	July 2021(AN)
11.	Write a C program to count number of lines in a text file	**7**	July 2021(AN)
12.	Distinguish between text mode and binary mode operation of a file	**3**	**June 2022**
13.	What do you mean by a pointer variable? How is it initialized?	**3**	**June 2022**
14.	Write a C program to replace vowels in a text file with character ‘x’	**7**	**June 2022**
15	Write a C program to print the elements of an array in reverse order using pointers	**7**	**June 2022**