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

Question Paper Code: 18MAT102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – September 2021

LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

(Civil 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.1

i. Find the rank of the matrix $A=\begin{bmatrix}1 & 2 & 3\\ -1 & 6 & 7\\ 0 & 4 & 5\end{bmatrix}$ 1M

ii. Calculate the characteristic polynomial of $B=\begin{bmatrix}1 & -1\\ 3 & 1\end{bmatrix}$ 1M

iii. Find the integrating factor for the differential equation $\frac{dy}{dx}+\frac{y}{x.\sqrt{x}}=sinx$ 1M

iv. Define the differential equation for the Newton's law of decay 1M

v. Find complementary function for the Cauchy-Euler differential equation $x^2\frac{d^2y}{dx^2}+7x\frac{dy}{dx}-7y=x$. 1M

vi. Form partial differential equation by eliminating arbitrary constants $z=(x+a)(x+b)$. 1M

vii. Solve $\frac{dx}{x}=\frac{dy}{y}=\frac{dz}{z}$. 1M

viii. Define Heat equation in one dimensional space. 1M

ix. Find complementary function of $(D^2-5DD'+6D'^2)z=e^{x+y}$ 1M

x. State one dimensional unsteady diffusion equation 1M

Q.2(A) Investigate the values of α and β for which the system of equations 10M

$$x+\alpha y+z=3$$
$$x+2y+2z=\beta$$
$$x+5y+3z=9$$

are consistent. When will these equations have a unique solution?

OR

Q.2(B) Find eigenvalues and eigenvectors of the matrix $A=\begin{bmatrix}-1 & 0 & 3\\ 0 & 5 & -3\\ 0 & 0 & 2\end{bmatrix}$ 10M

Q.3(A) Solve $\frac{dy}{dx}+y\sec^2 x=\tan x\sec^2 x$. 10M

OR

Q.3(B) Solve the differential equation $p^3-4xyp+8y^2=0$ (where $\frac{dy}{dx}=p$). 10M

Q.4(A)	Find the solution of differential equation $y'' + 4y = \tan 2x$, using the method of variation of parameters .	10M
	OR	
Q.4(B)	Find . $P_0(x), P_1(x), P_3(x)$ and $P_4(x)$.	10M
Q.5(A)	Find the equation of integral surface $2y(z-3)p+(2x-z)q = y(2x-3)$ passing through the circle $z=0, x^2+y^2=2x$.	10M
	OR	
Q.5(B)	Solve $z(x+y)p+z(x-y)q = x^2+y^2$ by Lagrange method.	10M
Q.6(A)	Solve the partial differential equation $(D^2+2DD'+D'^2)z = e^{2x+3y}$	10M
	OR	
Q.6(B)	Using the method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$, where $u(x,0) = 6e^{-3x}$.	10M

*** END***

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

Question Paper Code: 18MAT110

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – September 2021

LINEAR ALGEBRA

(Common to CSE, CSIT & CST)

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.1	i.	Reduce the matrix into echelon form of $A=\begin{bmatrix}1 & 2 & 3\\ 2 & 5 & 6\\ -1 & -2 & 4\end{bmatrix}$	1M
	ii.	State Cayley-Hamilton theorem	1M
	iii.	State any two conditions of the vectors to be a vector space.	1M
	iv	Determine whether the given set of vectors $\{[1,2],[2,6]\}$ is Linearly Independent (or) not.	1M
	v.	Find T^{-1}, if exists for the Linear transformation $T(x,y)=(3x,x-y)$	1M
	vi	Determine the value of k so that the vectors $\{(2,\ 3,\ k,\ 4),(1,\ k,\ 3,-5)\}$ are orthogonal with respect to the Euclidean inner product in $\mathbb{R}^4$.	1M
	vii.	Determine whether the functions $T(x,y) = (\ \lvert x\rvert, 0\ )$ is a linear transformation.	1M
	viii.	Define dual space.	1M
	ix.	Determine whether the least square solution of $Ax = b$ is the orthogonal projection of b on the column space A.	1M
	x.	Find the angle between the vectors $x=(1,2)$ and $y=(1,0)$ with an inner product space $\langle x,y\rangle = 2x_1y_1+3x_2y_2$.	1M
Q.2(A)		For what values of 'a' does the following system of equations have no solution, unique solution, or infinitely many solutions. $x-y+z=1;\ x+3y+az=2;\ 2x+ay+3z=3$	10M
		OR	
Q.2(B)		Determine the Eigen values and Eigenvectors of the matrix $A=\begin{bmatrix}1 & -3 & 3\\ 0 & -5 & 6\\ 0 & -3 & 4\end{bmatrix}$	10M
Q.3(A)		Let W be the subspace of R^4 spanned by the vectors $x_1=(1,-2,5,-3)$, $x_2=(0,1,1,4)$ and $x_3=(1,0,1,0)$. Find a basis for W and extend it to a basis for R^4.	10M
		OR	
Q.3(B)		Let $U = \{(x,y,z): 2x+3y+z=0\}$, $V = \{(x,y,z): x+2y-z=0\}$ be a subspaces of $\mathbb{R}^3$. Find a basis for U∩V. Determine the dimension of U+V.	10M

Q.4(A)	Show that the linear transformation T on $\mathbb{R}^3$ is invertible and find a formula for T^{-1}, $T(x, y, z) = (2x, 4x - y, 2x + 3y - z)$.	10M
	OR	
Q.4(B)	Let $T: R^3 \to R^2$ be a linear transformation given by $T(x, y, z) = (3x + 2y - 4z, x - 5y + 3z)$. Find the matrix representation of T related to the basis $\alpha = \{(1,1,1),(1,1,0),(1,0,0)\}$ and $\beta = \{(1,3),(2,5)\}$	10M
Q.5(A)	Let $T: R^3 \to R^3$ be the linear transformation defined by $T(x_1, x_2, x_3) = (x_1 + 2x_2 + x_3, -x_2, x_1 + 4x_3)$. Let α be the standard basis and let $\beta = \{v_1, v_2, v_3\}$ be another basis consisting of $v_1 = (1, 0, 0), v_2 = (1, 1, 0)$ and $v_3 = (1, 1, 1)$ for $\mathbb{R}^3$. Find the associated matrix of T with respect to α and the associated matrix of T with respect to β. Are they similar?	10M
	OR	
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 T with respect to α and the associated matrix of T with respect to β. Are they similar?	10M
Q.6(A)	Find an orthogonal basis for $\mathbb{R}^3$ with the Euclidean inner product by applying the Gram-Schmidt orthogonalization to the vectors $x_1 = (1, 0, 1)$, $x_2 = (1, 0, -1)$, $x_3 = (0, 3, 4)$.	10M
	OR	
Q.6(B)	Find all the least square solutions to $Ax = b$, where $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 2 \\ -1 & 1 & -1 \\ -1 & 2 & 0 \end{bmatrix}, b = \begin{bmatrix} 3 \\ -3 \\ 0 \\ -3 \end{bmatrix}$.	10M

*** END***

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

Question Paper Code: 18MAT106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations –SEPTEMBER 2021

LINEAR ALGEBRA AND TRANSFORM CALCULUS

(EEE)

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.1	i.	Find the rank of the matrix $A=\begin{bmatrix}0 & 4 & 0\\ 2 & 0 & 2\\ 0 & 11 & 0\end{bmatrix}$.	1M
	ii.	Find the eigen values of A^{-1} where $A=\begin{bmatrix}3 & 0\\ 5 & 11\end{bmatrix}$	1M
	iii.	Verify Cauchy-Riemann equations for the function $f(z)=z^2$ at $z=0$.	1M
	iv.	Find the residue at $z=0$ of the function $f(z)=\frac{\sin z}{z}$.	1M
	v.	Find the Laplace transform of $3\cos 3t.\cos 4t$	1M
	vi.	State Convolution theorem	1M
	vii.	Define fourier sine and cosine transforms	1M
	viii.	Find the fourier cosine transform of e^{-ax}, $a>0$ and hence deduce the inverse formula	1M
	ix.	Find the value of Z-transform of n^p.	1M
	x.	State change of scale property for Z-transform.	1M

Q.2(A)	Solve the system of linear equations $x+y+w=3$; $-17x+y+2z-3w=1$; $17x+8y-5z+4w=1$; $-5x-2y+z=1$.	10M
	OR	
Q.2(B)	Reduce the quadratic form $3x^2+5y^2+3z^2-2yz+2zx-2xy$ to the canonical form and specify the matrix of transformation.	10M
Q.3(A)	Show that the function $f(z)=\sqrt{\lvert xy\rvert}$ is not analytic at the origin even through C.R equations are satisfied.	10M
	OR	
Q.3(B)	Evaluate $\int_C \frac{z^2-z+1}{z-1}dz$ where C is the circle (a). $\lvert z\rvert=2$ (b) $\lvert z\rvert=1.5$ (c). $\lvert z\rvert=\frac{1}{2}$	10M
Q.4(A)	Find the Laplace transforms of (a). t^3e^{-3t} (b) $te^{-t}\sin 3t$	10M
	OR	
Q.4(B)	Solove the equation by the transform method $y''-3y'+2y=e^{3t}$, $y(0)=1$, $y'(0)=0$.	10M

Q.5(A) Find the Fourier transform of f(x) $= \begin{cases} a^2 - x^2, |x| < a \\ 0, |x| > a \end{cases}$ Hence show that 10M

$$\int_0^\infty \frac{\sin x - x\cos x}{x^3} dx = \frac{\pi}{4}.$$

OR

Q.5(B) Find the Fourier sine transform of $e^{-|x|}$. 10M

Hence show that $\int_0^\infty \frac{x\sin mx}{1+x^2} dx = \frac{\pi e^{-m}}{2}, \ m > 0.$

Q.6(A) Find the Z-transform of the following (a). $3n - 4\sin\frac{n\pi}{4} + 5a$ (b). $(n+1)^2$. 10M

OR

Q.6(B) Find the inverse Z-transform of $\frac{2(z^2 - 5z + 6.5)}{(z-2)(z-3)^2}$ *for* $2 < |z| < 3$ 10M

*** END***

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

Question Paper Code: 18MAT107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – September 2021

LINEAR ALGEBRA COMPLEX VARIABLES & ORDINARY DIFFERENTIAL EQUATIONS

(Common to ME, ECE)

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

			Marks
Q.1	i.	Find the rank of the matrix A= $\begin{pmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{pmatrix}$.	1M
	ii.	Evaluate determinant of A, where A is a square matrix of order 3 with eigen values 2, 3 and 7.	1M
	iii.	Is the function $f(z) = z^2$ is analytic or not?	1M
	iv	Evaluate all values of $z = x + iy$ such that e^z= -2	1M
	v.	Define type of singularity at $z = 0$ for $f(z) = \frac{\sin z}{z}$.	1M
	vi	Find the residue at $z = 0$ for $f(z) = z\cos(\frac{1}{z})$.	1M
	vii.	Write a differential equation with order 1 but not degree 1.	1M
	viii.	Classify that the following differential equation is either linear or non-linear $e^x \frac{dy}{dx} + 3y = x^2 y$.	1M
	ix.	Find complementary function for the differential equation $x^2 \frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = x$.	1M
	x.	Write a shifting property for the inverse Laplace transform.	1M

Q.2(A) Find the Eigen values and Eigen vectors of the matrix $A = \begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$. **10M**

OR

Q.2(B) Investigate the values of α and β for which the system of equations **10M**

$$x + \alpha y + z = 3$$
$$x + 2y + 2z = \beta$$
$$x + 5y + 3z = 9$$

are consistent. When will these equations have a unique solution?

Q.3(A) Verify Cauchy Riemann equations at $z = (0,0)$ for the function defined by **10M**

$$f(z) = \begin{cases} \frac{\bar{z}^2}{z} & \text{when } z \neq 0 \\ 0 & \text{when } z = 0 \end{cases}$$

and show that $f'(z)$ does not exist at $z = (0,0)$

OR

Q.3(B) i) Show that $\log e = 1 + 2n\pi i$, $(n = 0, \pm 1, \pm 2, \pm 3, \ldots\ldots)$. **5M**

ii) Evaluate principal value of $(1 - i)^{4i}$ **5M**

Q.4(A)	To evaluate $\int_c f(z)dz$ where $f(z) = \pi e^{(\pi \bar{z})}$ and C is the boundary of the square with vertices at the points $0, 1, 1+i$ and i, the orientation of C being in the counter clockwise direction.	10M
	OR	
Q.4(B)	Give two Laurent series expansions in powers of z for the function $f(z) = \frac{1}{z^2(1-z)}$ and specify the regions in which those expansions are valid.	10M

Q.5(A)	i. Solve $x\frac{dy}{dx} + y = x^3y^6$	5M
	ii. Solve $sec^2y\frac{dy}{dx} + x\,tan\,y = x^3$	5M
	OR	
Q.5(B)	Solve $y\,p^2 + (x-y)p - x = 0$	10M

Q.6(A)	Solve $x^2y'' + xy' + y = log\,x\,sin(logx)$	10M
	OR	
Q.6(B)	$Solve\ y'' + 2y' - 3y = sint$, given that $y(0) = y'(0) = 0$	10M

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

Question Paper Code: 18EEE101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – SEPTEMBER 2021

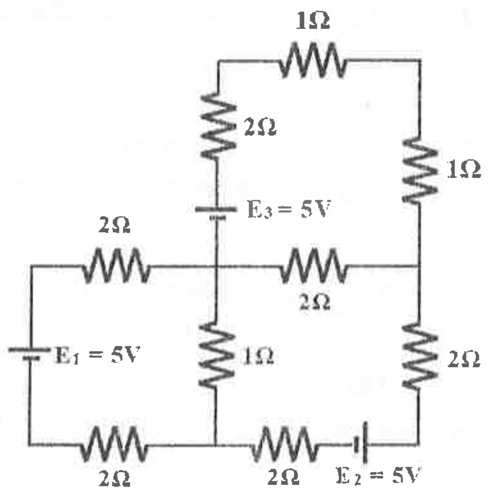
BASIC ELECTRICAL ENGINEERING

(Common to All)

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

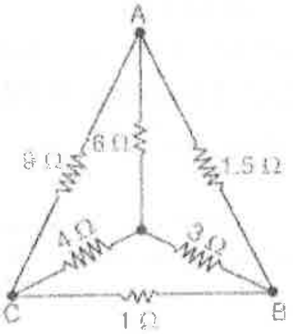
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only

			Marks	CO	BL
Q.1	i.	A 100 W electric light bulb is connected to a 250V supply. Determine the resistance of the bulb	1M	1	2
	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	2
	iv.	Define power factor.	1M	2	1
	v.	State Faraday's law of electromagnetic induction.	1M	3	1
	vi.	What is condition for maximum efficiency in transformer?	1M	3	1
	vii.	What are the parameters represented by Fleming's right-hand rule used in DC generator?	1M	4	1
	viii.	Define Slip of an induction motor.	1M	4	1
	ix.	How will an ideal diode behave in an electric circuit, when it is forward biased?	1M	5	1
	x.	Expand MCCB.	1M	5	1
Q.2(A)		Apply the node method to find battery currents in the circuit shown below.	10M	1	3



OR

Q.2(B)	A network of resistors is shown in figure, find the resistance (i) between terminals A and B (ii) B and C and (iii) C and A.	10M	1	3



Q.3(A)	Two coils A and B are connected in series across a 240 V, 50 Hz supply. The resistance of A is 5 Ω and the inductance of B is 0.015H. If the input from the supply is 3 kW and 2kVAR, find the inductance of A and the resistance of B. Calculate the voltage across each coil.	10M	2	2
	OR			
Q.3(B)	(i) Write the advantages of 3-phase systems	3M	2	1
	(ii) 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.	7M	2	2
Q.4(A)	(i) An iron ring of mean diameter 10cm is uniformly wound with 2000 turns of wire. When a current of 0.25 A is passed through the coil a flux density of 0.4 T is set up in the iron. Find (a) the magnetizing force and (b) the relative permeability of the iron under these conditions.	4M	3	2
	(ii) Draw and explain hysteresis loop of a ferro magnetic material.	6M	3	1
	OR			
Q.4(B)	(i) Explain the construction and working principle of a single-phase transformer.	5M	3	2
	(ii) Derive the emf equation of a transformer.	5M	3	2
Q.5(A)	With the help of neat sketch, explain the constructional details of a DC machine.	10M	4	2
	OR			
Q.5(B)	Explain how rotating magnetic field is produced in the stator of an induction motor. Also discuss principle of operation of three phase induction motor.	10M	4	2
Q.6(A)	Discuss in details the operation of a half wave rectifier with a neat circuit diagram and relevant waveforms.	10M	5	2
	OR			
Q.6(B)	Explain the working of a switch fuse unit (SFU). Also mention its advantages and disadvantages.	10M	5	2

*** END***

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 18CSE102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations SEPTEMBER 2021

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 Part-A or B only

			Marks	CO	BL
Q.1	i.	What is a variable?	1M	1	1
	ii.	Compare break and continue statements	1M	1	1
	iii.	Compare Predefined and User defined functions.	1M	2	1
	iv	Define an integer array of size 3 and assign 3 values to it	1M	2	3
	v.	Write the syntax to declare a pointer variable	1M	3	1
	vi	Define structure	1M	3	1
	vii.	Abbreviate LIFO and FIFO	1M	4	1
	viii.	List out the operations performed in stack.	1M	4	1
	ix.	How strcmp( ) function works??	1M	5	1
	x.	What is a file?	1M	5	1

		Marks	CO	BL
Q.2(A)	Explain Structure of C Program with example.	10M	1	2
	OR			
Q.2(B)	a. What are C data types? Give an example b. Write a C program to display bigger and smaller of two numbers.	10M	1	1
Q.3(A)	Illustrate with example to perform binary search using array	10M	2	2
	OR			
Q.3(B)	Apply Insertion sort procedure to sort the following numbers into ascending order 95,85, 45, 75, 25, 35, 15, 55	10M	2	3
Q.4(A)	Construct a C program to swap of two numbers using pass by reference and pass by value.	10M	3	3
	OR			
Q.4(B)	Explain dynamic memory allocation and related function with example	10M	3	2
Q.5(A)	Explain the concept of stack with a neat diagram	10M	4	2
	OR			
Q.5(B)	Discuss in detail about queue and its operations	10M	4	6
Q.6(A)	Explain any four string handling functions with example	10M	5	2
	OR			
Q.6(B)	Explain major file operations in C with example	10M	5	3

*** END***

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

Question Paper Code: 18MAT105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – SEPTEMBER 2021

CALCULUS AND DIFFERENTIAL EQUATIONS

(EEE)

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.	State Lagrange's Mean Value Theorem	1M	1	1
	ii.	Find the length of the curve $y = x$ from $x = 0$ to $x = 4$.	1M	1	1
	iii.	Write Mixed derivative theorem.	1M	2	1
	iv	Find $\lim_{\substack{x\to 2\\ y\to 2}} \frac{xy+1}{x^2+2y^2}$	1M	2	1
	v.	valuate $\iint_R dA$, when $0 \le r \le 2, 0 \le \theta \le 2\pi$	1M	3	2
	vi	State Stokes Theorem.	1M	3	1
	vii.	Define Order of a Differential Equation.	1M	4	1
	viii.	Write the general solution of second order differential equation.	1M	4	1
	ix.	What are the conditions for convergence of a series in Ratio test.	1M	5	1
	x.	Test the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{n^{7/2}}$	1M	5	1
Q.2(A)		Verify Rolle's theorem for the function $f(x) = \frac{Sinx}{e^x}$ in $(0, \pi)$	10M	1	3
		OR			
Q.2(B)		Find the area of the polar curve $r = a(1-\cos\theta)$	10M	1	3
Q.3(A)		Find $\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}, \frac{\partial^2 f}{\partial x^2}, \frac{\partial^2 f}{\partial y^2}, \frac{\partial^2 f}{\partial x \partial y}$ and $\frac{\partial^2 f}{\partial y \partial x}$ for the function $f(x, y, z) = \log(x + 2y + 3z)$	10M	2	3
		OR			
Q.3(B)		Find the derivative of $f(x, y, z) = x^3 - xy^2 - z$ at the point (1, 1, 0) in the direction of $v = 2i - 3j + 6k$	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)		Verify divergence theorem for the expanding vector field $F = x\bar{i} + y\bar{j} + z\bar{k}$ over the sphere $x^2 + y^2 + z^2 = a^2$.	10M	3	4

Q.5(A)	Solve $x\log x\frac{dy}{dx}+y=\log x^{2}$	10M	4	3
	OR			
Q.5(B)	Solve $y''-6y'+13y=8e^{3x}Sin2x$	10M	4	3
Q.6(A)	Form the partial differential equations by eliminating the arbitrary constants and functions from the following $i)\ (x-a)^{2}+(y-b)^{2}+z^{2}=r^{2}$ $ii)\ z=xy+f\left(x^{2}+y^{2}\right)$	10M	5	3
	OR			
Q.6(B)	Determine the series converges or diverges $\sum_{n=1}^{\infty}\frac{2^{n}}{n^{3}}$	10M	5	3

*** END***

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

Question Paper Code: 18MAT101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – SEPTEMBER 2021

ENGINEERING CALCULUS

(Common to CE,ME, ECE, CSE, CSIT & CST)

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

			Marks	CO	BL
Q.1	i.	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
	ii.	Define Gamma function.	1M	1	1
	iii.	State the Lagrange's mean value theorem.	1M	2	1
	iv	Find the limit of $\underset{x\to\infty}{Lt} \frac{\ln x}{2\sqrt{x}}$	1M	2	1
	v.	State Alternating series test	1M	3	1
	vi	If $f(x) = e^x$ in $0 < x < 1$ then determine a_0	1M	3	1
	vii.	Evaluate $\frac{dw}{dt}$ if $w = xy$, $x = \cos t$ and $y = \sin t$	1M	4	1
	viii.	Find the gradient of the function $f(x,y) = y - x$ at $(2,1)$	1M	4	1
	ix.	Write the parameterization form of $x^2 + y^2 + z^2 = a^2$.	1M	5	1
	x.	Find the $Curl F$ when $F = (x^2 - z)i + xe^z j + xy k$	1M	5	1

		Marks	CO	BL
Q.2(A)	Find the area of the polar curve r = a sin 2θ	10M	1	3
	OR			
Q.2(B)	i. Show that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$	5M	1	3
	ii. Evaluate the value of $\int_0^{\frac{\pi}{2}} \sqrt{\tan\theta}\, d\theta$	5M	1	3

Q.3(A)	i. Verify Rolle's theorem for $f(x)=(x+2)^3(x-3)^4$ in $(-2,3)$	5M	2	3
	ii. Verify the Cauchy's mean value theorem for the functions e^x and e^{-x} in the interval (a,b)	5M	2	3
	OR			
Q.3(B)	i. Evaluate $\underset{x\to 0}{Lt}\left(\frac{1^x+2^x+3^x}{3}\right)^{\frac{1}{x}}$	5M	2	3
	ii. 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	5M	2	3
Q.4(A)	Determine whether the following series converges or diverges. i) $\sum_{n=1}^{\infty}\frac{(n+1)(n+2)}{n!}$ ii) $\sum_{n=1}^{\infty}(-1)^n\frac{n}{n^2+1}$	10M	3	4
	OR			
Q.4(B)	Obtain the Fourier series for $f(x)=x^2$ in $-\pi\le x\le\pi$.	10M	3	3
Q.5(A)	Find $\frac{\partial w}{\partial u}$ and $\frac{\partial w}{\partial v}$, if $w=xy+yz+zx,\ x=u+v,\ y=u-v,\ z=uv$ at $(1,2)$	10M	4	3
	OR			
Q.5(B)	Find the local extreme values of function $f(x,y)=x^3-y^3-2xy+6$	10M	4	3
Q.6(A)	Evaluate $\int_0^{\pi}\int_0^{\pi}\int_0^{2\sin\phi}\rho^2\sin\phi\,d\rho\,d\phi\,d\theta$	10M	5	3
	OR			
Q.6(B)	Verify divergence theorem for the expanding vector field $F=x\bar{i}+y\bar{j}+z\bar{k}$ over the sphere $x^2+y^2+z^2=a^2$.	10M	5	

*** END***

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 18CHE101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC - AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – SEPTEMBER 2021

ENGINEERING CHEMISTRY

(Common to all)

Time: 3 Hours   **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

			Marks	CO	BL
Q.1	i.	List the ions responsible for hardness in water.	1 M	1	1
	ii.	Define alkalinity.	1 M	1	1
	iii.	State Pauli's exclusion principle.	1 M	2	1
	iv	Define ionization potential?	1 M	2	1
	v.	State Beer-Lamberts Law.	1 M	3	1
	vi	What are Stokes and Anti Stokes line	1 M	3	1
	vii.	State the first law of thermodynamics.	1 M	4	1
	viii.	What is a fuel cell?	1 M	4	1
	ix.	Name any two allotropes of Carbon.	1 M	5	1
	x.	What is the role of gypsum in Portland cement manufacturing?	1 M	5	1
Q.2(A)		Explain with neat diagram, the ion exchange process to get de-ionized water and write down the disadvantages of this process.	10 M	1	5
		OR			
Q.2(B)		Discuss the treatment of water for civic purpose.	10 M	1	6
Q.3(A)		Explain the S_N1 and S_N2 reactions with examples.	10 M	2	5
		OR			
Q.3(B)		**(i)** Briefly explain Aufbau principle and Hund's rule.	4 M	2	5
		(ii) Draw the structure of the following molecules using VSEPR Theory (a) $BeCl_2$, (b) CH_4, (c) SO_2.	6 M	2	3
Q.4(A)		Describe the working principle and applications of NMR Spectroscopy.	10 M	3	5
		OR			
Q.4(B)		Discuss the principle and applications of UV-Vis Spectroscopy.	10 M	3	6
Q.5(A)		Elaborate on the estimation of Entropy of an isothermal, isobaric, and isochoric processes.	10 M	4	6
		OR			
Q.5(B)		Explain the working principle, applications, advantages and disadvantages of Lead acid battery.	10 M	5	5
Q.6(A)		Elaborate the preparation of Portland Cement with neat diagram.	10 M	5	6
		OR			
Q.6(B)		Explain the Carbon Nanotube (CNT) growth process by CVD method.	10 M	5	2

*** *END****

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

Question Paper Code: 18PHY103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations –SEPTEMBER 2021

PHYSICS: ELECTROMAGNETIC THEORY

(ECE)

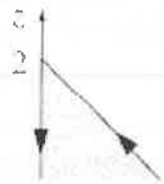
Time: 3Hrs **Max Marks: 60**

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

			Marks	CO	BL
Q.1	i.	Mention the conditions for Solenoidal field.	1M	CO1	1
	ii.	Evaluate the integral $\int_{-2}^{2}(2x+3)\delta(3x)dx$ (use Dirac delta function)	1M	CO1	3
	iii.	Write relationship between the potential gradient and electric field.	1M	CO2	1
	iv	Define coulomb's law.	1M	CO2	1
	v.	What is electric dipole moment?	1M	CO3	1
	vi	Express the relation between electric displacement **D** and Electric Field **E**?	1M	CO3	1
	vii.	What is cyclotron frequency?	1M	CO4	1
	viii.	Write Ampere's law.	1M	CO4	1
	ix.	Write Lorentz force equation.	1M	CO5	1
	x.	What is self-inductance?	1M	CO5	1

Q.2(A) i) What is divergence explain physical significance? Calculate divergence for the given vector, **V** = $y^2\,\hat{x}+(2xy+z^2)\,\hat{y}+2yz\,\hat{z}$. — 4M — CO1 — 2

ii) What is fundamental Theorem of Curl (Stokes theorem)? Test stokes theorem for the function $\vec{V} = xy\hat{\imath} + (2xy)\hat{\jmath} + 3xz\hat{k}$ the triangular shaded area as shown in the figure. — 6M — 4



OR

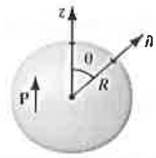
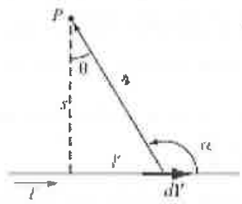
Q.2(B) Explain the spherical coordinate system and derive the unit vectors $(\hat{r},\hat{\theta},\hat{\emptyset})$ in terms of Cartesian unit vectors $(\hat{\imath},\hat{\jmath},\hat{k})$. — 10M — CO1 — 3

Prove the following vector identities in the spherical coordinate system
$\hat{r}.\hat{r} = \hat{\theta}.\hat{\theta} = \hat{\phi}.\hat{\phi} = 1$

Q.3(A) Define Gauss's law in electrostatics. Obtain Integral and differential form of Gauss's law. What are the limitations in it? — 10M — CO2 — 2

Use Gauss's law to find the electric field inside and outside a spherical shell of radius R that carries a uniform surface charge density σ(r).

OR

Q.3(B)	i) Discuss about Poisson's equation and Laplace's equation in electrostatics. On what conditions Poisson's Equation reduces to Laplace's Equation?	3M	CO2	2
	ii) Obtain boundary conditions for electric field ($\boldsymbol{E}_{\parallel}$, $\boldsymbol{E}_{\perp}$ and $\boldsymbol{E}_{tot}$) and electrostatic potential $\vec{\boldsymbol{V}}$ at a boundary between plane conductor and free space, use Guassian Pillbox.	7M	CO2	3
Q.4(A)	Define the electrostatic terms 1) polarization '**P**', 2) electric displacement '**D**', 3) susceptibility χ, 4) Dielectric constant ϵ_r and give physical significance of each quantity. Obtain a relation between χ and ϵ_r.	10M	CO3	3
	OR			
Q.4(B)	i) Find the torque for a polar molecule induced by a uniform electric field.	4M	CO3	4
	ii) Find the electric potential and field produced by a uniformly polarized sphere of radius *R*. inside and outside 	6M	CO3	3
Q.5(A)	State and explain Biot-Savart's law. Find the magnetic field a distance 's' from a long straight wire carrying a steady current *I* as shown in figure? 	10M	CO4	
	OR			
Q.5(B)	Define magnetization. Give the classification of different types of magnetic materials. Explain Ampere's law in case of magnetized materials.	10M	CO4	3
Q.6(A)	i) Write four Maxwell's equations (either in differential form or integral form). Why Maxwell modified Amperes law?	7M	CO5	2
	ii) What is emf? Derive the expression for motional emf.	3M	CO5	
	OR			
Q.6(B)	Using Maxwell's equations derive expression for the plain wave electromagnetic in free space and show that the electric field **E** and magnetic field **B** vectors satisfies the three-dimensional wave equation and mutually perpendicular. What is the velocity of this wave in free space?	10M	CO5	3

*** END***

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

Question Paper Code: 18PHY101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations –SEPTEMBER 2021

ENGINEERING PHYSICS

(Common to CE & ME)

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

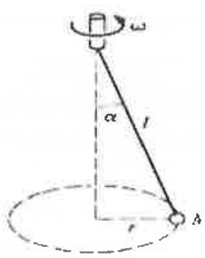
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

			Marks	CO	BL
Q.1	i.	Write an expression for velocity in polar coordinates.	1M	CO1	1
	ii.	When a constant force of 25 N acts on two masses 5 Kg and 10 Kg. What is the ratio of their acceleration?	1M	CO1	2
	iii.	State the law of conservation of linear momentum.	1M	CO2	1
	iv	What is the minimum velocity required for 100 kg object to escape from the surface of the Earth?	1M	CO2	2
	v.	If the amplitude of SHM is '*A*' and time period '*T*' What is the speed of the pendulum in SHM at $x = A/2$?	1M	CO3	2
	vi	Waves on strings are always transverse. Why?	1M	CO3	1
	vii.	What is the relationship between the path difference and phase difference?	1M	CO4	1
	viii.	What is grating element?	1M	CO4	1
	ix.	Define Pumping mechanism in LASER system.	1M	CO5	1
	x.	Give any two applications of LASER.	1M	CO5	1

Q.2(A) Derive the expression for the acceleration in polar coordinates by starting from position $\vec{r} = r\hat{r}$ of the particle and explain each terms in the expression. — 10M, CO1, 3

OR

Q.2(B) Mass M hangs from a string of length 'l', which is attached to a rod rotating at constant angular frequency 'ω', as shown in the diagram. The mass moves with steady speed in a circular path of constant radius. Find 'α', the angle the string makes with the vertical and discuss the result. — 10M, CO1, 4



Q.3(A) i) Derive rocket equation — 5M, CO2, 3

ii) Discuss the motion of a rocket under a constant gravitational field. — 5M, CO2, 3

OR

Q.3(B) With the help of work-energy theorem, deduce the expression for escape velocity for an object of mass '*m*' projected vertically upward. — 10M, CO2, 4

Q.4(A)	i) What are Lissajous figures? On what factor Lissajous figure depends?	3M	CO3	2
	ii) Construct the Lissajous figures for the motion described by $x = \cos(2\pi t)$ and $y = \cos(2\pi t + \pi/2)$.	7M	CO3	4
	OR			
Q.4(B)	What are damped oscillations? Derive the differential equation for damped oscillations. Discuss the various cases of damped harmonic oscillator	10M	CO3	3
Q.5(A)	Derive the formula for refractive index of transparent liquid by using Newton's ring method?	10M	CO4	3
	OR			
Q.5(B)	Describe Fraunhofer diffraction due to double slit with a suitable diagram. And obtain the conditions for maxima, minima, and secondary maxima intensities in the diffracted spectrum.	10M	CO4	3
Q.6(A)	Derive the relation between the probabilities of spontaneous emission and stimulated emission in terms of Einstein's coefficients?	10M	CO5	4
	OR			
Q.6(B)	With the help of neat diagram, explain the construction and working of Ruby (solid-state) laser.	10M	CO5	4

*** END***

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

Question Paper Code: 18PHY102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations –SEPTEMBER 2021

MODERN PHYSICS

(Common to EEE, CSE & CST)

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

			Marks	CO	BL
Q.1	i.	If the amplitude of SHM is '*A*' and time period '*T*'. Calculate the speed of the pendulum in SHM at $x = A/2$?	1M	CO1	2
	ii.	Waves on strings are always transverse. Why?	1M	CO1	1
	iii.	What is the relationship between the path difference and phase difference?	1M	CO2	1
	iv	Write the conditions to get interference pattern.	1M	CO2	1
	v.	What is de Broglie's hypothesis of matter waves?	1M	CO3	1
	vi	Define wave function Ψ.	1M	CO3	1
	vii.	Differentiate intrinsic and extrinsic semiconductors.	1M	CO4	1
	viii.	What are the majority charge carriers in p-type and n-type semiconductors?	1M	CO4	1
	ix.	Define Pumping mechanism in LASER system.	1M	CO5	1
	x.	Give any two applications of LASER.	1M	CO5	1

		Marks	CO	BL
Q.2(A)	i) What are Lissajous figures? On what factor Lissajous figure depends?	2M	CO1	2
	ii) Construct the Lissajous figures for the motion described by $x = \cos(\omega t)$ and $y = \cos(\omega t + \pi/2)$.	8M	CO1	4
	OR			
Q.2(B)	What are damped oscillations? Derive the differential equation for damped oscillations. Discuss the various cases of damped harmonic oscillator.	10M	CO1	3
Q.3(A)	Describe the formation of Newton's rings with necessary theory, derive an expression for determination of radius of curvature of a curved surface of plano convex lens.	10M	CO2	3
	OR			
Q.3(B)	Describe Fraunhoffer diffraction due to double slit with a suitable diagram. Derive the expression for its resultant intensity and discuss corresponding terms.	10M	CO2	3

Q.4(A)	Derive Schrodinger's time independent and time dependent wave equations.	10M	CO3	3
	OR			
Q.4(B)	Write down Schrodinger equation for a quantum mechanical particle confined in a potential box defined as $V(x) = 0$ for $0 \le x \le a$ and $V(x) = \infty$ otherwise. Obtain the energy eigenvalues and Eigen functions for this particle in the ground, 1^{st} and 2^{nd} excited states.	10M	CO3	4
Q.5(A)	Describe the construction and working of PN junction diode. Explain I-V Characteristics of a PN junction diode under forward bias and a reverse bias with suitable diagrams.	10M	CO4	3
	OR			
Q.5(B)	i) On the basis of band theory, explain how the solids are classified into metals, semiconductors and insulators?	7M	CO4	3
	ii) Distinguish between direct and indirect band gap semiconductors.	3M	CO4	4
Q.6(A)	Deduce the relation between the probabilities of spontaneous emission and stimulated emission in terms of Einstein's coefficients?	10M	CO5	4
	OR			
Q.6(B)	Explain the construction of Ruby (solid-state) laser working principle with a neat diagram.	10M	CO5	4

*** END***

pilgrims come to bathe and worship because the place is supposed to be holy. In the north western region of India, travellers often cross the tributaries of Indus and see strange and beautiful sights. Here we have one of the rarest places of pilgrimage. This is Manimahesh situated beside the beautiful lake of the same name. To reach it, pilgrims trek along the river Ravi. Just beyond are the beautiful Kulu and Kangra Valleys, known for their delicious fruits and works of art.

Questions
(1) Why do people bathe and worship where two or more rivers meet?
(2) Where do we find the holy places in India generally?
(3) Why do people other than the pilgrims visit our holy places?
(4) Name the river that leads the travellers to Manimahesh.
(5) Pick out a word from the passage which means 'a river or a stream that flows into a larger one or a lake'.

OR

Q.3(B) Write your opinion on any one of the following topics — 10M

1. Online education
2. Corona virus : Impact on Global economy

Q.4(A) Correct the following sentences — 10M

1. We came by walk.
2. Our exams begin from December 16, 2020.
3. Sun rises in the east.
4. She sat besides her sister.
5. She has male voice.

OR

Q.4(B) Imagine that you are introducing your friend to your father by highlighting his background, personality, unique qualities and his association with you. — 10M

Q.5(A) Write a conversation between two girls discussing their ambitions in their life. — 10M

OR

Q.5(B) You are the sports secretary of your college; write a letter to the sports dealer who has sent you defective sports items. Ask for reimbursement or replacement. — 10M

Q.6(A) Write a report on a fire accident in one of the godowns of an industry and suggest the measures for avoiding such accidents in future. — 10M

OR

Q.6(B) Assume that recently you have purchased a dish washer from Modern electric equipment in Madanapalle. The appliance has not performed up to your expectations. Draft an e-mail informing the company about the cause of your dissatisfaction and seek an appropriate replacement/claim in this regard. — 10M

***** END*****

Hall Ticket No: Question Paper Code: 18ENG101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech. I Year I & II Semester (R18) Supplementary End Semester Examinations – SEPTEMBER 2021

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.1 i. Fill in the blanks using the word given in the bracket. 1M

The researchers ______________________(travel)several countries in order to collect more significant data.

ii. Subject + has/have + verb (past participle) is the form of present perfect continuous. (**True** or **False**) 1M

iii. Put the verbs in brackets into the past perfect tense. 1M
I (do) my work.

iv. Fill in the blanks with appropriate answer from the given options 1M
I did my homework when I ____________________(watch) television.

1. Was watching
2. Watched
3. Has watching
4. None of the above

v. What is the synonym of the word 'awful' 1M

vi. What is the antonym of the word 'Mischievous' 1M

vii. Change the following sentence from ***Direct speech to Indirect speech.*** 1M
I said to him, "You have taken your turn"

viii. Write one word by using the prefix – super 1M

ix. Write one word by using the suffix – esque 1M

x. What is body language? 1M

Q.2(A) Write an essay on your admiring personality in your life. 10M

OR

Q.2(B) Write two short paragraphs of comparison on any one of the following topics. The word limit should not exceed 200. 10M

a. Generation gap
b. Value of discipline in life

Q.3(A) Read the following passage carefully and answer the questions below. 10M

India is a land of pilgrims and pilgrimages. These holy places whether in the hills or in the plains, are generally situated on river banks or by the sea. It is not only religious people who visit these places of pilgrimage. Also travellers and sight seers from all over India and even from abroad visit these. Wherever two or more rivers meet,