VIDYA ACADEMY OF SCIENCE & TECHNOLOGY - TECHNICAL CAMPUS

Malakkal P.O, Kilimanoor, Thiruvananthapuram – 695 602

(Accredited by NAAC with 'B++' Grade)

DEPARTMENT OF CIVIL ENGINEERING

S2 - Question Bank

Question Bank

Subject: VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS

<table>
<tr><th colspan="4">Module 1</th></tr>
<tr><th>Sl. No</th><th>Questions</th><th>Marks</th><th>KU/KTU</th></tr>
<tr>
<td>1</td>
<td>Find the parametric equation of the tangent vector of the curve $r(t) = t\,2\,\hat{\imath} + 2t\,3\,\hat{\jmath} + 3\hat{t}k$ at $t = 1$.</td>
<td>3</td>
<td>KTU JUNE 2023</td>
</tr>
<tr>
<td>2</td>
<td>Find the directional derivative of $f(x, y) = xe^y$ at $(1,1)$ in the direction of the vector $\hat{\imath} - \hat{\jmath}$</td>
<td>3</td>
<td>KTU JUNE 2023</td>
</tr>
<tr>
<td>3</td>
<td>Show that $F = (cosy + y\,cosx)\hat{\imath} + (sinx - xsiny)\hat{\jmath}$ is a conservative vector field. Hence find a potential function for It?</td>
<td>7</td>
<td>KTU Apr-2018 & Dec-2017, jun 2023</td>
</tr>
<tr>
<td>4</td>
<td>Find the divergence and curl of the vector field $f(x, y, z) = yz\vec{\imath} + xy^2\vec{\jmath} + yz^2\vec{k}$</td>
<td>7</td>
<td>KTU JUN 2023 ,KTU Dec-2017</td>
</tr>
<tr>
<td>5</td>
<td>Show that $\int (3x\,2e\,ydx + x\,3e\,ydy)\,c$ is independent of the path and hence evaluate the integral from $(0,0)$ to $(3,2)$.</td>
<td>3</td>
<td>KTU Jun 2023</td>
</tr>
<tr>
<td>6</td>
<td>Show that the integral $\int_{)1,1)}^{(3,3)} (e^x logy - \frac{e^y}{x})dx + \left(\frac{e^x}{y} - e^y logx\right) dy$

Where x and y are positive, is independent of path and find its value.</td>
<td>5</td>
<td>KTU Dec-20117</td>
</tr>
<tr>
<td>7</td>
<td>If $\vec{r} = x\vec{\imath} + y\vec{\jmath} + z\vec{k}$ and $r = |\vec{r}|$, then show that $\nabla f(r) = \frac{f'(r)}{r}\vec{r}$.</td>
<td>5</td>
<td>KTU Dec-2017</td>
</tr>
<tr>
<td>8</td>
<td>Prove that the force field F= e^yi+ x $e^y j$ is conservative in the entire xy- plane</td>
<td>7</td>
<td>KTU Model question</td>
</tr>
<tr>
<td>9</td>
<td>Find the work done by the Force field $F(x, y, z) = xy\vec{\imath} + yz\vec{\jmath} + xz\vec{k}$ along C where C is the curve $r(t) = t\vec{\imath} + t^2\vec{\jmath} + t^3\vec{k}$</td>
<td>7</td>
<td>KTU Model Question</td>
</tr>
<tr>
<td>10</td>
<td>Show that $f(x, y) = (cosy + ycosx)\vec{\imath} + (sinx - xsiny)\vec{\jmath}$ is a conservative vector field. Hence find the scalar potential for it.</td>
<td>5</td>
<td>KTU Dec-2017</td>
</tr>
<tr>
<td>11</td>
<td>Find the directional derivative of $f(x, y) = x^2 = 3xy + y^2$

at the point $P(2,1)$ in the direction of $\vec{a} = \frac{1}{3}\vec{\imath} + \frac{2}{3}\vec{\jmath}$</td>
<td>3</td>
<td>KTU-June 2022</td>
</tr>
</table>

12	Evaluate $\int 3xy\, dy$ over the line segment C joining (0,0) and (1,	3	KTU-June 2022
13	a)Find the parametric equation of the tangent to the curve $\vec{r}(t) = 2\cos\pi t\,\vec{\imath} + 2\sin\pi t\,\vec{\jmath} + 6t\vec{k}$ at $t = \dfrac{1}{3}$ b) Show that the vector field $\vec{f}(x,y) = 2xy^3\vec{\imath} + 3y^2x^2\vec{\jmath}$ is conservative and find ϕ such that $\vec{f} = \nabla\phi$. Hence evaluate $\int\limits_{(2,-2)}^{(-2,0)} 2xy^3 dx + 3y^2x^2 dy$	7 7	KTU-June 2022
14	a. Find the position and velocity vectors of the particle, given $\vec{a}(t) = (t+1)^{-2}\vec{\jmath} + e^{-2t}\vec{k}$, $\vec{v}(0) = 3\vec{\imath} - \vec{\jmath}, \vec{r}(0) = \vec{k}$ b. If $\vec{r} = x\vec{\imath} + y\vec{\jmath} + z\vec{k}$, 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 Green's theorem, evaluate the line integral $\int (xy + y\,2)\,c\,dx + x\,2dy$ where C is bounded by $y = x$ and $y = x\,2$ and positively oriented	5	KTU June 2023,Apr-2018
2	If σ is any closed surface enclosing a volume V and $F = x\vec{\imath} + 2y\vec{\jmath} + 3z\vec{k}$, 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	Evaluate the surface integral $\iint z^2 \sigma\, dS$, where σ is the portion of the cone $z = \sqrt{x^2 + y^2}$ between the planes z=1 and z=3.	7	KTU JUNE 2023
5	Using Greens theorem evaluate $\int_C (xy + y^2)dx + x^2 dy$, where C is the boundary of the common to the curve $y = x^2$ and $= x$.	7	KTU Apr-2018
6	Using stokes theorem evaluate $\int_C f \cdot dr$ where $F = xz\, i + 4x^2y^2 j + xy\, k$, C is the rectangle $0 \le x \le 1, 0 \le y \le 3$ in the plane $z = y$.	7	KTU JUNE 2023,KTU DEC-2017
7	Determine whether the vector fields are free of sources and sinks, If it is not locate them. (i)$(y + z)i - xz^3 j + x^2 \sin y\, k$ (ii)$xy\, i - 2xyj + y^2\, k$	5	KTU Dec-2017
8	Evaluate the surface integral $\iint_\sigma xz\,ds$, 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 $\iint_S F \cdot n ds$ where $F = (x^2 + y)i + z^2 j + (e^y - z)k$ and S is the surface of the rectangular solid bounded by the co-ordinate planes $x = 3,\ y = 1,\ z = 3$	5	KTU Apr-2018
10	Use stokes theorem to evaluate the integral $\int_C F \cdot dr$ where $\vec{F} = (x^2 - y^2)\vec{i} + 2xy\vec{j}$ and C is the rectangle in the xy- plane bounded by the lines $x = 0$, $y = 0$, $x = a$ and $y = b$.	5	KTU Apr-2018
11	Find the circulation of $F = (x - z)i + (y - x)j + (z - xy)k$ using Stokes theorem around the triangle with the vertices A(1,0,0),B(0,1,0) and C(0,0,1).	7	KTU MODEL QUESTION
12	Use divergence theorem to find the out ward flux of the vector field $F = 2xi + 3yj + z^3 k$ 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	3	KTU-June 2022

	$\vec{f}(x,y) = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$		
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 $\vec{f}(x,y) = xy\vec{i} + \left(\dfrac{x^2}{2} + xy\right)\vec{j}$ 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 loo down the positive Z axis	7 7	KTU-June 2022

	Module 3		
1	Determine whether the vector field $F = 4(x^3 - x)\hat{\imath} + 4(y^3 - y)\hat{\jmath} + 4(z^3 - z)\hat{k}$ is free of sources and sinks. If not locate them. (3	3	KTU june 2023
2	Show that the functions x, $x\,lnx$ are linearly independent.	3	KTU june 2023
3	Discuss the existence and uniqueness of solution of initial value problem $\frac{dy}{dx} = \frac{y}{\sqrt{x}}$, $y(1) = 3$	3	KTU JUNE 2023
4	Prove that $y_1(x) = e^x$ and $y_2(x) = e^{4x}$ form a fundamental system (basis) for the differential equation $y'' - 5y' + 4y = 0$. Can $5e^x - 2e^{4x}$ be a solution (do not use verification code) of the differential equation ?Explain.	5	KTU JULY-2018
5	Discuss the existence and uniqueness of solution of the initial value problem $\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$ in the rectangle $|x| \le 1, |y - 1| \le 1$.	6	KTU JULY-2018
6	If $y_1(x) = x$ is a solution of $x^2 y'' + 2xy' - 2y = 0$, fInd the general solution.	5	KTU JULY-2018
7	Examine whether e^{2x}, e^{3x} are linearly independent solutions of the differential equation $\frac{d^2 y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$ in $-\infty < x < \infty$,What is its general solution?	3	KTU MAY-2017
8	Solve the Cauchy -Euler differential equation $(x^2 D^2 - 3xD + 10)y = 0$	3	KTU MAY-2017
9	Solve $(D^3 + 8)y = sinx\ cosx + e^{-2x}$	6	KTU MAY-2017
10	Solve y"+y= $sec\ x$ by the method of variation of parameters	7	KTU JUNE 2023, KTU MODEL QUESTION
11	Solve $y''+4y'+4y= x^2 + e^{-x}cosx$	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 JUNE 2023,KTU-Dec 2018
2	Find the Laplace transform of i)sin $^2 t$ ii) $\cos(\omega t + \theta)$	3,7	KTU june 2023,KTU-Dec 2018
3	Solve the initial value problem $y'' - y' - 6y = 0, y(0) = 6,\ y'(0) =$ 13 using Laplace transforms.	7	KTU-March 2017
4	Using Laplace transform solve $y '' + 5y ' + 6y = e\ -2t$ given that $y(0) = y ' (0) = 1$	7	KTU JUNE 2023
5	Find the Inverse Laplace Transform of: $(i)\ \frac{S-4}{S^2-4}$ $(ii)\ \frac{4}{S^2-2s-3}$	8	KTU JUNE 2023,KTU- April 2018
6	Find the Laplace Transform of : $(i)\ sin3tcos2t$ $(ii)\ e^{-2t}cos^2t$	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$tcost$ (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	7	KTU-June 2022
	b) Using convolution theorem find the Inverse Laplace Transform of $\frac{s^2}{(s^2+a^2)(s^2+a^2)}$	7	
15	a)Find the inverse Laplace Transform of $\frac{s+8}{(s^2+4s+5)}$	7	KTU-June 2022
	b) Using Laplace Transform solve y''+16y=$4\delta(t-3\pi)$, $y(0) = 2$, y'(0)=0	7	

Module 5

1	Determine the Fourier sine Transform of $f(x) = 3x, 0 < x < 6$.	3	KTU JUNE 2023
2	Find the complex Fourier sine transform of $f(x) = \begin{cases} sinx, 0 < x < \pi \\ 0, \quad x > \pi \end{cases}$	7	KTU JUNE 2023
3	Find the Fourier transform and integral representation of $f(x) = \begin{cases} 1 & , if \ |x| < 1 \\ 0, \ otherwise \end{cases}$ Hence show that $\int_0^\infty \frac{sin \ w}{w} = \pi/2$	7	KTU june 2023
4	Use Fourier integral to show that $\int_0^\infty \frac{cosx\omega+\omega sinx\omega}{1+\omega^2} \ d\omega = \begin{cases} 0 \ if \ x < 0 \\ \frac{\pi}{2} if \ x = 0 \\ \pi e^{-x} \ if x > 0 \end{cases}$	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 sine integral of $f(x) = sinx \ if \ 0 < x < \pi$	3	KTU JUNE 2023
7	Express f(x) = 1, 0 < x <π 0, x > π, 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)=$e^{-|x|}$. 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< π.	7 3	KTU-April 2018, KTU-June 2022
10		8	KTU-July 2017

	Using Fourier integral representation show that $\int_0^\infty \frac{\sin\omega - \omega\cos\omega}{\omega^2} =$ $\begin{cases} \frac{\pi x}{2}, & if\ 0 < x < 1 \\ \frac{\pi}{4}, & if\ x = 1 \\ 0, & if\ x > 1 \end{cases}$		
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)=$\begin{cases} e^x, if - a < x < a \\ 0, otherwise \end{cases}$	7	KTU-June 2022
	b))Find the Fourier cosine Integral of f(x)=$\begin{cases} cosx, if 0 < x < \frac{\pi}{2} \\ 0, otherwise \end{cases}$	7	
15	a)Find the Fourier cosine transformation of f(x)=$\begin{cases} x^2, if 0 < x < 1 \\ 0, x > 1 \end{cases}$	7	KTU JUNE 2023,KTU-June 2022
	b))Find the Fourier transform of f(x)=$\begin{cases} a - |x|, if\ |x| < a \\ 0, otherwise \end{cases}$	7	

QUESTION BANK

ENGINEERING CHEMISTRY (CYT 100)

Updated on 10/01/2024

Ms. Anchu E S

AP in Chemistry

Dept. Of Applied Science

COMPILED BY

DEPARTMENT OF APPLIED SCIENCE

VIDYA ACADEMY OF SCIENCE AND TECHNOLOGY TECHNICAL CAMPUS, KILIMANOOR

MODULE I

Sl. No:	Questions	Marks	KTU Year
1.	State & explain Nernst equation ?	(4)	2017
2.	Explain Helmholtz double layer?	(3)	2018
3.	How will you determine the pH of a solution using glass electrode?	(10)	2017, 2019,2024
4.	Explain the construction of Li-Ion cell?	(4)	2021
5.	Explain different types of electrodes?	(10)	2018
6.	Explain potentiometric titration?	(3)	2023
7.	How will you measure the conductivity of a solution ?	(3)	2021
8.	Briefly explain Electroless plating, Advantages	(4)	2020, 2024
9.	Explain the mechanism of electro chemical corrosion?	(10)	2021,2024
10.	What is galvanic series? How is galvanic series advantageous over electrochemical series in corrosion chemistry?	(3)	2022, 2023,2024

MODULE II

Sl. No:	Questions	Marks	KTU Year
1.	State and explain Beer Lamberts law?	(3)	2017
2.	What are different types of electronic transitions are possible in UV-Visible spectroscopy?	(3)	2021
3.	Give the instrumentation, working and applications of UV visible spectroscopy	(4)	2023
4.	Explain the various modes of vibration possible for CO_2 and H_2O, which of them are IR active.	(3)	2018,2023
5.	Write the basic principle of MRI imaging? Explain the process in NMR?	(10)	2018
6.	What is meant by the term Chemical shift in 1H NMR Spectroscopy? Explain the factors affecting it with suitable examples.	(3)	2019, 2021,2024
7.	Explain the origin of spin-spin splitting and draw the splitting pattern in CH_3-CH_2-CH_2-Cl.	(8)	2020
8.	Describe how IR Spectroscopy is used for(i)Determination of functional groups(ii)Determination of force constant(iii)Detection of impurities(iv)Distinguishing intra and inter molecular hydrogen bond	(8)	2020,2024
9.	Draw the molecular orbital energy diagram of (i) Ethene, ii) 1, 3-butadiene iii)1,3,5 hexatriene and iv) benzene to explain their UV-Vis absorption	(8)	2020
10	Explain chemical shift. Discuss any four factors affecting chemical shift with proper examples.	(10)	2023

MODULE III

Sl. No:	Questions	Marks	KTU Year
1.	Explain the principles of column chromatography ?	(10)	2023
2.	Give any three applications of nanomaterials	(3)	2024
3.	Describe the classification of nanomaterials based on dimension.	(8)	2021, 2024
4.	Write note on nano material?	(4)	2019
5.	Write note on sol gel process?	(4)	2017
6.	Briefly explain the principle and characterisation of SEM?	(10)	2023
7.	Distingish between TGA and DTA	(3)	2023, 2024
8	Discuss the principle and procedure in HPLC. Explain how TLC is useful in checking the purity of each fraction.	(8)	2020, 2022, 2024
9	Sketch the Derivative TA graph of Calcium oxalate monohydrate	(6)	2020, 2022, 2024
10	Explain the various chemical methods used for the synthesis of nanomaterials.	(8)	2021

MODULE IV

Sl. No:	Questions	Marks	KTU Year
1.	What are co-polymers? Explain the properties of random, alternating, block and graft polymer?	(10)	2016, 2022
2.	Draw and discuss the structure of polyacetylene and polyaniline	(10)	2022
3.	Discuss the construction, working and advantages of OLED	(10)	2023, 2024
4.	Briefly explain the rules and examples of R and S notation	(3)	2020
5	Draw the conformations of Ethane, give its potential energy-dihedral angle graph	(4)	2024
6	What is meant by stereo isomerism? What are the different types of stereo isomerism in organic molecules? Explain with examples.	(10)	2024
7	Discuss the synthesis of KEVLAR	(4)	2024
8	Explain the classification of conducting polymer.	(8)	2023
9	What is optical isomerism and give the condition for optical activity? Explain with an example. How can we distinguish enantiomers based on physical, chemical and biological properties?	(8)	2021, 2023
10	Write the structure of all possible isomers for C_4H_9Cl. Classify them as optically active or inactive.	(6)	2023

MODULE V

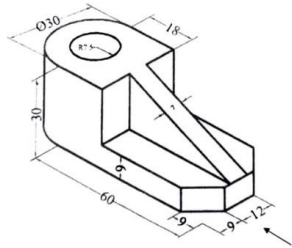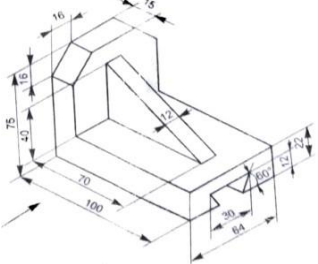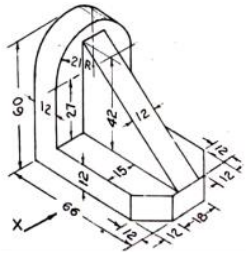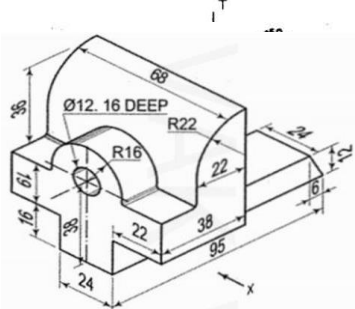| 1	Describe EDTA method for the estimation of hardness?	(4)	2022
2	Distinguish between aerobic and anaerobic oxidation	(6)	2019 2024
3	Explain reverse osmosis process?	(3)	2023,2018
4	Explain with flow chart, how water is purified for drinking purposes?	(10)	2021
5	Explain the process chlorination and break point of chlorination	(3)	2017
6	Explain BOD & COD?	(4)	2017,2021, 2024
7	Write a note on aerobic & anaerobic waste water treatment	(10)	2020
8	Discuss the procedure for the determination of DO in water.	(6)	2020, 2024
9	Explain the ion exchange process in water treatment. How is the exhausted resin regenerated?	(6)	2023, 2024
10	Explain primary, secondary and tertiary process involved in sewage water treatment with the help of flow diagram .	(8)	2021

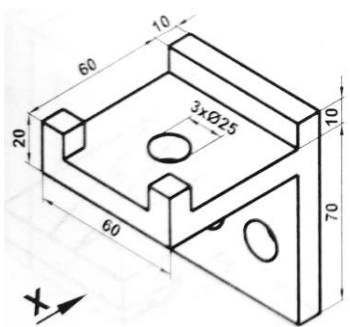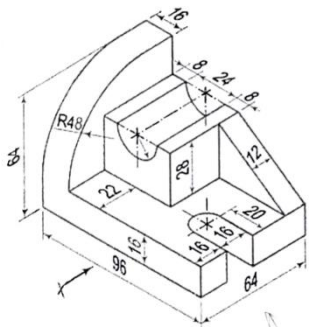| CODE: EST 110	COURSE NAME: ENGINEERING GRAPHICS		Credit: 3	
Qn. No.	**Module-1**	**Marks**	**Year**	
1	The front view of line AB is 50° inclined to XY line and is 55 mm long while its top view is 60º inclined to XY line. If end A is 10 mm above HP and 20 mm in front of VP, draw its projections. Find the true length and inclinations of line with HP and VP.	20	KTU-July 2021	
2	The end point A of a line is 20 mm above HP and 10mm in front of VP. The other end of the line is 50 mm above HP and 15 mm behind VP. The distance between the end projectors is 70 mm. Draw the projections of the line. Find the true length and true inclinations of the line with the principal planes. Also locate the traces of the line.	20	KTU-July 2021	
3	The front view of the line MN is 55 mm long. The point M is 15 mm above HP and 20 mm in front of VP. The point N is 35 mm above HP. Draw the projections of the line if its true length is 70 mm. Measure the true inclinations of the line with respect to the reference planes.	20	KTU-Dec 2020	
4	A line AB is in the first quadrant. Its ends A and B are 20 mm and 60 mm in front of to VP respectively. The distance between the end projectors is 75 mm. The line is inclined at 30° to the HP and its HT is 10 mm above XY line. Draw the projections of AB and determine its true length and mark VT.	20	KTU-Dec 2020	
5	One end point of a line AB is 12 mm above HP and is 15 mm in-front of VP. Other end point is 50 mm above HP and is 42 mm in front of VP. Draw the projections of the line AB if its elevation measures 70 mm. Find out its true length and the true inclinations with respect to the reference planes.	20	KTU-June 2022	
6	One end point P of a line PQ, 75 mm long, is 10 mm above HP and 20 mm in front of VP. The line is inclined 45° to HP and its plan is inclined 35° to x-y line. Draw the projections of the line PQ and find out true inclination of the line with respect to VP.	20	KTU-June 2022	
7	The distance between the end projectors through the end points of line AB is 60 mm. The end A is 20 mm above HP and 15 mm in front of VP. The end B is 45 mm in front of VP and above HP. Front view of the line measures 75 mm. Draw the projections of line AB and find its true length and true inclinations with HP and VP.	20	KTU-Dec 2021	
8	The top view of a line PQ is 70 mm long and makes an angle of 45 with XY. The end P is in VP and 15 mm above HP. The end Q is 30 mm above HP and the whole line is located in first quadrant. Draw its projections and find its true length, length of its elevation, inclinations with reference planes and also locate its traces.	20	KTU-Dec 2021	
9	A line PQ is 60 mm long has one of its ends on HP and 30 mm in front of VP. Draw the projections of the line if it is inclined at 30 degrees to HP and 45 degrees to VP. Locate the traces of the line and determine its apparent lengths and apparent inclinations.	20	KTU-Dec 2022	
10	The point M of a line MN is 15 mm above HP and 10 mm in front of VP and the other end N is 50 mm in front of the VP. The front view of the line has a length of 70 mm. The distance between the end projectors is 60 mm. Find the true length, plan length, true inclinations, and apparent inclinations of the line by drawing its projections. Also locate its traces.	20	KTU-Dec 2022	
11	The elevation of a straight line CD is 65 mm long. C is 15 mm below HP and is 30 mm in front of VP. D is 55mm below HP and' is in third quadrant. Draw the projections of line CD if the line is inclined 30° to HP. Find out its true length and true inclination with respect to VP.	20 KTU – Dec 2023		
12	The front view of a straight line MN which is 75 mm long is 70 mm and is inclined 40" to x-y line. The end point M is 20 mm above HP and is 35 mm behind VP. The other end N is 25 mm below HP and is in the third quadrant. Find out the true length and true inclinations of the line with HP and VP.	20 KTU – Dec 2023		
Qn. No.	**Module- 2**	**Marks**	**Year**	

1	A square pyramid of base 25 mm side and axis 60 mm long, has a corner of the base on the ground such that the square base is inclined at 30° to the ground and the two base edges containing that corner are equally inclined to HP. Draw the projections of the pyramid if its axis is inclined at 60° to the VP.	20	KTU-July 2021
2	A cylinder 40 mm diameter and 50 mm axis is resting on a point of its base circle on VP while its axis makes 45° with VP and front view of the axis makes 35° with XY line. Draw its projection.	20	KTU-July 2021
3	A pentagonal prism 30 mm base edge and 60 mm height is on HP on one of its base edges so that the axis is inclined at 45° with HP and the base edge on which it rests is inclined at 30° with VP. Draw the projections of the solid.	20	KTU-Dec 2020
4	A square pyramid base 40 mm side and axis 60 mm long is freely suspended from one of the comers of its base. Draw its projections when the axis makes an angle of 50° with the VP.	20	KTU-Dec 2020
5	A hexagonal prism base 20 mm side and axis 40 mm long is placed with one of its base edges on the HP such that the axis is inclined at 30° to HP and 45° to VP. Draw the projections of the prism.	20	KTU-June 2022
6	A cone of base diameter 50 mm and axis length 60 mm is resting on VP on one of its generators with the front view of the axis inclined at 40° to HP. Draw its projections.	20	KTU-June 2022
7	A pentagonal pyramid of base edge 30 mm and axis length 60 mm is resting on VP on one of its base edges. The axis of the pyramid is inclined at 35° to VP and the resting base edge is inclined at 45° to HP. Draw the projection of the pyramid.	20	KTU-Dec 2021
8	A right circular cone, 40 mm base diameter and 60 mm long axis is resting on HP on one point of base circle such that its axis makes 45° inclination with HP and 40° inclination with VP. Draw its projections.	20	KTU-Dec 2021
9	A rectangular prism of base 25 x 35 mm and height 50 mm is resting on VP on one of its longer base edges. Draw the projection of the solid when its axis inclined at 35 degrees to VP and the base edge resting on VP is inclined at 45 degrees to HP. Also assume that end face of the solid visible in front view is away from HP and located right side of the viewer.	20	KTU-Dec 2022
10	Draw the projection of a pentagonal pyramid of 30 mm base side and 65 mm long axis is resting on one of its corners of the base on HP. The axis is inclined at 30 degrees to HP and top view of the axis is inclined at 35 degrees to XY line. Consider that apex is away from VP and is on the right side of the viewer.	20	KTU-Dec 2022
11	A pentagonal pyramid, base 30 mm side and height 80mm has a triangular face on the ground and the vertical plane containing the axis make an angle of 30° with VP. Draw the projections of the solid.	20	KTU-Dec 2023
12	A cone of base 50 mm diameter and axis 75mm long has one of its generators on the HP. A plane containing that generator and the axis is perpendicular to the HP and is inclined at 60° to the VP. Draw the projections of the cone when the base is nearer to the VP than the apex.	20	KTU-Dec 2023
Qn. No.	**Module- 3**	**Marks**	**Year**
1	A hexagonal pyramid side of the base 30 mm and axis 70 mm rests with its base on the HP and an edge of the base inclined at 30° to VP. A section plane inclined at 45° to VP and perpendicular to HP passes through the pyramid at a distance of 10 mm from the axis and in front of it. Draw its top view, sectional front view and true shape of section.	20	KTU-July 2021
2	A pentagonal prism side of base 25 mm and altitude 50 mm, rests on its base on the HP such that an edge of the base is parallel to VP and nearer to the observer. It is cut by a plane inclined at 45° to HP, perpendicular to VP and passing through the centre of the axis. Draw the development of the surface of the truncated prism.	20	KTU-July 2021
3	A pentagonal pyramid side of base 25 mm, height 70 mm has its base on the ground and a side of the base parallel to VP. The pyramid is cut by a section plane passing through a point on the axis which is 25 mm below the apex and making an angle of 60° with the axis. Draw the projections and obtain	20	KTU-Dec 2020

	the front view, sectional top view and true shape of the section.		
4	Draw the development of the lower portion of a cylinder of diameter 50 mm and axis height 70 mm when it is sectioned by a plane inclined at 40° to HP, perpendicular to VP and bisecting the axis.	20	KTU-Dec 2020
5	A cylinder with a 60 mm base diameter and 70 mm axis is resting on its base in the HP. It is cut by an auxiliary inclined plane which makes a angle of 60° with the HP and perpendicular to VP and passes through the top end of the axis. Draw its front view, sectional top view and true shape of the section.	20	KTU-Dec 2021
6	. A pentagonal prism of base 30 mm and axis 60 mm long is kept with its base on HP with a base edge perpendicular to VP. It is cut by a plane inclined at 45° to HP. perpendicular to VP and passing through the mid-point of the axis. Draw the development showing the remaining portion of the solid.	20	KTU-Dec 2021
7	A hexagonal pyramid, side of base 25 mm and altitude 70 mm long, rests with its base on HP with two of its base sides parallel to VP. It is cut by a section plane perpendicular to VP, inclined at 45° to HP and passing through the axis 15mm from the base. Draw the sectional top view and true shape of the section. (June-2022)	20	KTU-June 2022
8	A pentagonal pyramid, side of base 50 mm and height 80 mm rests on its base on the ground with one of its base sides parallel to VP. A section plane perpendicular to VP and inclined at 30° to HP cuts the pyramid, bisecting its axis. Draw the development of the truncated pyramid.	20	KTU-June 2022
9	A hexagonal prism of base side 35 mm and height 65 mm rests on its base on HP with one of the base edges parallel to VP. It is cut by a section plane inclined towards right at an angle of 30 degrees to HP and perpendicular to VP. The section plane meets the axis of the prism at a height of 45 mm from the base. Draw the front view, sectional top view, and true shape of the section.	20	KTU-Dec 2022
10	Draw the development of the lateral surface a truncated right circular cone of base diameter 46 mm and height 64 mm, which is cut by a section plane inclined towards right at 30 degrees to HP and perpendicular to VP. Assume that the section plane is meeting the axis of the cone at 35 mm above the base. The cone is resting on HP on its base.	20	KTU-Dec 2022
11	A square prism of base side 30mm and height 75 mm rests on the HP on its base with two of its rectangular faces equally inclined to VP. It is cut by a plane perpendicular to VP and inclined at 60° to HP meeting the axis at 15 mm from top. Draw its elevation. sectional plan and true shape of section.	20	KTU-Dec 2023
12	Draw the development of the lateral surfaces of the hexagonal pyramid of base of side 25 mm and altitude 60 mm which is resting vertically on its base on the ground with two of the sides of the base perpendicular to the VP.	20	KTU-Dec 2023
Qn. No.	**Module- 4**	**Marks**	**Year**
1	Draw the isometric projection of a hexagonal prism, 25 mm side of base and 60 mm height, which is resting on a rectangular face on HP.	20	KTU-Dec 2020
2	A hemisphere of diameter 70 mm is placed centrally over a cylinder of diameter 50 mm and height 80 mm, with its flat surface facing upward. Draw the isometric view of the combination.	20	KTU-Dec 2020
3	Draw the isometric view of a pentagonal pyramid, side of base 20 mm and height 50 mm which rests centrally with base on a cylinder of diameter 60 mm and height 40 mm.	20	KTU-July 2021
4	A hollow cylinder of inside diameter 40 mm, outside diameter 60 mm and 80 mm long is resting on its generator on the top of a rectangular slab of 80 mm x 60 mm and height 30mm. Draw the isometric view of the combination if the axis of the cylinder is parallel to the longer edges of the slab.	20	KTU-July 2021
5	A sphere of 50 mm diameter is placed centrally on the top of the frustum of a square pyramid of 30 mm base side, 20 mm top side and the axis 50 mm long. Draw the isometric projection of the solids.	20	KTU-Dec 2021

		Marks	Year
6	A hexagonal pyramid of base edge 25 mm and height 60 mm is surmounted centrally over a square slab of 70 mm side and 30mm thickness lying with its square side on HP so that one side of the square slab and one base edge of the pyramid are parallel to VP. Draw the isometric view of the combination.	20	KTU-Dec 2021
7	A square pyramid of base edge 20 mm and height 40 mm is mounted centrally on a face of a cube of base edge 50 mm. Draw the isometric projection of the objects.	20	KTU-June 2022
8	Draw the isometric projections of a hexagonal prism with edge of base 30 mm and axis 60	20	KTU-June 2022
9	Draw the isometric view of a triangular prism resting vertically on a circular disc with the axes of both the solids coinciding each other. The triangular prism is having a base edge of 30 mm and height 50 mm. The circular disc is of 60 mm diameter and 40 mm thick. Assume that one of the base edges of the triangular prism is parallel to VP, which is nearer to it and the combination of the solids is lying on the ground on one of the end faces of the circular disc.	20	KTU-Dec 2022
10	A sphere of diameter 60 mm is resting centrally on top of a pentagonal prism which is on HP on one of its end faces. Prism is having a base edge of 30 mm and altitude 40 mm. If the axes of both the solids are coinciding with each other, draw the isometric view of the combination of solids. One of the base edges of the prism is perpendicular to VP and it is on the left side of the viewer.	20	KTU-Dec 2022
11	A cylindrical slab, 60 mm in diameter and 20 mm thick is surmounted by a cube of 30 mm side. The axes of the solids are in the same vertical line. Draw the isometric projection of the solids	20	KTU-Dec 2023
12	A waste paper basket is in the form of a frustum of hexagonal pyramid with base 100 mm hexagon and top 150 mm hexagon. Draw the isometric view if its height is 40 cm.	20	KTU-Dec 2023
Qn. No.	**Module- 5**	**Marks**	**Year**
1	A square pyramid of base sides 30 mm and height 45 mm rests on its base on the ground with two base edges parallel to the Picture Plane (PP). The nearest edge of the base is 20 mm behind PP. The station point is situated at a distance of 70 mm in front of the PP, 40 mm to the right of the axis of the pyramid, and 60 mm above the ground. Draw the perspective view of the pyramid.	20	KTU-Dec 2021
2	A square pyramid of base side 30 mm and height 45 mm is resting on the ground plane. The nearest edge of the base is parallel to and 20 mm behind the Picture Plane (PP). The station point is situated at a distance of 70 mm in front of the PP, 40 mm to the right of the axis of the pyramid, and 60 mm above the ground. Draw the perspective view of the pyramid.	20	KTU-June 2022
3	A rectangular box of 50 mmx 30 mm x 25 mm size rests on the ground on one of its 50x30 mm rectangular face on the ground plane. The box is located behind the PP with a vertical edge touching it and a face containing the largest edge making an angle of 30° to the PP. The station point is located 45 mm in front of PP and 55 mm above the ground plane. The central plane passes through the centre of the box. Draw the perspective view of the box.	20	KTU-Dec 2020
4	A pentagonal prism of base sides 30 mm and length 70 mm is resting on one of its rectangular faces on the ground, behind the Picture Plane (PP) and one pentagonal face touching the PP. The station point is 65 mm in front of the PP, 30 mm above the ground, and 80 mm to the right of the axis of the prism. Draw its perspective view.	20	KTU-July 2021
5	A rectangular prism of 40 mm x 20 mm x 15 mm size is lying on its 40 mm x 20 mm rectangular face on the ground plane with a vertical edge parallel and 10 mm behind picture plane and end faces inclined at 30 degrees with the picture plane. The central plane is 60 mm away from the axis of the prism towards left. The station point is situated 50 mm in front of the picture plane and 45 mm above the ground plane. Draw the perspective view of the prism.	20	KTU-Dec 2022

6	A rectangular prism of size 20 x 20 x 40 mm is lying on the ground plane on one of its largest faces. A vertical edge is in the Picture Plane (PP) and the longer face containing that edge makes an angle of 30° with PP. The station point is 50 mm in front of the PP. 30 mm above the ground plane, and lies in a central plane which passes through the centre of the prism. Draw the perspective view of the prism.	20	KTU-Dec 2023
7	Draw the top view, front view and any one side view of the figure shown below. The front view direction is marked with a long arrow. Any missing dimension may be suitably assumed. 	20	KTU-Dec 2020
8	Draw the top view, front view and any one side view of the figure shown below. The front view directions marked with a long arrow. Any missing dimension may be suitably assumed. 	20	KTU-July 2021
9	Draw the top view, front view and any one side view of the figure shown below the front view direction is marked as X. Any missing dimension may be suitably assumed. 	20	KTU-Dec 2021
10	Draw the front view, top view, and side view of the object given below. Front view should be drawn as seen in the direction of the arrow X. 	20	KTU-June 2022

11	Draw the front view, top view, and left side view of the object given below. Front view should be drawn as seen in the direction of the arrow X. Assume dimensions suitably if found missing.	20	KTU-Dec 2022
12	Draw the front view, top view, and side view of the object given below. Front view should be drawn as seen in the direction of the arrow X.	20	KTU-Dec 2023

EST120: BASICS OF CIVIL ENGINEERIG

Module 1

Sl. No	Questions	Marks	KTU Exam
1.	What are the responsibilities of an engineer in ensuring the safety of built environment?	4	July 21
2	Discuss the role of a Civil Engineer in the infrastructural development of a country	4	Dec 21 June 22
3	Discuss about Group A and Group C buildings as per NBC	4	Dec 21
4	Discuss about the minimum size requirements of rooms for a residential building as per NBC	4	Dec 21
5	Define the following: Covered Area, Plinth Area, Floor Area, Carpet Area , Circulation Area and Floor Area Ratio	4	Dec 20 June 23
6.a	Mention the factors to be considered while selecting the site for a building	5	July 21
6.b	Draw a neat sketch showing important parts of a residential building	5	July 21
7	List out the major disciplines of civil engineering and explain their role in the infrastructural framework.	10	July 21 Dec 19 June 23
8a	Discuss the components of a residential building with a neat figure.	5	Dec 19
8.b	Explain the role of NBC, KBR and CRZ norms in building rules.	5	Dec 19 Dec 20
9.a	Discuss the requisites of a good site plan for a building.	5	Dec 19
9.b	List out any five major factors to be considered for the selection of a good site for a residential building.	5	Dec 19 June 23
10	How can you classify the buildings based on occupancy according to NBC? Explain briefly	10	

Module 2

1	What are the principles of surveying?	4	July 21 Dec 19
2	List out the different varieties of timber available in Kerala	4	July 21
3	What are the objectives or purpose of surveying:	4	Dec 20 June 22
4	What are the properties of good bricks	4	Dec 20
5	What are constituents of good brick earth?	4	
6	What are the qualities of a good building stone?	4	Dec 19
7.a	Enumerate the physical and chemical properties of ordinary Portland cement	5	July 21
7.b	Write a note on water proofing materials.	5	July 21
8	List out the modern construction materials used for construction. Explain any four	10	July 21
9.a	Explain the types and uses of architectural glass as a construction material.	5	Dec 19
9.b	With sketches explain any five market forms of steel section and their uses	5	Dec 19
10.a	List out any five major qualities of a good timber	5	Dec 19
10.b	List out two uses of any five different types of cement.	5	Dec 19

11	What are the classification of surveying? Explain primary classification	5	
12	What are the different kinds of Cement available and what are their uses	10	Dec 20

Module 3

1	Differentiate between stretcher and header bond.	4	July 21
2	Write a note on ramp.	4	July 21
3	List out the criteria for the selection of a good roofing material.	4	Dec 19
4	Define bearing capacity of soil.	4	Dec 19
5.a	Explain the circumstances where pile foundations are adopted	5	July 21
5.b	Explain well foundation with neat sketch.	5	July 21
6	Explain various elements of a green building design	10	July 21
7.a	With a neat sketch explain any two types of shallow foundation.	5	Dec 19
7.b	With neat sketches compare English bond and Flemish bond.	5	Dec 19
8.a	Explain the water management and energy management in green buildings	5	Dec 19
8.b	Discuss the civil engineering aspects of MEP and HVAC in a commercial building	5	Dec 19
9	Different types of roofing and flooring materials	10	
10	Explain different types of foundation	5	Dec 20

HUN 102 - PROFESSIONAL COMMUNICATION

QUESTION BANK

Sl. No.	Questions	Mark	Question Paper
	MODULE 1		
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	KTU- July 2021 (2019 scheme)
2	Find the misspelled 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	KTU- June 2022 (2019 scheme)
3.	Write the definition of the compound words of the following. a. Swimming pool b. Paddle boat c. Neck tie d. Black bird e. Foot print f. Sunset	3	KTU- July 2021 (2019 scheme)
4.	Write the definition for the following compound words. a) Wild life b) Son-in- law	1	KTU- June 2022 (2019 scheme)

5.	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
	  c) Plenty, still d) Frequency, yet
			KTU- July 2021 (2019 scheme)

	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, necessitat		
6.	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	KTU June 2022 (2019 scheme)
7.	Complete the sentence as directed. a) He said, " I shall go as soon as it is possible." (Change into Indirect speech) b) He proposes that they should wait for the award. (Change into Direct speech) c) The guard refused him admittance. (Rewrite the sentence using "Admittance…..")	3	KTU- July 2021 (2019 scheme)
8.	Find the error in the sentences given below. He drank once again (a)/ as he was (b)/ feeling thirsty (c)/ No error	1	KTU- June 2022 (2019 scheme)
9.	Write down two numerical adjectives and use it in a sentence	2	KTU- July 2021 (2019 scheme)
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	KTU- June 2022 (2019 scheme)
11.	Write down the significance of technical communication	2	Model Question
MODULE 2			
1	Help your friend by suggesting and explaining SQ3R methods andPQRST methods to improve his reading skills?	6	KTU- July 2021 (2019 scheme)
2	What is reading and what are the four kinds of reading styles. When these styles are used?	6	KTU- June 2022 (2019 scheme)
3	Explain the following concepts. a. Skimming b. Scanning c. SQ3R method	6	Model Question
4	What are the comprehension techniques?	3	Model Question
5	What do you mean by critical reading?	3	Model Question
6	How do you recognize non-verbal cues?	3	Model Question
7	Explain the significance of note taking.	3	Model Question
8	Explain in detail how you identify the various transitions in a text.	6	Model Question
9	Explain about reading styles, speed and valuation.	3	Model Question
10	Define PQRST method.	3	Model Question

MODULE 3

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	KTU- July 2021 (2019 scheme)
2	Point out the differences between debate and group discussion?	2	KTU- July 2021 (2019 scheme)
3	How voice modulation affects a project presentation?	3	Model Question
3	How body language could help you in a group discussion. Write down 6 points	3	KTU- July 2021 (2019 scheme)
4	Explain the etiquettes one must follow in GD?	4	KTU- June 2022 (2019 scheme)
5	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	KTU- June 2022 (2019 scheme)
6	What do you mean by brain storming the topic?	3	KTU- July 2021 (2019 scheme)
7	Explain the group discussion strategies and activities to improve the GD skills.	4	Model Question
8	What are the different types of presentation skills?	4	Model Question
9	Introduce yourself for a campus placement program.	4	Model Question
10	Differentiate between group discussion and debate.	4	KTU- June 2022 (2019 scheme)

MODULE 4

1	How can we develop effective listening skills? How active listening plays an important role in communication?	3 3	KTU- July 2021 (2019 scheme)
2	What are the advantages and disadvantages of telephonic orvideo interviews?	5	KTU- July 2021 (2019 scheme)
3	Differentiate between active and passive listening.	3	KTU- June 2022 (2019 scheme)
4	List the barriers in listening?	3	KTU- June 2022 (2019 scheme)
5	Write short notes on types of interviews?	3	Model Question
6	What are the type of interviews and explain each.	4	Model Question
7	Explain intensive listening.	3	Model Question
8	How dress code and body language affects an interview?	3	Model Question
9	What do you mean by TED talks?	3	Model Question
10	What are the FAQs related to job interview?	3	Model Question

MODULE 5

1	Write a letter to the HR manager of a leading company, requesting permission to do a two - weeks internship at his company as a part of your academic curriculum.	6	KTU- July 2021 (2019 scheme)
2	What are the different types of reports?	2	KTU- July 2021 (2019 scheme)
3	What is a report? Explain its structure and types	6	KTU- June 2022 (2019 scheme)

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	KTU- June 2022 (2019 scheme)
5	What are the differences between bio data, CV and Resume?	6	KTU- July 2021 (2019 scheme)
6	Explain analytical and issue-based essays and report writing.	6	Model Question
7	Explain in detail the term bibliography.	4	Model Question
8	Write down the differences between technical and literary style and the purpose of formal writing.	6	Model Question
9	What is the use of sequence words in writing? Explain the common errors in writing.	3 3	Model Question
10	Explain the structure and type of a report along with the basics of report writing	6	Model Question

*****

EST 120	BASICS OF MECHANICAL ENGINEERING	Credit: 4	
Sl No.	MODULE-4	Mark	Year
1	Write notes on hybrid vehicles. (asked 2 times)	4	Dec 2022
2	In an air standard diesel cycle, the compression ratio is 16 and at the beginning of compression the temperature is 15°C and the pressure is 0.1 MPa. Heat is added until the temperature at the end of the constant pressure process is 1480°C. Calculate (i) cut-off ratio (ii) Heat supplied per kg. of air (iii) Work done per kg. of air (iv) Efficiency of the cycle. Take Assume Cp = 1.005 kJ/kg. K and Cv = 0.718 kJ/kg. K.	10	Dec 2022
3	Explain the working of four stroke petrol engine with neat sketches.	8	Dec 2022
4	How does a two stroke engine differ from four stroke engine?	2	Dec 2022
5	With the help of a figure explain the working of a 4 stroke petrol engine.	6	June 2022
6	Explain the working of two stroke SI engine with a neat sketch.	6	June 2023
7	What are the important assumptions made in arriving at air standard cycle?	4	June 2023
8	Explain various processes involved in a Carnot cycle with P-V and T-S diagram	5	June 2023
9	An Engine working on Otto cycle takes in air at a pressure and temperature of	5	June 2023
10	An Engine working on Otto cycle takes in air at a pressure and temperature of 100 kPa and 300 K. Find out the air standard efficiency of the engine if the clearance volume of the engine is 16% of the cylinder volume. Also find the maximum pressure of the cycle, if the maximum temperature is limited to 600°C	5	June 2023
11	With the help of a block diagram, explain the fuel and air systems of SI engine.	4	June 2023
12	Why 2 stroke engines are not widely used in commercial vehicles nowadays?	4	June 2022
13	List any two merits and demerits of water cooling system over air cooling system.	4	June 2022
14	With the help of a p-V and T-S diagram derive the air standard efficiency of a Diesel cycle	10	June 2022
15	Explain any four merits and demerits of Petrol engine over Diesel engine.	4	June 2022
16	Why petrol engines are called as SI engines and diesel engines are called as CI engines?	4	Dec 2020
17	What is meant by scavenging and how is it achieved in a two stroke engine?	4	Dec 2020
18	Explain the air standard Diesel cycle with P-V and T-S diagrams. Derive the expression for its efficiency	10	Dec 2020
19	Explain the CRDI system in automobiles.	5	Dec 2020
20	A Carnot engine, working between 650 K and 310 K, produces 150 kJ of work. Find thermal efficiency and heat added during the process.	5	Dec 2020
21	Derive the expression for efficiency of Carnot Cycle, Otto Cycle, Diesel Cycle with P V Diagram	10	Jul 2021
22	Explain the Working theory of Carnot, Otto, Diesel Cycle.	4	Jul 2021

Sl No.		Mark	Year
23	An engine working on diesel cycle has a diameter of 150mm and stroke 200mm. The clearance volume is 10% of the swept volume. Determine the compression ratio and air standard efficiency of the engine if the cut off takes place at 6% of the stroke.	10	Dec 2020
24	Explain the working and Parts of 2 stoke and 4 stroke petrol and diesel engine.	4	Dec 2020
25	Difference between 2 stroke and 4 stroke engine and SI and CI engine.		Jun 2020
26	Explain the working of Air system and Fuel system of SI and CI engines.		Jun 2021
27	Explain advantages and disadvantages of cooling system and lubricating system of SI and CI engines	4	Dec 2019
28	Explain the working and difference of CRDI and MPFI engines	3	Dec 2022
29	Explain the impracticability of Carnot Cycle	3	Dec 2022
30	Basic theory and Definitions of system and surroundings, Thermodynamic laws	3	Dec 2021

Sl No.	MODULE-5	Mark	Year
1	Explain with a neat sketch, the working of Kaplan turbine	10	Dec 2022
2	Explain the working of Pelton turbine with a neat sketch	6	June 2023
3	With neat sketch explain the working of Francis turbine (Asked 2 times)	10	June 2022
4	What is mean by priming of a pump? Why is it necessary in a centrifugal pump?	4	Dec 2022
5	Explain the working of Centrifugal Pumps.	5	Dec 2020
6	With the help of a neat sketch explain the working of a reciprocating pump. (Asked 2 times)	6	Dec 2020
7	A Pelton turbine with the head of 450m generates13MW at 450rpm. Calculate discharge of the turbine if the overall efficiency is 80%.	4	Dec 2021
8	A centrifugal pump discharges water at a rate of 200 litres/minute against a head of 16 m when running at 300 rpm. Calculate the power required to run the pump if the overall efficiency of the pump is 50 %.	3	Dec 2020
9	A centrifugal pump discharges water at a rate of 300 litres/minute against a head of 20 m when running at 300 rpm. Calculate the power required to run the pump if the overall efficiency of the pump is 50 %	4	June 2023
10	What are the different types of gears used in power transmission?	4	Dec 2022
11	What are the advantages and disadvantages of gear drives?	4	June 2023
12	List any two advantages and two disadvantages of belt drives	4	June 2022
13	Explain the working of a single plate clutch with neat sketch.	7	Dec 2020
14	Describe any four desirable properties of refrigerants. (Asked 2 times)	4	Dec 2020
15	How does a central air conditioning system vary from a unitary system?	4	June 2023
16	What is the unit used for specifying capacity of refrigeration? Define the unit	4	June 2022
17	What is the Unit of Refrigeration?	1	Jul 2021
18	Explain the split air conditioner and its working.	4	Dec 2020
19	Explain the term Refrigeration.	2	Jul 2021
20	Explain the working Reversed Carnot Cycle with PV Diagram	5	Dec 2019
21	Explain the basic components of Vopour compression refrigeration system with the help of neat sketch. Draw Pressure- Enthalpy and Temperature-Entropy diagrams of the same. (Asked 4 times)	10	June 2022
22	What is Psychrometry and explain Psychromertic Chart?	3	Jun 2021
23	What are the types of Air Conditioning Systems working and Diagram?	5	Jun 2021

Sl No.	MODULE-6	Mark	Year

#	Question	Marks	Date
1	Explain the production processes:- (i) Turning (ii) Arc welding (iii) Extrusion (iv) Forging	10	Dec 2022
2	Explain Forging, Rolling and Extrusion Process	5	June 2022
3	Explain the elements of CNC systems with block diagram. List the advantages of CNC machines.	10	Dec 2022
4	Compare conventional machine tools and CNC machines.	4	Dec 2020
5	Explain the working of CNC Machines.	4	Dec 2020
6	Briefly describe rolling process.	4	Dec 2022
7	Explain Additive Manufacturing with examples (Asked 2 times)	4	Dec 2022
8	What is rapid prototyping? Write its advantages.	4	June 2023
9	What is casting? With the help of a neat sketch, explain the process of sand mould casting. Write any two applications of casting (Asked 2 times)	10	June 2023
10	List two products manufactured by casting and forging.	4	June 2022
11	Explain Sand Casting with Diagram	5	Jul 2021
12	Explain the arc welding process with a neat sketch	6	June 2022
13	Explain Welding Process. What are the different types of welding processes?	10	Jul 2021
14	Differentiate between soldering and brazing (Asked 2 tmies)	4	June 2022
15	Define machining process.	2	June 2022
16	Explain the components of a Drilling machine with a neat diagram. List out the operations performed in it	10	June 2023
17	Explain the following machining operations (i) Turning (ii) Drilling (iii) Milling and (iv) Grinding	8	June 2022
18	Explain Grinding Process Types and Working	4	July 2019
19	Diagram and Working of Lathe Machine, Drilling Machine and Milling Machine.	10	June 2022
20	Describe the working of a cluster rolling mill giving a sketch.	4	Dec 2020
21	Give the block diagram of a lathe, indicate the principal parts and list out the important operations performed on a lathe	10	Dec 2020
22	What is the Basic Theory of Manufacturing and Manufacturing Processes?	3	Dec 2022
23	Difference between CAD and CAM	3	Dec 2021

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

7.	Write the difference between 'while' and 'do -while' statements.	3	June 2023
8.	Explain various formatted I/O statements in C.	3	June 2023
9.	Write a menu driven program to find the area of square, triangle, circle and rectangle according to the choice given.	10	June 2023
10.	Differentiate between break and continue statements using an example.	4	June 2023
11.	Explain any four types of operators used in C	7	June 2023
12.	Write a program to generate the following pattern 1 1 2 1 2 3 1 2 3 4	7	June 2023

Module III

1.	Explain any 4 string handling functions in C programming.	7	July 2021 June 2022
2.	Write a C program to find second largest element in an array	7	July 2021
3.	Write a C program to check whether a string is palindrome or not without using string handling functions	7	July 2021
4.	Write a C program to compare any two strings using string handling functions	3	June 2022
5.	Write a C program to find the largest element in an array	3	June 2022
6.	Write a C program to sort an array of numbers using bubble sort	7	June 2022
7.	What are the different ways of declaring and initialising a single dimensional array?	3	June 2023
8.	Write a C program to check whether the given number is Armstrong or not. (A number is Armstrong if the sum of the cubes of the digits equals to the number)	3	June 2023
9.	Implement string concatenation without using built in functions.	8	June 2023
10.	Write a C program to accept a 2-D integer matrix and check whether it is symmetric or not (A matrix 'A' is symmetric if $A=A^T$).	6	June 2023
11.	Explain any four string handling functions used in C using example. Write the syntax also.	6	June 2023
12.	Write a program to print the product of two matrices	8	June 2023

Module IV

1.	Write a C program to: (i) Create a structure with fields: Name, Address, Date of birth. (ii) Read the above details for five students from user and display the details	7	July 2021

2.	What is recursion? Write a C program to display Fibonacci series using recursive function	7	July 2021 June 2022
3.	Write a C program to sort N numbers using functions	7	July 2021
4.	Name the different types of parameter passing. Illustrate each of them with an example	3	June 2022
5.	What are the advantages of modular programming?	3	June 2022
6.	What are the main differences between structures and unions? Which is preferred in what situation? Give examples.	7	June 2022
7.	Define function prototype. Why is it used? Differentiate formal and actual parameters.	3	June 2023
8.	Mention the difference between structure and union using suitable examples	3	June 2023
9.	Explain different storage classes used in C by providing suitable examples.	8	June 2023
10.	What is meant by recursion? Write a program to find the factorial of a number using recursion.	6	June 2023
11.	Implement linear search using function. Reading the inputs and printing the result must be done in the main function.	10	June 2023
12.	Compare User defined functions with library functions.	4	June 2023

Module V

1.	Write a C program to reverse a string using pointers	7	July 2021
2.	Differentiate between array of pointers and pointer to an array	7	July 2021
3.	Write a C program to count number of lines in a text file	7	July 2021
4.	Distinguish between text mode and binary mode operation of a file	3	June 2022
5.	What do you mean by a pointer variable? How is it initialized?	3	June 2022
6.	Write a C program to replace vowels in a text file with character 'x'	7	June 2022
7.	Write a C program to print the elements of an array in reverse order using pointers	7	June 2022
8.	What is meant by the scale factor of a pointer variable? Explain using examples.	3	June 2023
9.	List out the various modes of opening a file in C language.	3	June 2023
10.	Write a program to read and store the details (the name, employee code (integer) and salary) of 'n' employees in a company into a file using structure. Print the details of the employee whose employee code is given as input	14	June 2023
11.	What is meant by passing arguments into a function by reference? Write a program to swap two numbers using pass by reference.	8	June 2023
12.	Write a program to copy the content of a file to another.	6	June 2023