Subject: LINEAR ALGEBRA AND CALCULUS (MAT 101)

Module I			
Sl. No	Questions	Marks	KU/KTU
1.	Solve the following system of equations? Y +z-2w =0 2x-3y-3z+6w=2 4x+y+z-2w =4	7	Model question (KTU-2019)
2.	Determine the rank of the matrix A = $\begin{bmatrix} 1 & 2 & -1 \\ -2 & -4 & 2 \\ 3 & 6 & -3 \end{bmatrix}$	3	Model question (KTU-2019)
3.	Solve the following by Gauss elimination Y+z-2w=0, 2x-3y-3z+6w=2, 4x+y+z-2w=4	7	Model question (KTU-2019)
4.	Diagonalize the matrix $\begin{bmatrix} -1 & 2 & -2 \\ 2 & 4 & 1 \\ 2 & 1 & 4 \end{bmatrix}$	7	Model question (KTU-2019)
5.	Write down the Eigen values $\begin{bmatrix} 2 & 0 \\ 0 & -1 \end{bmatrix}$	3	Model question (KTU-2019)
6.	What kind of conic section the quadratic from $3x_1^2+22x_1x_2+ 3x_2^2 =0$ represents and transform it to principal axes	7	KTU JAN-2016
7.	Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$	7	KTU JAN-2016
8.	Determine whether the matrix is orthogonal $\begin{bmatrix} 1 & 0 & -0 \\ 1 & 1/\sqrt{2} & -1/\sqrt{2} \\ 0 & 1/\sqrt{2} & 1/\sqrt{2} \end{bmatrix}$	3	KTU JUN-2016
9.	Reduce the matrix A= $\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \end{bmatrix}$ to row echelon form. Hence find its rank	7	KTU Aug-2016
10	Find out what type of conic section the quadratic form $17x_1^2-30x_1x_2+17x_2^2=128$ and transform it to principal axes	7	KTU Dec-216
11	Solve the system of equation by Gauss elimination method 3x+3y+2z=1 x+2y=4 10y+3z=-2 2x-3y-z=5	7	KTU Dec-2016

12	$A=\begin{bmatrix} 3 & 0 & 2 \\ 0 & 2 & 0 \\ -2 & 0 & 0 \end{bmatrix}$ find an orthogonal matrix P that diagonalizes A	3	KTU Feb-2017
13	Reduce to echelon form and hence find the rank of the matrix $A=\begin{bmatrix} 3 & 0 & 2 \\ -6 & 42 & 24 \\ 21 & -21 & 0 \end{bmatrix}$	7	KTU Mar 2017
14.	Find the rank of the matrix $A=\begin{bmatrix} 2 & -2 & 0 \\ 0 & 4 & 8 \\ 2 & 0 & 4 \end{bmatrix}$	3	KTU Mar 2017
15	If 2 is an eigen value of $\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ without using its characteristic equation ,find other eigen values .Also find the eigen values of A^3 ,A^T ,A^{-1} ,5A, A-3I and Adj A	7	KTU Dec 2016
16	What kind of conic section or pair of straight line is given by the quadratic form $3x^2+22xy+3y^2=0$ express $(x,y)^T$ interms of new coordinates.	7	KTU Dec-2016
17	Determine the rank of the matrix $A=\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 2 & 5 \end{bmatrix}$	3	KTU DEC-2019
18	Solve the system of equations by Gauss elimination method X +2y +3z = 1 2x +3y +2z = 2 3x +3y + 4z =1	7	KTU DEC-2019
19	Find the eigen values and eigen vectors of A = $\begin{bmatrix} 4 & 2 & -2 \\ 2 & 5 & 0 \\ -2 & 0 & 3 \end{bmatrix}$	7	KTU DEC-2019
20	Find the values of μ and λ for which the system of equations 2x +3y + 5z = 9 7x +3y +-2z =8 2x + 3y + λz = μ Has i)no solution, ii)a unique solution iii)infinite solution	7	KTU DEC-2019
21	Find the matrix of transformation that diagonalize the matrix $A=\begin{bmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{bmatrix}$.Also write the diagonal matrix.	7	KTU DEC-2019
Module II			
1.	Let Z=f(x,y) where x= rcosθ , y= rsinθ prove that $\left(\frac{\partial z}{\partial x}\right)^2+\left(\frac{\partial z}{\partial y}\right)^2=\left(\frac{\partial z}{\partial r}\right)^2+1/r^2\left(\frac{\partial z}{\partial \theta}\right)^2$	7	Model question (KTU-2019)
2.	show that the function u(x,t) = sin (x-ct) is a solution of the equation	3	Model question

			(KTU-2019)
3.	Use Lagrange multiplier to determine the dimensions of a rectangular box open at the top having a volume $32ft^3$ and requiring the least amount of material for its construction.	7	Model question (KTU-2019)
4.	Find $f_x(1,3)$and $f_y(1,3)$ for the function $f(x,y) = 2x^3y^2+2y+4x$	3	Model question (KTU-2019)
5.	Find the slope of the surface $Z= x^2y+5y^3$in the X direction at the point(1,-2)	3	Model question (KTU-2019)
6.	Let $W=\sqrt{x2 + y2 + z2}$,$x = \cos\theta$, $y = \sin\theta$, $z = \tan\theta$. Use chain rule to find $\frac{dw}{d\theta}$ when $\theta= \pi/4$	7	Model question (KTU-2019)
7.	Locate all relative maxima ,relative minima and saddle points of $f(x,y)=xy+ a^3/x +b^3/y$ ($a \neq 0$, $b \neq 0$	7	Model question (KTU-2019)
8.	Find the points on the sphere $x^2 + y^2 +z^2 =4$ that are closest to and farthest from the point (3,1,-1)	3	Model question (KTU-2019)
9.	Given the function $W=xy+z$ use chain rule to find the instantaneous rate of change of W at each point along the curve $x=\cos t, y = \sin t, z = t$	3	Model question (KTU-2019)
10.	Use the chain rule to find $d\frac{dw}{ds}$ at $s=\frac{1}{2}$ if $w=r^2-r\tan\theta$, $r=\sqrt{s}$, $\theta = \pi s$	3	Model question (KTU-2019)
11.	11.Find the slope of sphere $x^2 +y^2 +z^2 =1$ in the y-direction at $(\frac{21\ -2}{33\ 3})$	3	Model question (KTU-2019)
12.	Locate all relative maxima , relative minima and saddle point if any for $f(x,y)=y^2+xy+4y+2x+3$	7	Model question (KTU-2019)
13	Given $f = e^x\sin y + e^y\cos x$, show that the function satisfies the Laplace equation $f_{xx} + f_{yy} = 0$	3	KTU Apr-2018
14	Let $w = 4x^2 + 4y^2 + z^2$,where $x = \rho\sin\varphi\cos\theta$, $y = \rho\sin\varphi\sin\theta$, $z = \rho\cos\varphi$. Find $\frac{\partial w}{\partial \rho}, \frac{\partial w}{\partial \varphi}, \frac{\partial w}{\partial \theta}$ using chain rule.	7	KTU Dec-2018
15	Locate all relative extrema and saddle points of the function $f(x,y) = 2xy - x^3 - y^2$	7	KTU Apr-2018
16	If $u = \log(x^3 + y^3 + z^3 - 3xyz)$, show that $(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z})^2 u = \frac{-9}{(x + y + z)^2}$	7	KTU June-2016
17	If $f(x,y)=xe^y + 5y$ find the slope of f(x,y)in the x-direction at (4,0)	3	KTU DEC-2019
18	Show that $\frac{\partial^2 z}{\partial x^2} +\frac{\partial^2 z}{\partial y^2}=0$,where $z =e^x$	3	KTU DEC-2019

	$\sin y + e^x \cos y$		
19	Let f be a differentiable function of three variables and suppose that w =f (x-y ,y-z ,z-x),show that $\frac{\partial w}{\partial x}$ + $\frac{\partial w}{\partial y}$ +$\frac{\partial w}{\partial z}$ = 0	7	KTU DEC-2019
20	Locate all relative extrema of f (x,y)=4xy -y^4 - x^4	7	KTU DEC-2019
21	Find the local linear approximation L to the function f(x,y) = $\sqrt{x^2 + y^2}$ at the point P(3,4).Compare the error in approximating f by L at the point Q (3.04,3.98) with distance PQ.	7	KTU DEC-2019
22	The radius and height of a right circular cone are measured with errors of at most 1% and 4% respectively.Use differentials to approximate the maximum percentage error in the calculated volume.	7	KTU DEC-2019
	Module III		
1	use double integral to find the area of the region enclosed between the parabolas y=$\frac{1}{2}$ X^2 and the line y=2x	3	Model question (KTU-2019)
2	Use polar coordinates to evaluate the area of the circle X^2+Y^2 =4	3	Model question (KTU-2019)
3	Evaluate the integral $\int_0^4\int_{\sqrt{y}}^2 e^{x3}dxdy$ by changing the order of integration	7	Model question (KTU-2019)
4	Find the volume of the solid bounded by the cylinder x^2+y^2=4 and the planes y+z=4 and z=0	7	Model question (KTU-2019)
5	Use spherical coordinates to find the volume of the solid bounded above by the sphere x^2+y^2+z^2=16 and below by the cone Z= $\sqrt{x2 + y2}$	7	Model question (KTU-2019)
6	Evaluate $\iiint$xdxdydz where v is the volume of the tetrahedron bounded by the plane x=0,y=0,z=0,x+y+z=a	7	Model question (KTU-2019)
7	Evaluate $\iiint\sqrt{1 - x^2 - y^2 - z^2}$ dxdydz taken throughout the volume of the sphere$x^2 + y^2 + z^2 = 1$ by transforming to spherical polar coordinates	3	Model question (KTU-2019)
8	Find the area of the region R enclosed between the parabola y= $\frac{x2}{2}$ and the line y=2x	7	Model question (KTU-2019)
9	Use triple integral to find the volume of the solid within the cylinder $x^2 + y^2$ =9 and between the planes z=1 and x+z=5	7	Model question (KTU-2019)
10	Evaluate$\int_0^1\int_0^1 \frac{dydx}{\sqrt{1 - x^2}\sqrt{1 - y^2}}$	3	Model question

			(KTU-2019)
11	Use the integral to find the area enclosed by the given curves y=sin x and y=cos x in $0 \le x \le \frac{\pi}{4}$	7	Model question (KTU-2019)
12	Evaluate $\int_0^1\int_0^{y^2}\int_{-1}^{z} z\,dx\,dy\,dz$	7	Model question (KTU-2019)
13	Evaluate $\iint_R xy\,dA$, where R is the region bounded by the curves $y = x^2$ and $x = y^2$.	7	KTU Dec-2017
14	Evaluate $\int_0^3\int_0^{\sqrt{9-y^2}} 2y\,dx\,dy$	3	KTU Dec-2016
15	Evaluate $\int_{-1}^{2}\int_0^2\int_0^1 (x^2 + y^2 + z^2)\,dx\,dy\,dz$	3	KTU Apr-2018
16	Use a triple integral to find the volume of the solid within the cylinder $x^2 + y^2 = 9$ and between the planes $z = 1$ and $x + z = 5$.	7	KTU Dec-2017
17	Find the mass of the square lamina with vertices (0,0) (1,0) (1,1) and (0,1) and density function $x^2 y$	3	KTU Dec-2019
18	Evaluate $\iint_R dx\,dy$ where R is the region bounded by the parabolas $y^2=4ax$ and $x^2=4ay$	7	KTU Dec-2019
19	Evaluate $\int_0^\infty\int_0^\infty e^{-(x^2 + y^2)}\,dx\,dy$ by changing to polar coordinates	3	KTU Dec-2019
20	Evaluate $\int_0^2\int_{\frac{y}{2}}^1 e^{x^2}\,dx\,dy$ by reversing the order of integration	7	KTU Dec-2019
21	Use triple integrals to find the volume of the solid within the cylinder $x^2+y^2=9$ and the planes $z=1$ and $x+ z=5$	7	KTU Dec-2019
22	Use double integral to find the area of the region enclosed between the parabolas $y=\frac{x^2}{2}$ and $y=2x$	7	KTU Dec-2019
	Module IV		
1	Test the convergence of the series $\sum_{k=1}^{\infty} \frac{k}{k+1}$	3	Model question (KTU-2019)
2	Test the convergence of the alternating series $\sum_{k=1}^{\infty} (-1)^{k+1}\frac{1}{k}$ using Leibnitz test.	3	Model question (KTU-2019)

3	Check Whether the series $\sum_{k=1}^{\infty}(-1)^{k+1}\frac{(2k)!}{(3k-2)!}$ Is absolutely convergent, conditionally convergent or divergent.	7	Model question (KTU-2019)
4	Check the convergence of the series $\frac{3}{4}+\frac{3.4}{4.6}+\frac{3.4.5}{4.6.8}$ +……..	3	Model question (KTU-2019)
5	Determine Whether the alternating series $\sum_{k=1}^{\infty}(-1)^{k+1}\frac{3^{2k-1}}{k^2+1}$ is absolutely convergent.	7	Model question (KTU-2019)
6	Show that the series $\sum_{k=1}^{\infty}\frac{\cos k}{k^2}$ is convergent	3	KTU JAN-2016
7	Test the convergence of the series $1+\frac{1.2}{1.3}+\frac{1.2.3}{1.3.5}+$ ……..	3	KTU JAN-2016
8	Check whether the series $\sum_{k=1}^{\infty}\frac{1}{2k-1}$converges or not.	3	KTU JUN-2016
9	Test whether the series converges or diverges $\sum_{k=1}^{\infty}\frac{k}{2^k}$	3	KTU Aug-2016
10	Determine whether the series$\sum_{k=1}^{\infty}\left(\frac{3}{4}\right)^{k+2}$ converges and if so find its sum	3	KTU Dec-216
11	Test the convergence of$\sum_{n=1}^{\infty}\left(\frac{n}{n+1}\right)^{n^2}$	7	KTU Dec-2016
12	Show that the series$\sum_{n=1}^{\infty}\left(\frac{1}{2}\right)^{n}$ converges	3	KTU Feb-2017
13	Find the interval of convergence and radius of convergence of the infinite series $\sum_{n=0}^{\infty}n!x^n$	7	KTU June-2017
14	Determine whether the series$\sum_{k=0}^{\infty}\frac{5}{4^k}$ is converges, if so find the sum	3	KTU Apr-2018
15	Determine whether the alternating series $\sum_{k=1}^{\infty}(-1)^{k+1}\frac{k+7}{k(k+4)}$ is absolutely convergence.	7	KTU Apr-2018
16	Test the convergence of $\frac{x}{1.2}+\frac{x^2}{2.3}+\frac{x^3}{3.4}+\ldots$	7	KTU Dec-2016
17	Test the convergence of the series $\sum_{k=1}^{\infty}\frac{k}{2k+1}$	3	KTU Dec-2019
18	Check the convergence of $\sum_{k=1}^{\infty}\frac{1}{k^{\frac{k}{2}}}$	3	KTU Dec-2019

19	(a)Find the general terms of the series $1+\frac{1.2}{1.3}+\frac{1.2.3}{1.3.5}+\frac{1.2.3.4}{1.3.5.7}+\ldots$ and use the ratio test to show that the series converges. (b)Test whether the following series is absolutely convergent or conditionally convergent $\sum_{k=1}^{\infty}\frac{(-1)^k}{\sqrt{k(k+1)}}$	7 7	KTU Dec-2019
20	(a)Test the convergence of $\frac{x}{1.2}+\frac{x^2}{2.3}+\frac{x^3}{3.4}+\ldots+\frac{x^k}{k(k+1)}+\ldots$ (b)Test the convergence of the series $\sum_{k=1}^{\infty}\frac{(k+1)!}{4!k!4^k}$	7 7	KTU Dec-2019
	Module V		
1	Find the values to which the Fourier Series of f(x)=x for $-\pi \le x \le \pi$ with $f(x+2\pi) = f(x)$	7	KTU Apr-2018
2	State the conditions for which a function f(x) can be represented as fourier series.	3	KTU Apr-2018
3	Discuss the convergence of a Fourier series of a periodic function f(x) of period 2π	3	KTU Dec-2017
4	Find the Fourier cosine series representation of f(x) = x,$0 \le x \le \pi$.Also find the Fourier series representation f(x) if f(x) is periodic function with period π	3	KTU Dec-2017
5	Find the Fourier series of the periodic function f(x) of period 4,where f(x)=f(x) = $\begin{cases} -2, & -2 < x \le 0 \\ x, & 0 < x < 2 \end{cases}$ and deduce that i. $1+\frac{1}{3^2}+\frac{1}{5^2}+\frac{1}{7^2}+\ldots=\frac{\pi^2}{8}$ ii. $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\ldots=\frac{\pi}{4}$	7	KTU Apr-2018
6	Find the Fourier series of $f(x) = x, -\pi \le x \le \pi$	3	KTU DEC-2017
7	Obtain the half range cosine series of $f(x) = x^2, 0 \le x \le C$	3	KTU Dec-2017
8	Obtain the Fourier series of f(x) = f(x) = $\begin{cases} -\frac{\pi}{4}, & -\pi < x < 0 \\ \frac{\pi}{4}, & 0 < x < \pi \end{cases}$	7	KTU Dec-2017

9	Find the half range cosine series of f(x) = x,0 < x < l	3	KTU Apr-2018
10	Find the Fourier series of f(x) = $\begin{cases} -1 + x, & -\pi < x < \\ 1 + x, & 0 < x < \pi \end{cases}$	7	KTU Apr-2018
11	Find the half range sine series of f(x) = $\begin{cases} x, & 0 < x < 1 \\ 2 - x, & 1 < x < 2 \end{cases}$	7	Model question (KTU-2019)
12	Find the half range sine series of f(x)= $\begin{cases} \frac{2kl}{x} & \text{if } 0 < x < 1/2 \\ \frac{2k(l - x)}{l} & \text{if} \frac{1}{2} < x < l \end{cases}$	7	Model question (KTU-2019)
13	obtain the fourier series for $f(x)=e^{-x}$ in the interval $0<x<2\pi$ with $f(x+2\pi) = f(x)$. Hence deduce the value of $\sum_{n=2}^{\infty}(- 1)^n/1+n^2$	7	Model question (KTU-2019)
14	Find the fourier series of the function $f(x)=x^2$ -2 $\leq x < 2$ f(x+4)=f(x)	7	Model question (KTU-2019)
15	Find the Maciaurian series expansion of $f(x)=(1+x)^k$ for lxl <1 where k is any real number	7	Model question (KTU-2019)
16	Find the Taylors series of $\frac{1}{x + 2}$ about x=1	3	Model question (KTU-2019)
17	Find the Taylor series for *f(x)=cos x* about $x=\pi/2$ up to third degree terms	3	KTU Dec-2019
18	Find the Fourier half range sine series of $f(x)=e^x$ in 0 < x < 1	3	KTU Dec-2019
19	(a)Find the Fourier series of periodic function with period 2 which is given below f(x) = $\begin{cases} -x; & -1 \leq x \leq 0 \\ x; & 0 \leq x \leq 1 \end{cases}$ .Hence prove that $1 + \frac{1}{3^2} + \frac{1}{5^2}+\ldots=\frac{\pi^2}{8}$ (b)Find the half range cosine series for f(x) = $\begin{cases} kx & ;0 \leq x \leq L/2 \\ k(L - x) & ;L/2 \leq x \leq L \end{cases}$	7 7	KTU Dec-2019
20	(a)Find the Fourier series of f(x) = $\begin{cases} 0; & -\pi < x < 0 \\ x^2; & 0 < x < \pi \end{cases}$ (b)Obtain the Fourier series expansion for $f(x)=x^2$, $-\prod < x < \prod$	7 7	KTU Dec-2019

ENGINEERING PHYSICS B (PHT 110)

	MODULE 1 HARMONIC OSCILLATIONS & WAVES	Marks	Year
1	What is the effect of damping on the frequency and time period of an oscillator?	2	May 19, July '16 KTU
2	Explain the phenomenon of amplitude resonance and obtain the value of resonant frequency.	4, 2	May 19 KTU, Sep 2020
3	A wave is represented by $\Psi = 3*10^{-3}\cos(8.4*10^{13}t + 2.8*10^{5} Z)$ Vm^{-1}. Find the amplitude, frequency, wavelength and wave velocity. Where z in meter and t in second.	4	May;19 KTU
4	Solve the differential equation of a damped harmonic oscillator. Explain the time displacement curve of over damped, critically damped and under damped cases.	6	May;19 KTU
5	What is the condition for critical damping in the case of a damped harmonic oscillator? With the help of the expression for displacement write how this condition affects the amplitude of the oscillator	4	Dec '18 KTU
6	Distinguish between transverse and longitudinal waves.	2	May'19 KTU
7	What do you mean by Quality factor of an oscillator	2	Jan '16 KTU
8	What is resonance in forced oscillation? Give one example	2	Dec '16KTU
9	Frame and solve the differential equation of a forced harmonic oscillator	6	July '16 KTU
10	Distinguish between longitudinal waves and transverse waves	2	April '18KTU
11	What is meant by sharpness of resonance	4	June '16KTU
12	Frame the differential equation of a forced harmonic oscillator and obtain its solution.	6	Dec'18 KTU, Sep

			2020
13	Considering transverse vibration of stretched string derive one dimensional wave equation.	4	Jan’16, Dec '17
14	Derive an expression for fundamental frequency of transverse vibration of a stretched string. .	6	Dec '16KTU
MODULE 2 WAVE OPTICS			
1	What are coherent sources?	2	May’19 KTU
2	What is grating element? Write the grating equation in terms of grating element.	2	May’19 KTU
3	How an interference filter is constructed?	4	May’19 KTU
4	In fraunhofer’s diffraction due to a single slit a screen is placed 2m away from the lens to obtain a pattern. If the slit width is 0.2mm and the first minima lies 5mm on either side of central maxima, find the wavelength of light.	4	May’19 KTU
5	Explain the formation of interference fringes using air wedge. How is it used to determine the thickness of a thin wire?	6	May’19 KTU
6	Two independent sources of light cannot produce interference fringes. why	2	Jan , '16 KTU
7	Write the expression for the radius of the nth dark ring in Newton's rings interference pattern. What happens to this radius when air is replaced by a liquid of refractive index	4, 2	July '16 KTU, Sep 2020
8	In a Newton’s ring arrangement, if a drop of water **(μ=4/3)** is placed in between lens and plate, the diameter of the **10^{th}** dark ring is found to be **0.6cm**. Obtain the radius of curvature of the face of the lens in contact with the plate. The wavelength of the plate is **6000Å**	4	Dec '18 KTU
9	With necessary theory write the formation of interference pattern in an air wedge and derive an expression for the bandwidth	6	July '16 KTU
10	Show that the radi of different dark rings in Newton’s Rings are proportional to square root of integers. Explain with necessary theory, how the refractive index of the given liquid is determined using Newton’s rings arrangement.	6	April '18KTU

11	Write Rayleigh's criteria for resolution. State Rayleigh's criteria for geometrical and spectral resolution	6	Jan '16KTU
12	Define resolving power of a grating	2	July'16 KTU
13	Distinguish between Fresnel's and Fraunhofer Diffraction	2	May '17KTU
14	What is plane transmission grating? Describe how is it used to determine the wavelength of light	6	Dec '17KTU
15	With the help of a neat diagram, explain the formation of diffraction pattern with a single slit .Deduce the equation for the bright and dark fringes and the width of central maxima.	6	May '17KTU
	MODULE 3 **QUANTUM MECHANICS & NANOTECHNOLOGY**		
1	What is tunnel effect?	2	May'19 KTU
2	Estimate the de Broglie wavelength of an electron moving with a kinetic energy of 100 eV.	4	May'19 KTU
3	What is Fermi level? Give its physical significance.	4	May'19 KTU
4	Write the Schrodinger equation for a particle trapped in a one dimensional box of width L and solve it to obtain the energy eigen values.	6	May'19 KTU
5	Write the normalization condition of a wave function and its significance	2	Aug '16 KTU
6	Calculate the de Broglie wavelength of electron whose Kinetic energy is **10keV**	4	Jan '16 KTU
7	State Uncertainty principle. With help of it, explain the absence of electrons inside the nucleus. .	4	July '16 KTU
8	Solve Schrodinger's equation for a particle in a one dimensional box and obtain the following (i) energy values (ii) normalized wave function.	6	July '17KTU
9	Explain the Quantum Mechanical Tunneling .	4	July '16 KTU
10	Obtain energy and momentum operators	4	Dec '18KTU
11	What do you mean by Fermi energy level and Fermi energy?	2	May'16KTU
12	Derive Schrodinger's time independent equation from time dependent one	6	Dec '17KTU
	MODULE 4 **ACCOUSTICS & NANOTECHNOLOGY**		

1	What is the difference between echo and reverberation?	2	May’19 KTU
2	What is magnetostriction effect? Write one application.	2	May’19 KTU
3	A hall has dimensions of 25m X 20m X 8m. The reverberation time is 4s. Determine the average absorption coefficient of the surfaces.	4	May’19 KTU
4	Calculate the capacitance required to produce ultrasonic waves of frequency 1 MHz with an inductance of 1H.	4	May’19 KTU
5	What is inverse piezoelectric effect? With the help of a circuit diagram explain the production of ultrasonic waves using a piezoelectric oscillator.	6	May’19 KTU
6	Define absorption co-efficient of sound .	2	July '16 Dec '18 KTU
7	The volume of a hall is **3000 m^3**. It has a total absorption of **100 m^2 Sabine**. If the hall is filled with audience who add another **80 m^2 Sabine**. Find the difference in reverberation time.	4	Dec '18 KTU
8	What is reverberation and reverberation time? What is its significance? 6Write the factors on which the reverberation time depends. Write Sabine's formula.	6. 4	July '16 KTU, Sep 2020
9	What is piezo electric effect? With a neat circuit diagram explain the working of a Piezoelectric oscillator to produce ultrasonic waves	6	Jan '16 KTU, Sep 2020
10	What are the factors affecting acoustics of a building? Give remedies	6	Jan '16 \July’17 KTU
11	Define intensity of sound wave. Write the expression for the SIL in dB scale. Distinguish between threshold minimum intensity and threshold pain intensity	6	May’19 , May'16 KTU
12	What are NDT and SONAR? How ultrasonic waves is used in it?	6	Dec '16 KTU
13	What is Magnetostriction effect? What are ultrasonic waves? Write the principal of production of ultrasonic waves by Magnetostriction effect. Draw the circuit diagram of the Magnetostriction oscillator. Write any two application of ultrasonic waves	4	May'16 KTU
14	Name and explain two methods for the detection of ultrasonic waves. Name any four medical applications of ultrasonic waves	6	July '16KTU Sep 2020
15	Calculate the frequency of ultrasonic waves that can be generated by a nickel rod of length 4cm. (Young's modulus of nickel = 207 GPa and density of nickel 8900 kg/m3). .	4	July '16KTU

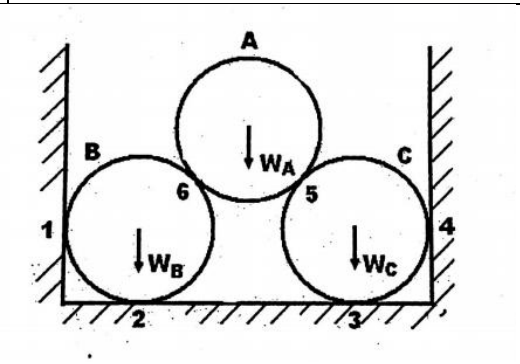
	MODULE 5 **LASER & FIBRE OPTICS**		
1	What are the advantages of semiconductor laser?	2	May'19 KTU
2	What is photovoltaic effect?	2	May'19 KTU
3	Compare photographs and holograms.	4	May'19 KTU
4	With a block diagram, explain the working of an optical communication system.	4	May'19 KTU
5	Explain construction and working of Ruby laser.	6	May'19 KTU
6	Explain the principle of OFC. Distinguish between step index and graded index fibers. Give any two advantages of optical fibres.	6	May'19 KTU
7	What is popul**ation** inversion? How can be achieved? Hint: Explanation of optical pumping using Xenon flash lamp in Ruby laser	2	Aug '16 KTU Sep 2020
8	What is the difference between spontaneous emission and stimulated emission?	2	Jan '16 Dec '18 KTU
9	What is a laser? What are the three requisites for laser action to take place? Hint: Laser expansion or explanation. Name three requisites-metastable state ,population inversion, stimulated emission, optical amplification Or three components—pumping system, lasing medium, optical resonator	2	Jan'17 KTU
10	What is holograpy? How is it different from that of photography? Draw the diagrams illustrating the recording and reconstruction of a hologram.	6	Jan '17 KTU
11	Outline the principle and working of Ruby laser	6	Jan '16 KTU
12	With a neat figure and energy level diagrams, explain the construction and working of He-Ne laser .	6	Dec '18 KTU
13	What is an LED? Give its working principle. Hint: Fig, Explanation, Working with the concept of direct bang gap semiconductor.	2	Jan '16 Dec'18 KTU Sep 2020

14	Name the principle behind the propagation of light through an optic fibre. How the essential conditions for this phenomenon is satisfied in optic fibres. List three advantages of fibre optic communication.	4	Aug '16 KTU Sep 2020
15	What are fibre optic sensors? Name two different types.	2	July '16 KTU
16	Define numerical aperture of an optical fibre and derive an expression for NA of a step index fibre. Any four applications of optical fibre	6	Jan '16 Dec '18 KTU Sep 2020

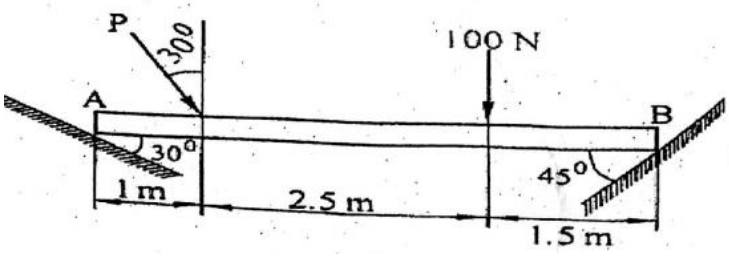
EST100 - ENGINEERING MECHANICS

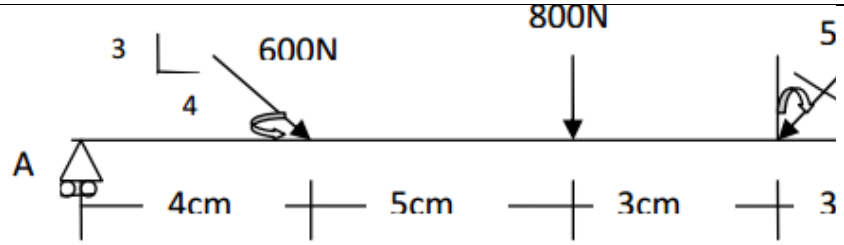
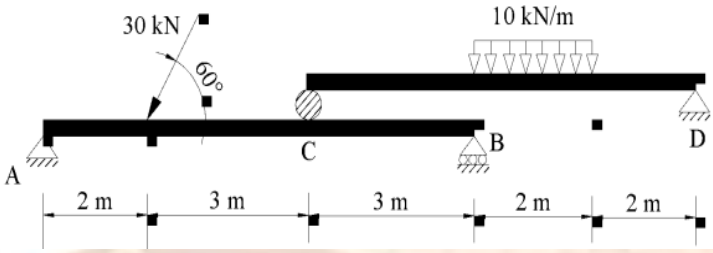
MODULE 1

1	Explain the laws of mechanics	3 marks	KTU 2017
2	State and prove Varignon's theorem of moments.	3 marks	KTU 2018
3	Calculate the amount of work done when the point of application is shifted from the point P, 2i- 6j- 3k to the point Q, 4i+3j-k by the application of a force F = 5i +2j +7k. (5) 3 With the help of sketches, explain how forces involved in the lifting of a load by a wedge are analysed	14 marks	KTU 2018
4	Explain the concept of free body diagram with figures	3 marks	KTU 2018
5	State Pappus Guldinus theorem.	3 marks	
6	Determine the volume of a body generated by rotation of a semi-circular area about a non- intersecting axis using this theorem	14 marks	
7	The greatest and least resultants of two forces F1 and F2 are 17N and 3N respectively. Determine the angle between them when their resultant is 149 N?	14 marks	KTU 2018
8	ABCD is a square , each side being 20cm and E is the middle point of AB. Forces of magnitude 7,8,12,5,9 and 6 kN act on lines of directions AB, EC, BC, BD, CA and DE respectively. Find the magnitude and direction of resultant force.	14 marks	KTU 2018
9	State and explain the principle of transmissibility of forces with figure?	14 marks	KTU 2018
10	3 cylinders of weight 300N (A), 200N (for B and C)are placed on a rectangular channel as shown in fig. Determine the reactions at 1, 2 and 4?	14 marks	KTU 2018



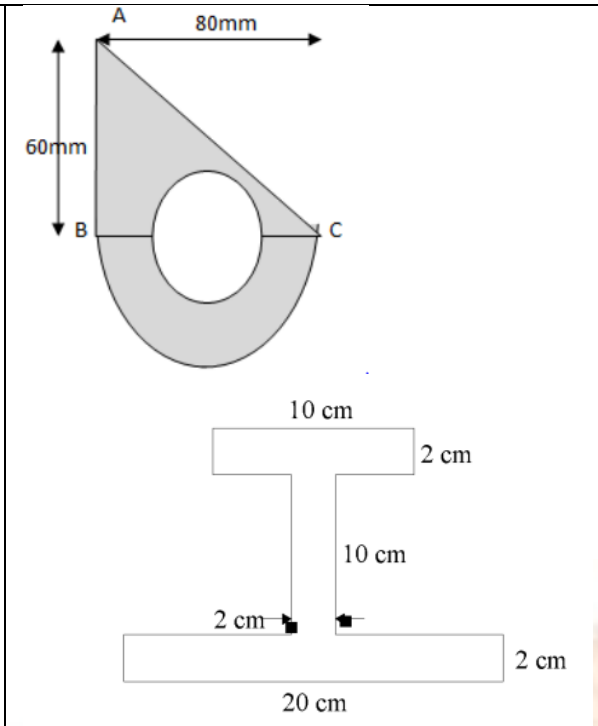
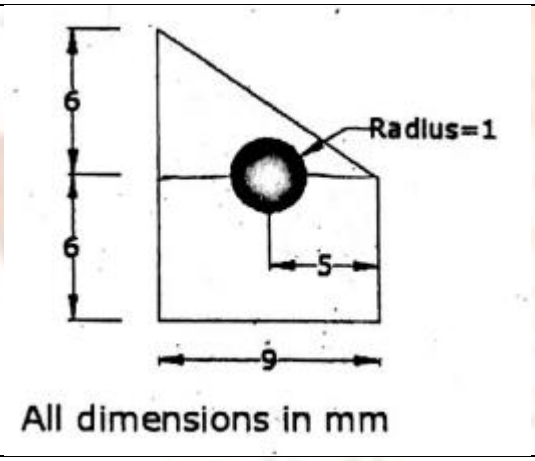
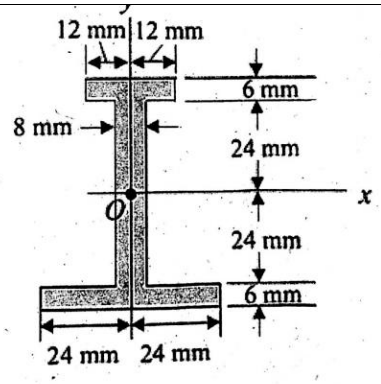
MODULE 2

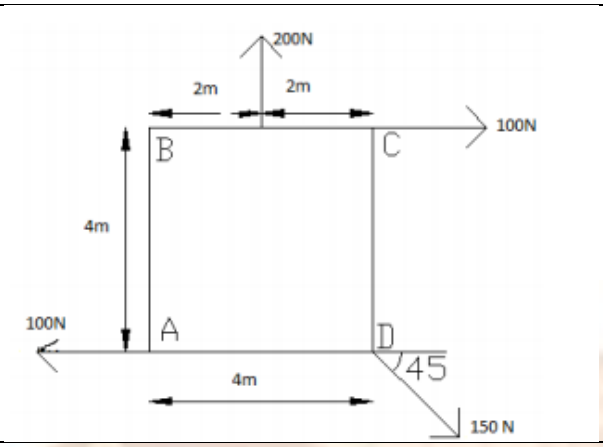
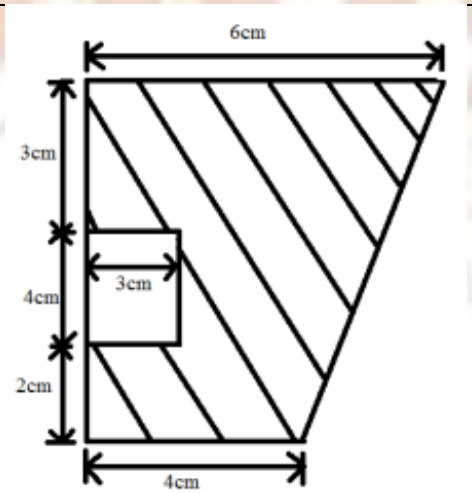
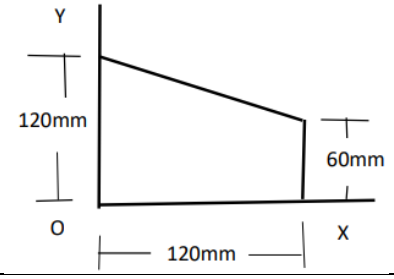
1	Define angle of friction and angle of repose. Establish the relationship between angle of friction and coefficient of friction?	3 marks	KTU DEC 2018
2	Distinguish between (i) Static and kinetic frictions,(ii) Sliding friction and rolling friction	3 marks	KTU DEC 2018
3	Distinguish static and dynamic friction	3 marks	KTU DEC 2018
4	A simply supported beam AB of span 5 m is carrying point loads 5kN, 3kN and 2kN at 1m, 3m and 4m respectively from support A. Calculate the support reaction at B.	3 marks	KTU DEC 2018
5	A lift has an upward acceleration of 1.2 m/s2 . What force will a man weighing 750 N exert on the floor of the lift? What force would he exert if the lift had an acceleration of 1.2 m/s2 downwards?	14 marks	KTU MAY 2018
6	write short notes on		
	Types of beams		
	Types of loads		
	Types of supports	14 marks	KTU 2018
7		14 marks	KTU 2018
	Determine the load P and support reactions?		
8	Determine the support reactions at A and B?	14 marks	KTU 2018

			
9	Determine the support reactions?	14 marks	KTU 2018
			
10	A ladder 5 m long and weighing 260 N is placed against a vertical wall at an inclination of $30^0$with wall. A man weighing 780 N climbs the ladder. When he is at a distance of 1.64 m along the ladder from lower end, the ladder slips, What is the coefficient of friction assuming it to be same for all contact surfaces?	14 marks)	KTU DEC 2017

MODULE 3

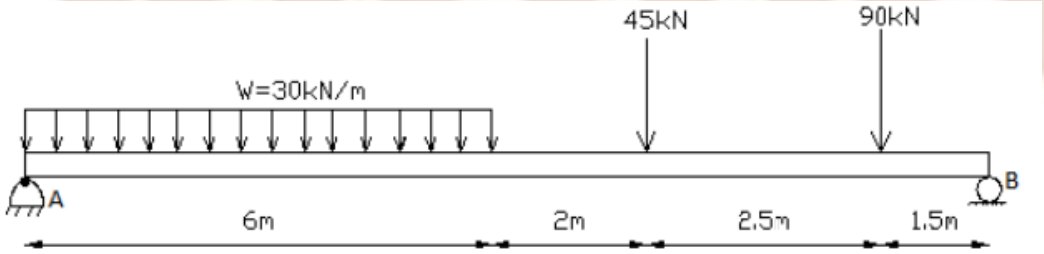
1	State and prove pappus guldinus theorem?	3 marks	KTU 2018
2	Write a note on moment of inertia	3 marks	KTU 2018
3	Write a note on parallel axis theorom	3 marks	KTU 2018
4	Write a note on perpendicular axis theorem	3 marks	KTU 2018
5	Calculate the centroid of given areas?	14 marks	KTU 2018

			
			KTU 2018
6	Determine the moment of inertia of given section	14 marks	KTU 2018
			
7	A solid cylinder 30mm diameter and weighing 30N is placed in a triangular channel, as shown in fig. Neglecting friction between the contact surfaces, calculate the normal reactions on the sides of the		

	channel		
8	Explain principal moment of inertia, principal axis?	3 marks	KTU 2018
9	State and prove parallel axis theorem?	3 marks	KTU 2018
10	For the system of forces, determine the magnitude,direction and position of the resultant force about A.		KTU 2019
		14 marks	KTU 2019
11	a) Define principal axes and principal moment of inertia. b) Determine the centroid of the shaded area. Also find moment of inertia of the shaded area about an horizontal axis passing through the centroid.	14 marks	KTU 2019
		14 marks	KTU 2019
12	Determine the product of inertia about OX and OY of the trapezium. 	14 marks	KTU 2019

MODULE 4

1. Highlight the principles of mechanics applied in the evaluation of elastic collusion of rigid bodies. 3 marks
2. Explain D'Alembert's principle 3 marks
3. Briefly explain equations of kinematics 3 marks
4. An effort of 200N is required just to move a certain body up an inclined plane of angle 15, the force acting parallel to the plane. If the angle of inclination of the plane is made $20^0$the effort required, again parallel to the plane is found to be 230N. Find the weight of the body and the coefficient of friction. (14 marks) KTU MAY 2017
5. Explain with sketches how the forces involved in the lifting of a load by a wedge are analysed. (14 marks) KTU DEC 2
6. State D'Alemberts principle giving equations expressing the above Principle on the motion of a lift moving upwards with an acceleration 'a' m/sec^{2}carrying a weight of 'W' N (3 marks)
7. Find the reactions at the supports A(hinged) and B (roller). 14 marks KTU Dec 2018



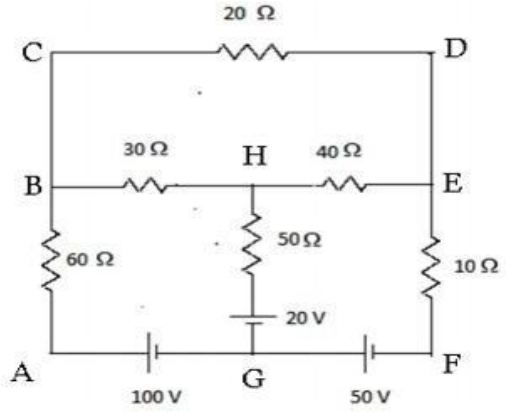
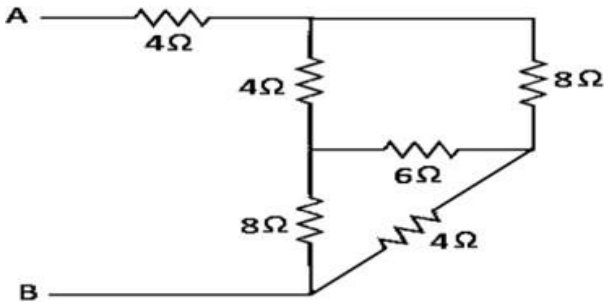
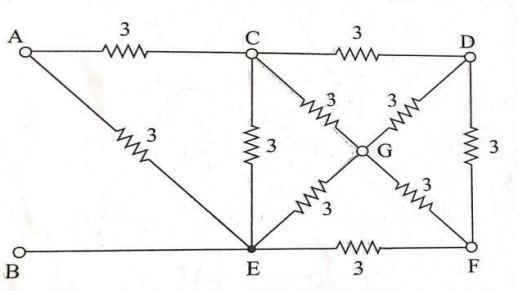
MODULE 5

1. What do you mean by instantaneous centre of rotation? How can it be located for a body moving with combined motion of rotation and translation? (3 marks) KTU MAY 2018
2. Compare damped and undamped free vibrations. 3 marks
3. State the equation of motion of a rotating rigid body, rotating about its fixed axis 3 marks
4. Illustrate the significance of instantaneous centre in the analysis of rigid body undergoing rotational motion. 3 marks KTU MAY 2018

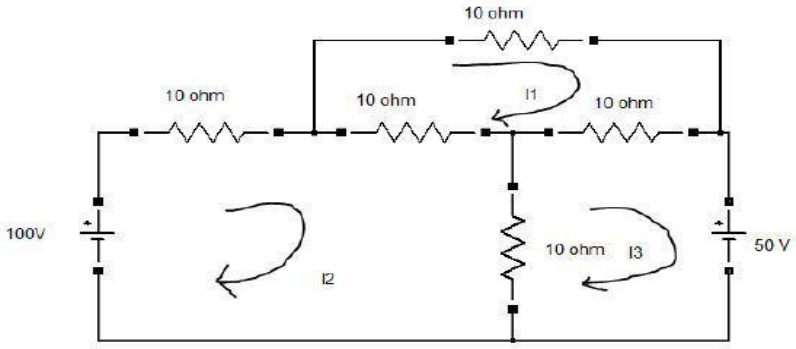
5. An elevator weigh 500N is ascending with an acceleration of 3 m/s2.During this ascend its operator whose weight is 700N is standing on the floor. What will be the reaction produced by the floor on the operator, what will be the total tension in the cable on the elevator (14 marks) KTU DEC 2017
6. Define simple harmonic motion? Derive an expression for the acceleration of particle executing simple harmonic motion. 14 marks KTU MAY 2018
7. Distinguish between SHM and periodic motion? (3 marks) KTU DEC 2018
8. Explain the types of vibrations (3 marks) KTU DEC 2018
9. Discuss – (a) amplitude (b) frequency (c) time period (3 marks) KTU MAY 2018
10. A body performing simple harmonic motion completes 8 oscillations in one minute. The velocity of the body is half the maximum velocity at a distance of 12 cm from the centre. Determine the amplitude and maximum acceleration. (14 marks) KTU MAY 2017
11. A particle has simple harmonic motion. Its maximum velocity was 6 m/s and the maximum acceleration was found to be 12 m/s^2. Determine the angular velocity and amplitude. Also determine its velocity and acceleration when displacement is half of the amplitude. (14 marks) KTU MAY 2017
12. The strength of a spring is such that a load of 50 N is required to elongate it by 10mm. When a certain load W is suspended from one end and caused to perform SHM, the complete oscillations per minute is 100. Calculate the stiffness of the spring and the value of load W (14 marks) KTU MAY 2017
13. A clock provided with a seconds pendulum is gaining 160 seconds a day. Find by how much the length of the pendulum should be increased so as to correct the clock. If it is running at correct time at a place where acceleration due to gravity is 9.81 m/s2 , find by how much the clock will lose or gain if it is taken to a place where the acceleration due to gravity is 9.79m/s2 . 14 marks KTU MAY 2019

BASICS OF ELECTRICAL ENGINEERING (EST130 PART-1)

MODULE-I

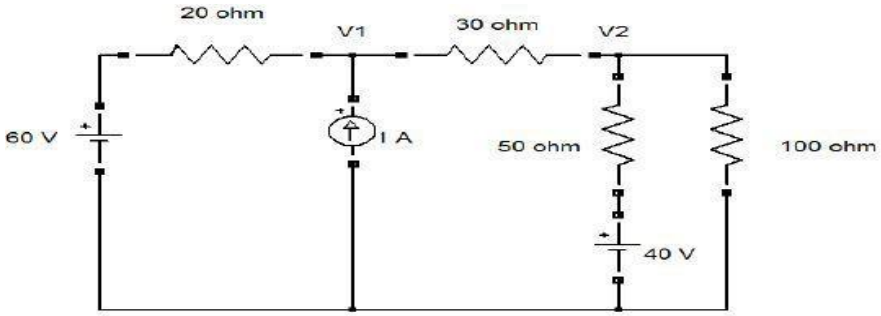
1	State and explain Kirchhoff's laws with examples	4	KTU-DEC 2019
2	Calculate the current in each branch of the following circuit using mesh analysis? 	10	KTU-DEC 2019
3	Using star-delta transformation, determine the equivalent resistance R_{AB} 	10	KTU-DEC 2019
4	Calculate equivalent resistance across B and A 	4	KTU-MAY 2016
5	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

6 Find mesh currents in the figure shown by mesh analysis



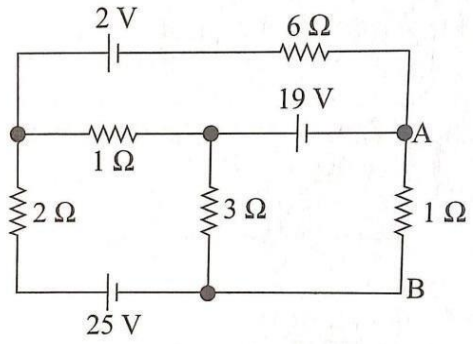
10 KTU-MAY 2017

7 Find current in 100 ohm resistor using node analysis



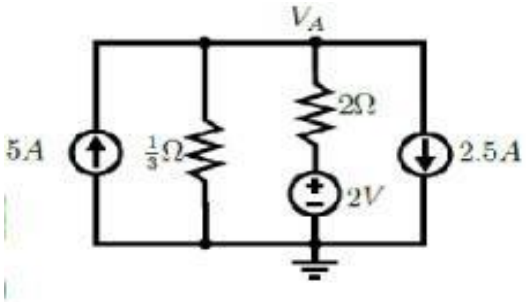
10 KTU-DEC-2018

8 By applying Kirchhoff's laws calculate current flowing through the 6Ω resistor in the network shown



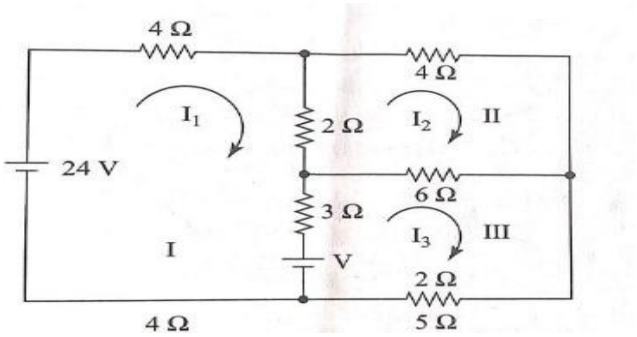
10 KTU-DEC-2016

9 From the figure use node voltage analysis to find voltage V_A



10 KTU-MAY 2016

10 A network with three meshes are shown. Apply mesh current method to determine the value of unknown voltage V, for which mesh current I_1=0.



10 KTU-MAY 2016

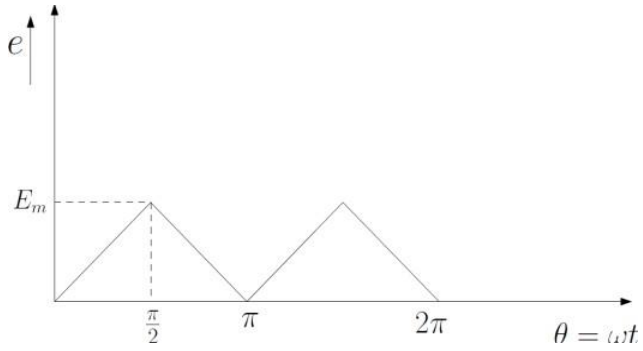
MODULE-II

1 Define the terms i) mmf ii) magnetic field strength iii) magnetic flux and iv) magnetic flux density. 4 KTU-DEC 2019

2 State and explain i) Faraday's laws and ii) Lenz's law. 4 KTU-DEC 2019

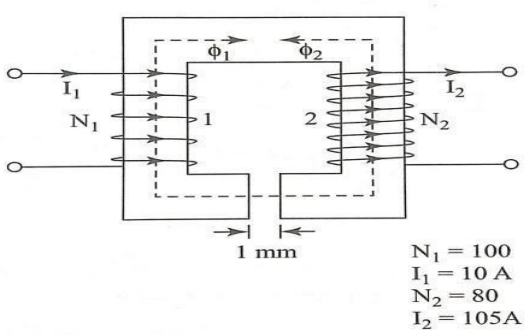
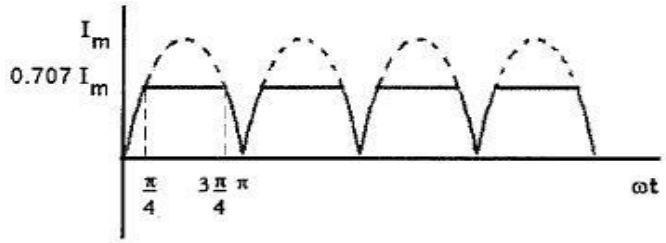
3 An alternating current varying sinusoidally with a frequency of 50Hz has an rms value of 20A.
i) Write down the equation for the instantaneous current
ii) Find the instantaneous value of current at 0.0025s.
iii) Find the instantaneous value of current 0.125s after passing through a positive maximum value
iv) At what time, measured from a positive maximum value, will the instantaneous current be 14.14 A? 10 KTU-DEC 2019

4 Determine the average and rms values of the triangular voltage wave having maximum value Em volt as shown in figure.



10 KTU-DEC 2019

5 Compare electric and magnetic circuits 4 KTU-DEC 2018

6	Calculate the flux produced in the air gap in the magnetic circuit shown infigure which is excited by the MMF of two windings. The mean length of theflux path is 40 cm. The permeability of iron is 2000. The uniform cross sectional area is 10 cm² 	4	KTU-DEC 2016
7	Draw the circuit of a series parallel magnetic circuit. Show its electrical equivalent	4	KTU-DEC 2016
8	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
9	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) magnetomotive force ii) magnetic flux density in air gap iii) magneticflux iv) relative permeability of steel ring. Assume that iron path takes about 40% of the total mmf.	10	KTU-MAY 2019
10	Determine the RMS, Average and Form Factor of the waveform shown below 	10	KTU-DEC 2018

MODULE-III

1	Explain the advantage of three phase system of power supply compared to single phase system of power supply	4	KTU-DEC 2019
2	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
3	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
4	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

5	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 iii. Calculate the power consumed in the circuit	4	KTU-MAY 2019
6	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 areconnected in (i) star (ii) delta	10	KTU-MAY 2019
7	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
8	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
9	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
10	An alternating voltage is defined as v=100 sin α 0<α<π v=0V π<α<2π What is the RMS value of this voltage	4	KTU-DEC 2017

BASICS OF ELECTRONICS ENGINEERING (EST 130 PART-2) QUESTION BANK			
Qn. No	**MODULE - 4**	**Marks**	**Year**
1.	What are the different types of capacitors? Give any two applications of capacitors.	4	KTU-DEC 2019
2.	Describe the forward characteristics of a diode?	4	KTU-DEC 2019
3.	Explain the working of an NPN transistor. Describe with suitable sketches the input-output characteristics of an NPN transistor.	10	KTU-DEC 2019
4.	a) Explain the formation of a potential barrier in a P-N junction diode. b) What do you understand by Avalanche breakdown? Draw and explain the reverse V-I characteristics of a diode.	4 6	KTU-DEC 2019
5.	What are passive components? Mention at least three components with symbol.	4	KTU-DEC 2019
6.	Explain the different types of variable resistors? Mention their applications.	5	KTU-DEC 2018
7.	Write down the color code for a given resistor of 47-Kilo-ohms with a tolerance of 10%.	4	KTU-DEC 2018
8.	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
9.	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	Model question 2019
10.	What is meant by avalanche breakdown?	4	Model question 2019

Qn. No	MODULE - 5	Marks	Year
1.	Draw the block diagram of a public address system and write the role of each block.	4	KTU-DEC 2019
2.	Explain the working of a bridge rectifier	4	KTU-DEC 2019
3.	a) What is the need of biasing? Draw the potential divider biasing circuit? b) Explain the working of a simple Zener voltage regulator	4 6	KTU-DEC 2019
4.	a) Draw the circuit diagram of an RC coupled amplifier and explain its frequency response. b) Narrate how capacitor filter eliminate ripples from the output of a rectifier.	4 6	KTU-DEC 2019
5.	Explain the working of Zener voltage regulator with a neat diagram.	5	KTU-DEC 2018
6.	With necessary diagrams, explain the working of a full wave bridge rectifier.	5	KTU-DEC 2018
7.	Draw the block diagram of a DC power supply and mention the functions of each block.	5	KTU-DEC 2017
8.	Discuss the role of coupling and bypass capacitors in a single stage RC coupled amplifier.	4	Model question 2019
9.	a) With a neat circuit diagram, explain the working of an RC coupled amplifier. b) Draw the frequency response characteristics of an RC coupled amplifier and state the reasons for the reduction of gain at lower and higher frequencies.	6 4	Model question 2019
10.	a) With the help of block diagram, explain how an electronic instrumentation system. b) Explain the principle of an antenna.	6 4	Model question 2019

Qn. No	MODULE - 6	Marks	Year
1.	Explain the concept of cells in cellular communication	4	KTU-DEC 2019
2.	a) 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 modulation index. b) Explain the block diagram of super heterodyne receiver.	5 5	KTU-DEC 2019
3.	a) Describe the principle of an antenna. b) With necessary block diagram explain the working of a GSM system	3 7	KTU-DEC 2019
5.	Compare AM and FM.	5	KTU-DEC 2019
6.	Draw and explain functional block diagram of cellular communication system.	10	KTU-DEC 2018
7.	Write the principle of frequency modulation and list the advantages of FM over AM.	5	KTU-DEC 2017
8.	a) With the help of a block diagram, explain the working of Super hetrodyne receiver. b) Explain the importance of antenna in a communication system.	6 4	Model question 2019
9.	a) With neat sketches explain a cellular communication system. b) Explain GSM communication with the help of a block diagram.	5 5	Model question 2019
10.	Differentiate AM and FM communication systems.	4	Model question 2019

LIFE SKILLS (HUT 101)

MODULE 1

Sl. No	Questions	Marks	KTU (Month/Year)
1	What do you mean by communication? What are the different types of Barriers to communication?	6	DEC,2016
2	Briefly mention different Levels of communication?	5	January,2017
3	Explain the Flow of communication and represent it diagrammatically?	5	KTU,july,2017
4	What are the different types of Communication Networks?	6	KTU,Dec,2019
5	Differences between Group Discussion & Debate	5	KTU,Apr,2019
6	Compose an e-mail to your friend	6	KTU,May,2018
7	Prepare your Resume	6	KTU,May,2018
8	Letter Writing- Formal & Informal	6	KTU,May,2016
9	Differences between Literary writing & Technical writing	5	KTU,DEC,2016
10	Methods to ensure success in GD	5	KTU,DEC 2018
11	Types of Report	4	KTU,Apr,2019
12	Multiple Intelligence	2	KTU,Apr,2019

MODULE 2

1	Different types of Thinking Hats	5	KTU,DEC2019
2	Differences between Lateral Thinking & Vertical Thinking	5	KTU,DEC,2019
3	Differences between Creative Thinking & Critical Thinking	4	KTU,Apr 2019
4	Differences between Creativity & Innovation	3	KTU,May 2016
5	Define : Kinesics, Proxemics, Chronemics	3	KTU, Jan 2017

6	Interpreting body language cues	3	KTU,july 2017
7	Discuss the steps in Problem Solving	5	KTU, April 2019
8	Differences between Convergent thinking & Divergent Thinking	3	KTU, July 2017
9	Myths of Creativity	5	KTU, July 2017
10	What are the different functions of Left Brain & Right Brain?	4	KTU, Dec,2016

MODULE 3

1	Differences between Group & Team	5	KTU, May 2018
2	Techniques of Group Dynamics	6	KTU, July 2017
3	Different types of Group	3	KTU, May 2018
4	Piaget's Theory of Moral Development	6	KTU, Jan 2017
5	Different steps in Group Problem Solving	6	KTU, April 2019
6	Different types of Team	3	KTU May,2018
7	What do you mean by Brain Storming?	4	KTU,Dec,2016
8	What is Mind Mapping & diagrammatically represent it	6	KTU, Jan 2017
9	What are the means to enhance productivity?	5	KTU, Dec 2016
10	Kohlberg's Theory	6	KTU, May 2018
11	Gilligan's Theory	4	KTU April 2019

MODULE 4

1	What do you mean by Moral Realism?	3	KTU, May,2016
2	What is Moral Absolutism?	3	KTU, Dec 2019
3	What is the importance of Professional Ehics?	5	KTU, Jan 2017
4	Explain Engineering as Experimentation	3	KTU, Dec 2019
5	Briefly mention Code of ethics	6	KTU, Dec 2019
6	What is the relevance of Environmental ethics with regard to Engineering?	6	KTU, Dec 2018

7	What is computer code of ethics	4	KTU, DEC2016
8	Mention IEEE and ME code of ethics	3	KTU,May 2016
9	What do you mean by Empathy, Integrity & sharing?	4	KTU, Dec 2018
10	Case Study	20	KTU(All Sem)

MODULE 5

1	What do you mean by Leadership & what are its different traits?	5	KTU July 2017
2	Explain VUCA Leadership	3	KTU Apr,2019
3	What are the different Levels of Leaderships?	6	KTU Dec 2019
4	Explain the term making of a leader	3	KTU Dec 2018
5	Differences between Transactional leader & Transformational leader?	5	KTU May 2018
6	What are the different types of Leadership?	6	KTU May,2018
7	Differences between Manager & Leader	4	KTU May,2016
8	Differences between Coaching & Teaching	3	KTU Dec 2016
9	What do you mean by DART Leadership?	3	KTU May 2016
10	What are the different levels of Leadership?	6	KTU Dec 2018
11	Leadership Grid	2	KTU Apr 2019
12	VUCA Leadership	2	KTU, Dec 2019