Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20MAT101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year I Semester (R20) Supplementary End Semester Examinations, December– 2025

ENGINEERING CALCULUS

(Common to CE, ME, ECE, CSE, CST, CSE-AI, CSE-DS, CSE-CS, CSE-IOT)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Determine the area between the curve $y=x$, $0\le x\le 4$ and the x-axis.	1M	1	2
	ii.	Find the value of $\Gamma\left(\frac{5}{2}\right)$	1M	1	2
	iii.	State Cauchy's mean theorem	1M	2	1
	iv	Evaluate $\underset{x\to 0}{Lt}\frac{\sin 5x}{2x}$	1M	2	2
	v.	State Root test	1M	3	1
	vi	If $f(x)=x$ in $0<x<2$ then determine a_0.	1M	3	2
	vii.	If $f(x,y)=x\sin y+ye^{2x}$ then find $\frac{\partial f}{\partial x}$.	1M	4	2
	viii	When a function $f(x,y)$ has a saddle point at (a,b).	1M	4	1
	ix.	Evaluate $\int_0^3\int_0^2 dy\,dx$	1M	5	2
	x.	Find the $gradf$ when $f=x+y+z$	1M	5	2
Q.2(A)		Find the volume obtained by revolving one arch of the cycloid $x=a(t-\sin t)$, $y=a(1-\cos t)$ about its base.	10M	1	3
		OR			
Q.2(B)		i) Find the value of $\Gamma\left(\frac{1}{2}\right)$ ii) Evaluate $\int_0^\infty \sqrt{x}\,e^{-x^2}dx$	10M	1	3
Q.3(A)		Prove that (if $0<a<b$), $\frac{b-a}{1+b^2}<\tan^{-1}b-\tan^{-1}a<\frac{b-a}{1+a^2}$ and hence show that $\frac{\pi}{4}+\frac{3}{25}<\tan^{-1}\left(\frac{4}{3}\right)<\frac{\pi}{4}+\frac{1}{6}$.	10M	2	3
		OR			
Q.3(B)		A window has the form of a rectangle surmounted by a semi-circle. If the perimeter is 40ft. Find its dimensions so that the greatest amount of light may be admitted.	10M	2	3
Q.4(A)		Determine whether the series converges or diverges, (i) $\sum_{n=1}^{\infty}\frac{n!}{10^n}$ and (ii) $\sum_{n=1}^{\infty}\frac{n^2(n+2)!}{n!3^{2n}}$	10M	3	3
		OR			

Q.4(B)	Expand $f(x) = x\sin x$ as a cosine series in the interval $0 < x < \pi$	10M	3	3
Q.5(A)	Find $\frac{\partial w}{\partial r}$ and $\frac{\partial w}{\partial s}$, if $w=(x+y+z)^2$, $x=r-s$, $y=\cos(r+s)$, $z=\sin(r+s)$ at $(r,s)=(1,-1)$.	10M	4	3
	OR			
Q.5(B)	A delivery company accepts only rectangular boxes the sum of whose length and girth (perimeter of cross section) does not exceed 108 inches. Find the dimensions of an acceptable box of largest volume.	10M	4	3
Q.6(A)	Change the Cartesian integral into an equivalent polar integral. Then evaluate the polar integral $\int_0^1 \int_0^{\sqrt{1-y^2}} (x^2+y^2)\,dx\,dy$.	10M	5	3
	OR			
Q.6(B)	Apply Green's Theorem to evaluate the integral $\oint_C y^2\,dx + x^2\,dy$ where C : the triangle bounded by $x=0, x+y=1, y=0$.	10M	5	3

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20MAT105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year I Semester (R20) Supplementary End Semester Examinations, December– 2025

CALCULUS AND DIFFERENTIAL EQUATIONS

(Electrical & Electronics Engineering)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S.No.		Question	Marks	CO	BL
Q.1	i.	Verify the Rolle's theorem for $f(x)=x^2$ in $[-1,1]$	1M	1	1
	ii.	Write the formula for surface area of the solid generated by the revolution about x-axis, of the arc of the curve $y=f(x)$ from x=a to x=b	1M	1	1
	iii.	Find the limit of $\underset{x\to\infty}{Lt}\dfrac{\ln x}{2\sqrt{x}}$	1M	2	1
	iv	Find the local extreme values of $f(x,y)=x^2+y^2-4y+9$	1M	2	1
	v.	Evaluate $\int_1^{\sqrt{3}}\int_1^{2x} dy\,dx$	1M	3	1
	vi	Find the *Divergence of* F when $F=x^2i+y^2j+z^2k$	1M	3	1
	vii.	What is the general form of exact D.E and write its general solution?	1M	4	1
	viii	Find the complementary function $y''=16y$.	1M	4	1
	ix.	Write the Clairauts form of partial differential equation.	1M	5	1
	x.	State P-Series test	1M	5	1
Q.2(A)		Prove that (if $0<a<b$), $\dfrac{b-a}{1+b^2}<\tan^{-1}b-\tan^{-1}a<\dfrac{b-a}{1+a^2}$ and hence show that $\dfrac{\pi}{4}+\dfrac{3}{25}<\tan^{-1}\left(\dfrac{4}{3}\right)<\dfrac{\pi}{4}+\dfrac{1}{6}$	10M	1	3
		OR			
Q.2(B)		Find the area of the parametric curve $x=a\cos^3 t,\ y=a\sin^3 t$	10M	1	4
Q.3(A)		Express $\dfrac{\partial w}{\partial r}$ and $\dfrac{\partial w}{\partial s}$ in terms of r and S if $w=x+2y+z^2$, $x=\dfrac{r}{s}$, $y=r^2+\log s$ and $z=2r$.	10M	2	3
		OR			
Q.3(B)		Find the local extreme values of function $f(x,y)=xy-x^2-y^2-2x-2y+4$	10M	2	3
Q.4(A)		Calculate $\iint_R f(x,y)dA$ for $f(x,y)=100-6x^2y$ *and* $R: 0\le x\le 2,\ -1\le y\le 1$	10M	3	3
		OR			

Q.4(B)	Use Green's theorem to find the counterclockwise circulation for the field $F=(x^2+4y)i+(x+y^2)j$ over the square bounded by x = 0, x = 1, y = 0, y = 1	10M	3	4
Q.5(A)	i) Solve $\frac{dy}{dx}-2xy=6xe^{x^2}$	5M	4	3
	ii) Solve $e^y dx+(xe^y+2y)dy=0$	5M	4	3
	OR			
Q.5(B)	Find the general solution of $y''+10y'+25y=14e^{-5x}$	10M	4	3
Q.6(A)	Form the partial differential equations by eliminating the arbitrary constants and functions from the following *i)* $(x-a)^2+(y-b)^2+z^2=r^2$ *ii)* $z=f(x)+e^y g(x)$	10M	5	3
	OR			
Q.6(B)	Show that the $p-$series $\sum_{n=1}^{\infty}\frac{1}{n^p}=\frac{1}{1^p}+\frac{1}{2^p}+\frac{1}{3^p}+----+\frac{1}{n^p}+---$ (*p a real constant)* converges if $p>1$, and diverges if $p\le 1$.	10M	5	4

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20CHE101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech I Year I & II Semesters (R20) Supplementary End Semester Examinations, December – 2025

ENGINEERING CHEMISTRY

(Common to All)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

		Question	Marks	CO	BL
Q.1	i.	State two drawbacks associated with hard water.	1M	1	1
	ii.	What is the permissible pH range of drinking water as per BIS standards?	1M	1	2
	iii.	Write the observed electronic configuration of Cu.	1M	2	2
	iv	Write an example illustrating an E1 reaction.	1M	2	2
	v.	State the Beer Lambert's law.	1M	3	1
	vi	Calculate the number of vibrational modes present in H_2O	1M	3	3
	vii.	In a spontaneous reaction, ΔG is _____.	1M	4	1
	viii	Name the electrolyte used in a lead–acid battery.	1M	4	2
	ix.	What is the function of gypsum in Portland cement manufacturing?	1M	5	2
	x.	Compare cloud point and pour point of lubricating oils.	1M	5	1
Q.2(A)		How is dissolved oxygen determined by Winkler's method? Explain the principle and procedure in detail.	10M	1	2
		OR			
Q.2(B)		With a neat diagram, explain the ion-exchange process for water treatment.	10M	1	2
Q.3(A)		Discuss the geometry of H_2O, $BeCl_2$, BCl_3, and XeF_2 based on VSEPR theory.	10M	2	2
		OR			
Q.3(B)		Describe S_{N1} elimination reaction, illustrating with example, reaction mechanism, and energy diagram.	10M	2	2
Q.4(A)		Describe in brief the principle and uses of Raman spectroscopy.	10M	3	2
		OR			
Q.4(B)		(i) Write a note on the principles of infrared (IR) spectroscopy.	5M	3	2
		(ii) Mention the significant applications of UV-Visible spectroscopy.	5M	3	2
Q.5(A)		Explain how a lithium-ion battery works and list its advantages and applications.	10M	4	2
		OR			
Q.5(B)		Write the derivation of entropy change for the expansion of an ideal gas in isothermal and isochoric processes.	10M	4	3
Q.6(A)		Explain in detail the manufacturing of Portland cement.	10M	5	2
		OR			
Q.6(B)		Write a note on the following lubricant properties: viscosity, viscosity index, flash point and pour point.	10M	5	2

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20PHY102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year I & II Semesters (R20) Supplementary End Semester Examinations, December– 2025

APPLIED PHYSICS

(Common to EEE, ECE, CSE, CST, CSE-AI, CSE-DS, CSE-CS,CSE -IoT)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Give at least two essential conditions of Simple harmonic motion.	1 M	1	1
	ii.	A travelling wave in a stretched string is described by the equation y = A Sin(kx-ωt). What is its maximum particle velocity?	1 M	1	1
	iii.	What is coherence?	1 M	2	1
	iv	Quartz has refractive indices 1.553 and 1.544. Calculate the thickness of the quarter wave plate for sodium light of wavelength 589 nm.	1 M	2	2
	v.	Calculate the wavelength associated with an electron with energy 2000 eV.	1 M	3	2
	vi	Define wave function Ψ.	1 M	3	1
	vii.	What is Fermi energy level?	1 M	4	1
	viii.	Give examples of Direct and indirect bandgap semiconductors.	1 M	4	1
	ix.	What is the active working material used in Ruby Laser?	1 M	5	1
	x.	Calculate the angle of acceptance of a given optical fiber, if the refractive indices of the core and cladding are 1.563 and 1.498, respectively.	1 M	5	2
Q.2(A)		i) What are Lissajous figures? On what factor does it depend?	2 M	1	3
		ii) Two simple harmonic motions acting simultaneously on a particle are given by the equations, $y_1 = 2\sin(10\,t), y_2 = 3\sin\left(10\,t + \frac{\pi}{2}\right)$. Calculate amplitude and phase constant of the resultant vibrations.	8 M	1	
		OR			
Q.2(B)		Discuss the various cases of damped harmonic oscillator by deriving the necessary expressions?	10 M	1	4
Q.3(A)		i) Define Interference? Explain how the radius of curvature of the given plano-convex lens is determined using Newton's rings experiment.	8 M	2	3
		ii) In Newton's ring experiment, determine the diameter of 10^{th} ring using source of wavelength 600 nm and the radius of curvature of the lens is 100 cm.	2 M	2	
		OR			
Q.3(B)		i) Show that if the angle of incidence corresponds to the Brewster's angle, then the angle between reflected and refracted beam is 90°.	5 M	2	3
		ii) Describe the construction and working of a Nicol prism.	5 M	2	
Q.4(A)		i) Applying Schrodinger time independent wave equation show that the energies of a particle trapped in a potential well with infinite walls is quantized.	8 M	3	4

	ii) An electron is moving under a potential field of 15 kV. Evaluate the wavelength of the electron wave.	2 M	3	
	OR			
Q.4(B)	What is tunneling? And explain the construction and working of scanning tunneling microscope.	10 M	3	4
Q.5(A)	i) On the basis of band theory, explain how the solids are classified into metals, semiconductors and insulators?	5 M	4	3
	ii) Distinguish between direct and indirect band gap semiconductors.	5 M	4	
	OR			
Q.5(B)	i) Discuss Hall effect and drive an expression of Hall coefficients for an n-type semiconductor.	10 M	4	3
Q.6(A)	Discuss the principle, construction and working of a Ruby LASER?	10 M	5	3
	OR			
Q.6(B)	i) Explain how optical fibers are classified.	5 M	5	4
	ii) Draw the block diagram of an optical fiber communication system and explain the function of each block.	5 M	5	

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20MAT107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year II Semester (R20) Supplementary End Semester Examinations, December– 2025

LINEAR ALGEBRA, COMPLEX VARIABLES AND ORDINARY DIFFERENTIAL EQUATIONS

(Electronics & Communication Engineering)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Define rank of a matrix	1M	1	1
	ii.	Find the characteristic equation for the matrix $A=\begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}$	1M	1	2
	iii.	Show that the function $f(z)=xy+iy$ is analytic.	1M	2	2
	iv.	Determine the singular points of the function $f(z)=\frac{z}{z^2-1}$	1M	2	2
	v.	Define Cauchy's Goursat theorem.	1M	3	1
	vi	Find the residue for $f(z)=\ ^1/_{(1-z)^2}$	1M	3	2
	vii.	What is the degree of the differential equation $\frac{d^2y}{dx^2}=1+x$	1M	4	1
	viii	Find the integrating factor for a given differential equation $\frac{dy}{dx}+\frac{y}{x}=secx$	1M	4	2
	ix.	What is Wronskian in the differential equation	1M	5	1
	x.	Find a function $f(x)$ whose Laplace transform is $30/p^2$	1M	5	2
Q.2(A)		Solve the equations: $x+2y+3z=0, 3x+4y+4z=0, 7x+10y+12z=0$	10M	1	3
		OR			
Q.2(B)		Find the Eigen values and Eigen vectors of the matrix $A=\begin{pmatrix}-2 & 2 & -3\\ 2 & 1 & -6\\ 1 & -2 & 0\end{pmatrix}$.	10M	1	3
Q.3(A)		Verify that each of the following functions is entire (i) $f(z)=3x+y+i(3y-x)$ (ii) $f(z)=\sin x\cosh y+i\cos x\sinh y$	10M	2	3
		OR			
Q.3(B)		(i) Show that $\overline{\cos(iz)}=\cos i\bar{z}$ for all z (ii) Show that $\log(-1+\sqrt{3}i)=\ln 2+2(n+1/3)\pi i$.	10M	2	3
Q.4(A)		Evaluate $\int_C f(z)dz$ where $f(z)=y-x-3ix^2$ and C consists of the line segments z=0 to z= i and other from z=i to z=1+i .	10M	3	3
		OR			
Q.4(B)		Use Cauchy's Residue theorem to evaluate the integral $\int_C f(z)dz$ of each of these functions $f(z)$around the circle $\|z\|=3$ in the positive sense. i) $\frac{\exp(-z)}{(z-1)^2}$, ii) $\frac{z+1}{z^2-2z}$	10M	3	3
Q.5(A)		Solve the differential equation $(y\log y)\,dx+(x-loy\,y)dy=0$	10M	4	3
		OR			
Q.5(B)		Solve the differential equation $y+px=x^4p^2$, (where $\frac{dy}{dx}=p$)	10M	4	3
Q.6(A)		Solve the differential equation $x^2\frac{d^2y}{dx^2}-x\frac{dy}{dx}+2y=x\,sin(logx)$	10M	5	3
		OR			
Q.6(B)		Find the solution of differential equation $y''+y=\tan x$, using the method of variation of parameters.	10M	5	3

*** END***

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20MAT102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year II Semester (R20) Supplementary End Semester Examinations, December– 2025

LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

(Common to CE and ME)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q. No		Question	Marks	CO	BL
Q.1	i.	Define Orthogonal Matrix with an example.	1M	1	1
	ii.	Find the Eigenvalues of the matrix $A=\begin{pmatrix}1 & -1\\ 0 & 3\end{pmatrix}$.	1M	1	1
	iii.	Find the order and degree of the differential equation $\frac{d^2y}{dx^2}+y^2=\left(\frac{dy}{dx}\right)^{3/2}$	1M	2	1
	iv	Find the integrating factor of differential equation $\frac{dy}{dx}-y\sin x=e^x$.	1M	2	1
	v.	Find the complementary solution of $y''-2y'+y=\sin x$.	1M	3	1
	vi	What is Wronskian in the differential equation	1M	3	1
	vii.	Find the Laplace transform of the $f(t)=\sin te^{-t}$.	1M	4	1
	viii.	Find inverse Laplace transform of $L^{-1}\left(\frac{1}{(s-2)}\right)$.	1M	4	1
	ix.	Write a PDE with order 2 and degree 1.	1M	5	1
	x.	Define Laplace equation in one dimensional space.	1M	5	1
Q.2(A)		Find the values of k for which the system of equations $(3k-8)x+3y+3z=0, 3x+(3k-8)y+3z=0, 3x+3y+(3k-8)z=0$ has non-trivial Solution and also find the solutions.	10M	1	4
		OR			
Q.2(B)		Find the eigenvalues and eigenvectors of the matrix $A=\begin{pmatrix}1 & 1 & 3\\ 0 & 5 & 1\\ 0 & 0 & 1\end{pmatrix}$.	10M	1	3
Q.3(A)		Solve the differential equation $(y\log y)\,dx+(x-\log y)\,dy=0$	10M	2	3
		OR			
Q.3(B)		Solve the differential equation $x\frac{dy}{dx}+y=x^3y^6$.	10M	2	3
Q.4(A)		Solve the differential equation $x^2y''-3xy'+4y=1+x^2$.	10M	3	3
		OR			
Q.4(B)		Solve by using method of variation of parameters $y''-2y'+y=e^x\log x$.	10M	3	3
Q.5(A)		Find the inverse Laplace transformation of (i) $L^{-1}\left(\frac{1}{s^2(s^2+a^2)}\right)$ (ii) $L^{-1}\left(\frac{s+2}{s^2-4s+13}\right)$	10M	4	3

OR

Q.5(B)	Find solution of differential equation $y'' + y = t$ with initial condition $y(0) = 1, y'(0) = 2$ by using Laplace transformation.	10M	4	4
Q.6(A)	Solve the partial differential equation by $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0$ with the condition $u(x,0) = 4e^{-x}$.	10M	5	3

OR

Q.6(B)	Solve the partial differential equation $\frac{\partial^2 z}{\partial x \partial x} = \sin x \sin y$ for which $\frac{\partial z}{\partial y} = -2\sin y$ when $x = 0$.	10M	5	4

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20MAT110

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year II Semester (R20) Supplementary End Semester Examinations, December– 2025

LINEAR ALGEBRA

(Common to CSE, CST, CSE-AI, CSE-DS, CSE-CS, CSE-IOT)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	When a linear system of non-homogeneous equations is said to be consistent and have infinite number of solutions	1M	1	1
	ii.	Determine the eigenvalues of the matrix $A=\begin{bmatrix}2 & 0\\ 8 & -7\end{bmatrix}$	1M	1	1
	iii.	Define basis of the vector space	1M	2	1
	iv	Determine whether the given set of vectors $\{[1,2],[2,6]\}$ is Linearly Independent (or) not.	1M	2	2
	v.	Define a Linear transformation of a vector space.	1M	3	1
	vi	Find $S\circ T$ whenever it is defined $T(x,y,z)=(x-y+z,x+z)$, $S(x,y)=(x,x-y,y)$.	1M	3	2
	vii.	Find the matrix representation of the linear transformation $T(x,y)=(y,3x-y)$ on R^2 with respect to the standard basis $\{e_1,e_2\}$	1M	4	2
	viii.	Let $T:R^2\to R^2$ be the Linear transformation defined by $T(x,y)=(2y,-x+4y)$. Compute $[T^*]_\alpha$, for the standard basis $\alpha=\{e_1,e_2\}$	1M	4	2
	ix.	Determine k so that the vectors are orthogonal with respect to Euclidean inner product space of R^4, $\{(2,3,k,4),(1,k,3,-5)\}$	1M	5	1
	x.	Check whether the matrix $\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$ is orthogonal or not.	1M	5	1
Q.2(A)		Solve the following system of linear equations using Gaussian elimination. $$w+x+y=3$$ $$-3w-17x+y+2z=1$$ $$4w-17x+8y-5z=1$$ $$-5x-2y+z=1$$	10M	1	3
		OR			
Q.2(B)		Find the inverse and A^4 for the matrix $A=\begin{bmatrix}1 & 1 & 2\\ 9 & 2 & 0\\ 5 & 0 & 3\end{bmatrix}$ using Cayley - Hamilton theorem.	10M	1	3
Q.3(A)		Show that the vectors $v_1=(1,2,1), v_2=(2,9,0)$ and $v_3=(3,3,4)$ in the 3-space $\mathbb{R}^3$ form a basis.	10M	2	3
		OR			

Q.3(B)	Find bases for the row space $R(A)$, Null space $N(A)$ and column space $C(A)$ of the matrix $A=\begin{bmatrix}0 & 1 & -1 & -2 & 1\\ 1 & 1 & -1 & 3 & 1\\ 2 & 1 & -1 & 8 & 3\\ 0 & 0 & -2 & 2 & 1\\ 3 & 5 & -5 & 5 & 10\end{bmatrix}$	10M	2	3
Q.4(A)	If $T:R^3 \to R^3$ is defined by $T(x,y,z)=(2x-z,3x-2y,x-2y+z)$ i) Determine the null-space N(T) of T. ii) Determine whether T is one-to-one. iii) Find a basis for N(T). **OR**	10M	3	3
Q.4(B)	Find the unique linear transformation $T:R^3 \to R^2$ so that $M=\begin{bmatrix}4 & 2 & 1\\ 0 & 1 & 3\end{bmatrix}$ is the matrix of T with respect to the bases $\alpha_1=\left\{\begin{bmatrix}1\\0\\0\end{bmatrix},\begin{bmatrix}1\\1\\0\end{bmatrix},\begin{bmatrix}1\\1\\1\end{bmatrix}\right\}$, $\alpha_2=\left\{\begin{bmatrix}1\\0\end{bmatrix},\begin{bmatrix}1\\1\end{bmatrix}\right\}$ and hence find *T(x,y,z)*.	10M	3	3
Q.5(A)	Consider the following ordered bases of R^3: $\alpha=\{e_1,e_2,e_3\}$ the standard basis and $\beta=\{u_1=(1,1,1),u_2=(1,1,0),u_3=(1,0,0)\}$. i. Find the transition matrix P from α to β. ii. Find the transition matrix Q from β to α. iii. Show that $[T]_\beta=Q^{-1}[T]_\alpha Q$ for the linear transformation T defined by $T(x,y,z)=(2y+x,x-4y,3x)$ **OR**	10M	4	3
Q.5(B)	Let D be the differential operator on the vector space $P_2(R)$. Given two ordered basis $\alpha=\{1,x,x^2\}$ and $\beta=\{1,2x,4x^2-2\}$ for $P_2(R)$. Find the associated matrix of D with respect to α and the associated matrix of D with respect to β. Are they similar?	10M	4	3
Q.6(A)	Find an orthogonal basis for the column space $C(A)$ of $A=\begin{bmatrix}1 & 1 & 2\\ 1 & 2 & 2\\ 1 & 0 & 4\\ 1 & 1 & 0\end{bmatrix}$. **OR**	10M	5	3
Q.6(B)	Find all the least square solutions to $Ax=b$, where $A=\begin{bmatrix}1 & 0 & 2\\ 0 & 2 & 2\\ -1 & 1 & -1\\ -1 & 2 & 0\end{bmatrix}, b=\begin{bmatrix}3\\-3\\0\\-3\end{bmatrix}$ *** **END***	10M	5	3

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20MAT106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year II Semester (R20) Supplementary End Semester Examinations, December– 2025

LINEAR ALGEBRA AND TRANSFORM CALCULUS

(Electrical & Electronics Engineering)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	Find the characteristic polynomial of a matrix $A=\begin{bmatrix}3 & 1\\ -2 & 4\end{bmatrix}$	1M	1	2
	ii.	What are the Eigen vectors of a matrix $A=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$	1M	1	1
	iii.	Determine the singular points of the function $f(z)=\dfrac{z^2-2z+3}{(z-2)^2(z+1)}$	1M	2	1
	iv	Find the residue at $z=0$ of the function $f(z)=z\cos\left(\dfrac{1}{z}\right)$	1M	2	1
	v.	Find $L\{\cos^2 t\}$	1M	3	2
	vi	Find $L^{-1}\left(\dfrac{s^2-3s+4}{s^3}\right)$	1M	3	1
	vii.	What is the change scale property for Fourier transform?	1M	4	1
	viii.	Find the Fourier sine transform of $f(x)=\dfrac{1}{x}$	1M	4	2
	ix.	Find the value of Z-transform of 1.	1M	5	1
	x.	Find $Z^{-1}\left(\dfrac{z}{(z+7)}\right)$	1M	5	2
Q.2(A)		Use Gauss-Jordan method, find the inverse of a matrix $\begin{bmatrix}1 & 1 & 3\\ 1 & 3 & -3\\ -2 & -4 & -4\end{bmatrix}$	10M	1	3
		OR			
Q.2(B)		Find Eigen values and Eigen vectors of the matrix $\begin{bmatrix}1 & 1 & 3\\ 1 & 5 & 1\\ 3 & 1 & 1\end{bmatrix}$	10M	1	3
Q.3(A)		Show that $f(x)=\sqrt{\lvert xy\rvert}$ is not analytic at the origin even though C.R equations are satisfied thereof.	10 M	2	3
		OR			
Q.3(B)		Find Taylor's expansion of $f(z)=\sin z$ about the point z=0.	10M	2	3
Q.4(A)		Find the Laplace transforms of (a). t^3e^{-3t} (b). $t^2e^{-3t}\sin 2t$	10M	3	3
		OR			

Q.4(B)	Apply Convolution theorem to evaluate (a). $L^{-1}\left(\frac{s}{(s^2+a^2)^2}\right)$ (b). $L^{-1}\left(\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right)$	10M	3	3
Q.5(A)	Find the Fourier transform of $f(x)=\begin{cases}1 & for\ \|x\|<1\\ 0 & for\ \|x\|>1\end{cases}$. Hence evaluate $\int_0^\infty \frac{\sin x}{x}dx$.	10M	4	3
	OR			
Q.5(B)	Find the Fourier cosine transform of e^{-x^2}	10M	4	4
Q.6(A)	Find the Z-transform of the following: (a). $3n-4\sin\frac{n\pi}{4}+5a$ (b). $\cosh n\theta$	10M	5	3
	OR			
Q.6(B)	Solve $y_{n+2}+6y_{n+1}+9y_n=2^n$ *with* $y_0=y_1=0$, using Z-transforms.	10M	5	4

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20CSE102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

B. Tech I Year (R20) Supplementary End Semester Examinations, December- 2025

C PROGRAMMING AND DATA STRUCTURES

(Common to All)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

S.No.		Question	Marks	CO	BL
1.	i)	Define C program structure.	1	1	1
	ii)	Write syntax of simple if statement.	1	1	1
	iii)	Define user-defined function.	1	2	1
	iv)	Differentiate between function declaration and definition.	1	2	2
	v)	What is a pointer?	1	3	1
	vi)	What is the use of strlen() function?	1	3	1
	vii)	What is a structure in C?	1	4	1
	viii)	What is the use of fwrite() and fread()?	1	4	1
	ix)	What is a stack?	1	5	1
	x)	Define linked list.	1	5	1
2(A)		Describe about all the operators in C with suitable examples.	10	1	2
		OR			
2(B)		Explain in detail about the different looping structures with examples.	10	1	2
3(A)		Write a C program to find the factorial and Fibonacci using recursions.	10	2	3
		OR			
3(B)		Explain about the binary search algorithm with example program.	10	2	2
4(A)		Discuss various string handling functions in C with examples.	10	3	2
		OR			
4(B)		Explain dynamic memory allocation functions with examples.	10	3	2
5(A)		Write a C program using structures to store and display student details.	10	4	3
		OR			
5(B)		Explain about the various file handling operations with suitable examples.	10	4	2
6(A)		Write a C program to implement push and pop operations using arrays.	10	5	3
		OR			
6(B)		Explain insertion operations in singly linked list with algorithm.	10	5	2

END

SET-2

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20ME101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year I & II Semesters (R20) Supplementary End Semester Examinations, December – 2025

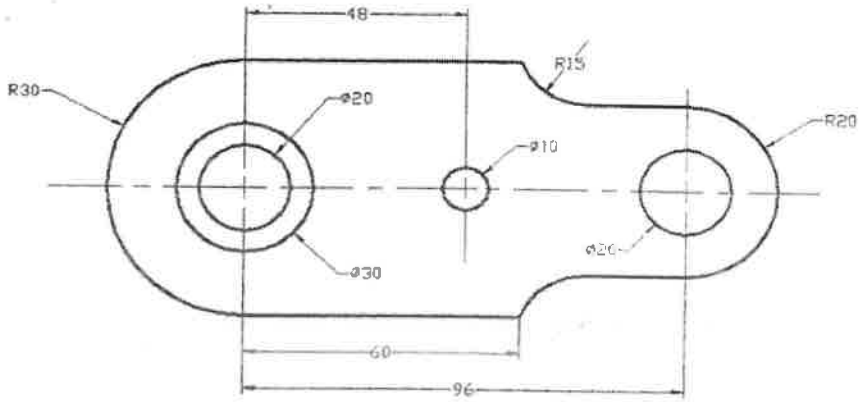
ENGINEERING GRAPHICS

(Common to All)

Time: 3Hrs **Max Marks: 60**

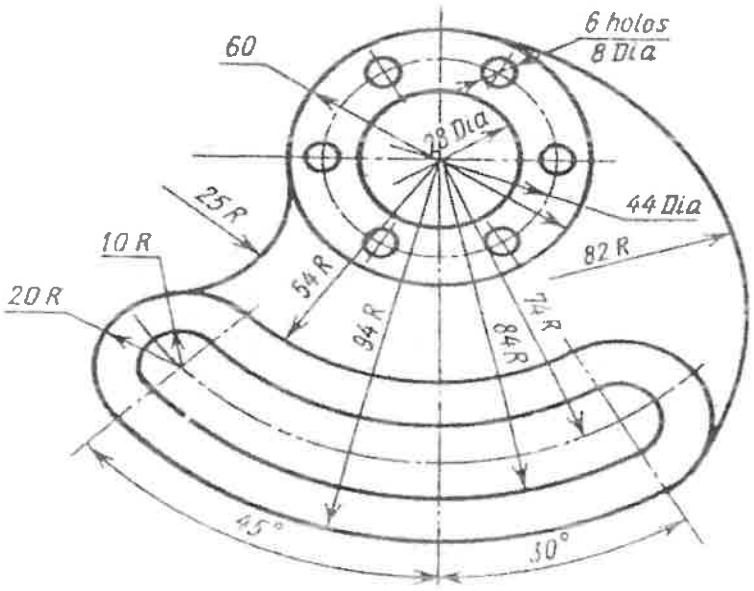
Attempt all the questions. All parts of the question must be answered in one place only.
In Q.no 1 to 5 answer either Part-A or B only

S.No.	Question	Marks	CO	BL
Q.1(A)	Draw the figure shown below using Auto CAD commands and dimension it.	12M	1	3

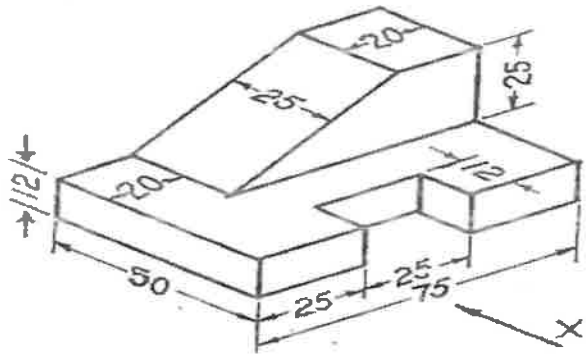


OR

Q.1(B)	Draw the figure shown below using Auto CAD commands and dimension it.	12M	1	3



Q.2(A)	A line CD 70 mm long is inclined at an angle of 30° to HP and 45° to VP. The point C is 40 mm above HP and 50 mm in front of VP. Draw the projection of the straight line and find its apparent inclinations.	12M	2	3
	OR			
Q.2(B)	Draw the projections of the following points on the same ground line. Name the quadrants. (i) Point A, 25 mm in front of the V.P. and 40 mm above the H.P. (ii) Point B, 35mm below the H.P. and on the V.P. (iii) Point C, 20 mm below the H.P. and 60 mm behind the V.P.	12M	2	3
Q.3(A)	Draw the projections of a regular pentagon of 45 mm side, which is resting with its base side on the HP. The surface of the pentagon is inclined at 45^0 to the HP and the base side resting on the HP is inclined at 60^0 to the VP.	12M	3	3
	OR			
Q.3(B)	A Hexagonal Pyramid of base edge 40 mm and 70 mm height has a triangular face on the ground, and the axis is parallel to V.P. Draw its projections.	12M	3	3
Q.4(A)	A Pentagonal prism of base edge 40 mm side and axis 60 mm has its base horizontal and an edge of the base parallel to V.P. A horizontal section plane cuts it at a distance of 30 mm above the base. Draw its front view and sectional top view.	12M	4	3
	OR			
Q.4(B)	A cylinder with a base diameter 50 mm and axis 80 mm is resting on ground with its vertical axis. It is cut by a section plane perpendicular to V.P and inclined at 45^0 to H.P passing through the top of the generator and cuts all other generators. Draw its development of its lateral surface.	12M	4	3
Q.5(A)	A vertical square prism, base 50mm side and height 100 mm. It is completely penetrated by another square prism, base 45 mm side and 120 mm long, faces of which are equally inclined to the VP. The axes of the two prisms are parallel to the VP and bisect each other at right angles. Draw the projections showing lines of the inter section.	12M	5	3
	OR			
Q.5(B)	Draw Front view ,Topview and sideview for the given isometric view.	12M	5	3



***** END*****

SET-1

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20ME101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year I & II Semesters (R20) Supplementary End Semester Examinations, December – 2025

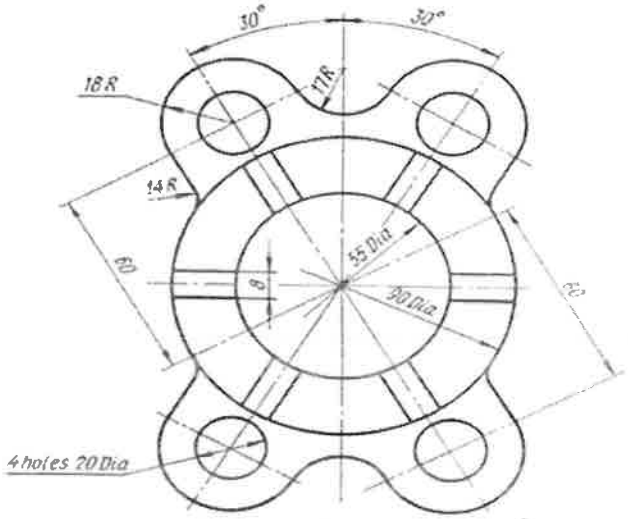
ENGINEERING GRAPHICS

(Common to All)

Time: 3Hrs **Max Marks: 60**

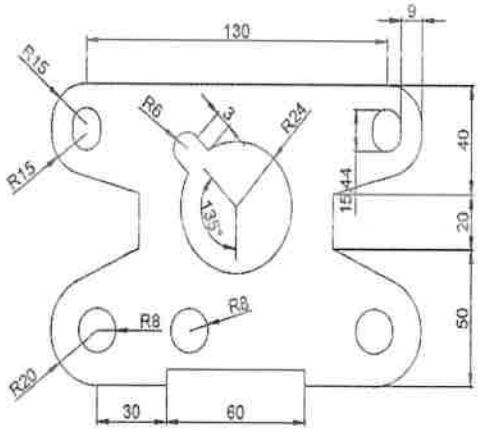
Attempt all the questions. All parts of the question must be answered in one place only.
In Q.no 1 to 5 answer either Part-A or B only

S.No.	Question	Marks	CO	BL
Q.1(A)	Draw the figure shown below using Auto CAD commands and dimension it.	12M	1	3



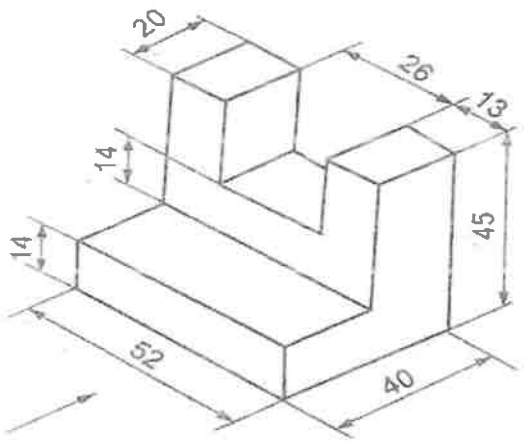
OR

Q.1(B)	Draw the figure shown below using Auto CAD commands and dimension it.	12M	1	3



Q.2(A)	i. A point G is 30 mm above H.P, 50 mm in front of V.P and 40 mm in front of P.P. Draw front view, top view and side view of the point.	6M	2	3
	ii. A point H is 40 mm below H.P, 50mm behind V.P and 30 mm in front of P.P. Draw front view, top view and side view of the point.	6M	2	3

	OR			
Q.2(B)	A line AB 90 mm long is inclined at an angle of 30⁰ to H.P and 45⁰ to V.P. The point A is 40 mm above H.P and 35 mm in front of V.P. Draw its Projections and find the apparent inclinations with HP and VP.	12M	2	3
Q.3(A)	A pentagonal pyramid side of base 40 mm and axis 80 mm is resting with one of its slant edge on the HP. The axis of the pyramid is parallel to VP. Draw its projections.	12M	3	3
	OR			
Q.3(B)	Draw the projections of a regular hexagon of 30 mm side having one of its sides in the H.P and inclined at 60⁰ to V.P and its surface making an angle of 45⁰ with H.P.	12M	3	3
Q.4(A)	A Pentagonal prism of base edge 50 mm side and axis 80 mm has its base horizontal and an edge of the base parallel to V.P. A horizontal section plane cuts it at a distance of 40 mm above the base. Draw its front view and sectional top view.	12M	4	3
	OR			
Q.4(B)	A cylinder of base diameter 35 mm and axis 60 mm is resting on ground with its axis vertical. It is cut by a section plane perpendicular to V.P and inclined at 45⁰ to H.P passing through the top of the generator and cuts all other generators. Draw its development of its lateral surface.	12M	4	3
Q.5(A)	A Vertical cylinder of 90 mm diameter is completely penetrated by another cylinder of 80 mm diameter with their axes bisecting each other at 90⁰. Draw their projections showing curves of penetration, assuming the axis of penetrating cylinder to be parallel to the V.P.	12M	5	3
	OR			
Q.5(B)	Draw Front view ,Topview and sideview for the given isometric view.	12M	5	3



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Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20ENG101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year I & II Semesters (R20) Supplementary End Semester Examinations, December– 2025

PROFESSIONAL ENGLISH

(Common to All)

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q. No		Question	Marks	CO	BL
Q.1	i.	Fill in the blank with an appropriate verb form. Prasad ----------(**receive**) the parcel just now.	1M	1	3
	ii.	Add a suffix to the noun **"Progress"** to form a meaningful word.	1M	1	3
	iii.	Fill in the blank with an appropriate modal verb We -------obey the laws.	1M	1	3
	iv	Use the correct conditional. If I had purchased the Test book test series, I_____(crack) the SBI Probationary Officer examination.	1M	1	3
	v.	Add a prefix to the verb given to form a meaningful word. **Conscious**	1M	1	3
	vi	Define skimming.	1M	1	3
	vii.	State whether the given statement is true or false "Nonverbal communication includes written communication".	1M	1	2
	viii.	Change the following sentence from **direct speech** to **indirect speech.** "I took Spanish lessons before"	1M	1	3
	ix.	Define a memo in one or two sentences.	1M	1	2
	x.	Would you please lend me your bike? Change into informal communication.	1M	1	2
Q.2(A)		Read the following sentences carefully and write synonyms of the underlined word from each sentence. i. Everyone knows that they can never tolerate hypocrisy. ii. Being honest should be one of our most important character traits. iii. Our topic today is abstract nouns. iv. We all know what a comic man he is. v. All of these fruits are beneficial for your health. vi. All this has an aromatic smell. vii. We believe you are impartial. viii. He magnified their happiness like their pain. ix. The court will be deciding the suspect's punishment. You can sense the fear from his eyes. x. This software is used to convert JPG files into PNG.	10M	1	3
		OR			
Q.2(B)		Complete the sentences given below with suitable verb forms for the words given in the brackets. i. I _____ (see) a great film yesterday. ii. How long _____ (you wait) for me? iii. Peter _____ (play) football in the afternoon when he got the call. iv. He twisted his ankle while he _____ (Play). v. He never _____ (work) in the evening, only on Sundays. vi. Lee _____ (be) late every day since Tuesday. vii. Herbert's father _____ (never forget) his son's birthday. viii. Travelling _____(become) much easier and more comfortable in the past hundred years. ix. I _____ (not finish) my report because I had a problem with my computer.	10M	1	3

x. He always goes to the supermarket alone, but today he _____ (take) his son with him.

Q.3(A)	**Write a paragraph on the following topics.** i. Discipline is the hallmark of the student. ii. Contribution of Technology in Education.	10M	2	4
	OR			
Q.3(B)	**Read the following text carefully and answer the questions given below:**	10M	2	3

A large bulk of our adult population is illiterate and uneducated. Their condition poses a problem. On the one hand, there is a shortage of teachers for adult education and on the other, the adults feel shy of starting to learn art a late age and attend classes like children. Moreover, the adult villagers find little time to spare for attending classes like children. The job of a farmer is very strenuous and he needs ample rest and relaxation. In addition to this, he finds that what is taught at the adult centers of education has no bearing on his daily needs and therefore, he grows cynical about adult education.

It is necessary that adult education in village should be made more agriculture oriented so as to make it more purposeful and meaningful for the farmer. In town and cities also, education needs to be made work-based and it should comprise a type of system in which earning and learning go together side by side. Efforts should be made to discourage the tendency of the village folks migrating to the towns.

Another aspect of the problem is the confinement of the industry to cities and towns. What is called the industrial area is entirely the monopoly of the cities. For the expansion of education and literacy in rural areas, it is necessary that the industry should be dispersed in villages also. An important development that has taken place of late in the countryside is the phenomenal success of the green revolution.

Choose the correct option of the following questions:

i. What does create a problem?
   a. Lack of education in our country.
   b. Illiteracy among a large number of adults.
   c. Defective educational system in the country.
   d. Increasing population in the country.

ii. One of the main problems facing adult education in the country is
   a. Shortage of teachers for such schools and storage of school buildings.
   b. Shortage of students available for such schools
   c. Poor financial condition of the people in our country
   d. Lack of funds with the government for such schools.

iii. The main problem for educating the adult villagers is
   a. Their financial helplessness to purchase the books required for studies.
   b. Their inability to read and write
   c. Their shyness to attend classes like children.
   d. That they hardly find time to attend the class.

iv. The job of farmers in our country is such that
   a. It needs complete overhauling.
   b. Cooperative farming has become essential.
   c. Small scale industries in the villages need encouragement.
   d. Farmers need ample rest and relaxation.

v. A farmer has grown cynical about education because
   a. He has no time to go to school
   b. Centres for education are at far off places.
   c. What is taught at such schools is mostly of no use in his daily life.
   d. He has no money to pay the fee for education.

vi. What is needed for adult education in village is that
   a. It should be made compulsory.
   b. It should be free.
   c. It should be available in every village.
   d. It should be made agricultural oriented.

vii. For making adult education popular in cities and towns, it is necessary that
   a. A wide publicity should be given to it.
   b. Centre for education should be good looking
   c. Only experienced hands should be employed as teachers
   d. Education imparted there should be work based

viii. What type of system of education does the author recommend for village?
   a. System in which the emphasis is on physical; development.
   b. A system in which earning and learning go together.
   c. A system which should cater to economic needs of the villagers.
   d. None of these

ix. For expansion of education in villages, it is necessary that
   a. Industries should be set up in villages also.
   b. Education should be free and compulsory.
   c. Present educational system should be replaced with technical and vocational education.
   d. Government alone should run all educational institutions

x. A new development that has taken pace in the village is
   a. Expansion of schools
   b. Success of green revolution
   c. Encouragement of cottage industries.
   d. Mechanized farming

Q.4(A)	Write a detailed note on the importance of non-verbal communication on the professional platform.	10M	3	4
	OR			
Q.4(B)	Develop the following situation into meaningful conversation with minimum twelve exchanges: Ask your friend and share your routine actions.	10M	3	4
Q.5(A)	Write an essay on the significance of developing listening skills. Suggest a few ways in which listening skills can be developed.	10M	4	3
	OR			
Q.5(B)	Develop the following situation into meaningful conversation with minimum twelve exchanges: Discuss among a team of three members on ordering your favourite food in a restaurant.	10M	4	3
Q.6(A)	You work for a reputed company which is interested to expand their contacts across the country. In view of this, write an email to Mr. Ronald to opening a new branch your company in Delhi including the following points: • introduce your company • explain why you are thinking of expanding to New Delhi • ask what help Mr. Ronald as a partner can provide for your business • ask for contact details of a partner located in your city	10M	5	4
	OR			
Q.6(B)	The Director of your company is planning to set up a mango pulp factory in your city. So, he has directed you to gather information on the possibilities of setting up the factory. Write a report using the following points: • purpose of establishing a mango pulp factory in your city • availability of land in your area and other facilities like water, Labour and marketing facilities • required infrastructure • any other relevant point	10M	5	4

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 20EEE101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semesters (R20) Supplementary Semester Examinations, December– 2025

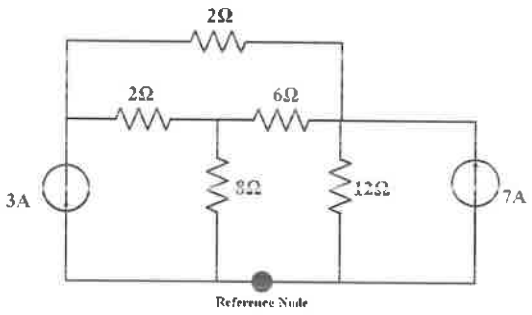
BASIC ELECTRICAL ENGINEERING

(Common to All)

Time: 3Hrs **Max Marks: 60**

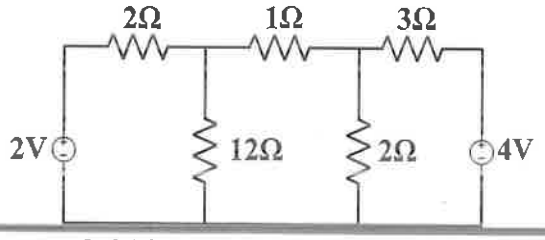
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only

Q. No.		Questions	Marks	CO	BL
Q.1	i.	A current of 10A flows through an 12Ω resistor. What is the power delivered in the resistor?	1M	1	1
	ii.	In superposition theorem, when we consider the effect of one voltage source, all the other voltage sources are ..... a) Shorted b) Opened c) Removed d) Undisturbed	1M	1	1
	iii.	If an R-C load is drawing 5 kVA at a power factor of 0.6 (leading) from a single-phase A.C. supply, find the active power drawn by the load.	1M	2	1
	iv.	Sketch the phasor diagram for series R-L circuit.	1M	2	2
	v.	A flux density of 1.2 T is produced in a piece of cast steel having relative permeability of 764. Find the magnetic field strength required to produce the given flux density.	1M	3	2
	vi.	What is condition for maximum efficiency in transformer?	1M	3	1
	vii.	In a DC generator, what is the function of brush?	1M	4	1
	viii.	Write the applications of three phase slip ring induction motor.	1M	4	1
	ix.	How will an ideal diode behave in an electric circuit, when it is reverse biased?	1M	5	1
	x.	Mention different types of cables.	1M	5	1
Q.2(A)		Compute the voltage across each current source using node voltage method.	10M	1	3



OR

Q.2(B)		By using superposition theorem, determine the current in 1Ω resistor.	10M	1	3



Q.3(A)		A Pure inductance of 318 mH is connected in series with a pure resistance of 75Ω. The circuit is supplied from 50HZ source and the voltage across 75Ω resistor is found to be 150V. Calculate the supply voltage and the phase angle.	10M	2	3

OR

Q.3(B)	Derive the relationship between phase and line voltages in a balanced three phase star connected system. Also write the expressions for active, reactive and apparent powers.	10M	2	3
Q.4(A)	Draw and explain hysteresis loop of a ferromagnetic material.	10M	3	2

OR

Q.4(B)	i) Explain various losses present in the single-phase transformer.	4M	3	3
	ii) A 200 kVA rated transformer has a full-load copper loss of 1.5 kW and an iron loss of 1 kW. Determine the transformer efficiency at full load and 0.85 power factor.	6M	3	3
Q.5(A)	i) Derive the emf equation of a DC generator.	6M	4	3
	ii) A 4-pole generator has a lap-wound armature with 50 slots with 16 conductors per slot. The useful flux per pole is 30mWb. Determine the speed at which the machine must be driven to generate an e.m.f. of 240V.	4M	4	3

OR

Q.5(B)	With a neat sketch, explain the operation of an three phase induction motor.	10M	4	3
Q.6(A)	Discuss in detail the operation of a full wave rectifier with a neat circuit diagram and relevant waveforms.	10M	5	3

OR

Q.6(B)	What is earthing? Explain different types of earthing. Also, write the importance of earthing.	10M	5	2

***** END*****