Hall Ticket No: ☐☐☐☐☐☐☐☐☐☐    Question Paper Code: 20EEE101

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
**B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024**
## 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 A or B only**

| Q.No | | Question | Marks | CO | BL |
|---|---|---|---|---|---|
| Q.1 | i. | Draw theV-I characteristic of an ideal current source. | 1M | 1 | 1 |
| | ii. | Define an ideal voltage source | 1M | 1 | 1 |
| | iii. | Define phase and phase difference. | 1M | 2 | 1 |
| | iv | A supply voltage has a mean value of 175V. Determine its maximum value and its RMS value. | 1M | 2 | 1 |
| | v. | What is an ideal transformer? | 1M | 3 | 1 |
| | vi | Write the expression for efficiency of transformer. | 1M | 3 | 1 |
| | vii. | In a DC generator, which element is used to convert the A.C. voltage into D.C. voltage? | 1M | 4 | 1 |
| | viii. | Write the applications of three phase slip ring induction motor. | 1M | 4 | 1 |
| | ix. | How is MCCB different from MCB? | 1M | 5 | 1 |
| | x. | What is the importance of earthing? | 1M | 5 | 1 |
| Q.2(A) | | Solve the following circuit using node voltage method and find $V_a$, $V_b$ and $V_c$. | 10M | 1 | 3 |
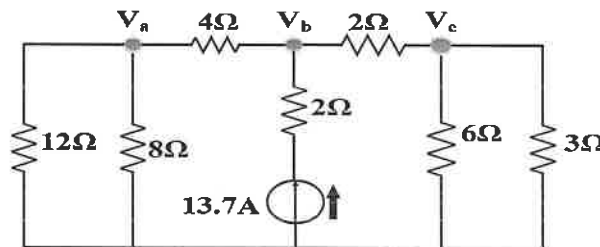


OR

| Q.2(B) | Derive the expression for equivalent star resistances of delta connected system. | 10M | 1 | 2 |
|---|---|---|---|---|
| Q.3(A) | A three-phase, balanced delta-connected load of $(4+j8)\Omega$ is connected across a 400V, three-phase balanced supply. Determine the phase currents and line currents. Assume the phase sequence to be RYB. Also, calculate the different powers drawn by the load. | 10M | 2 | 3 |

OR

| Q.3(B) | An alternating current is given by I = 14.14sin 377t. Find (i) RMS Value of the current (ii) Frequency (iii)Instantaneous value of the current when t = 3ms (iv) Time taken by the current to reach 10A for the first time. | 10M | 2 | 3 |
|---|---|---|---|---|
| Q.4(A) | What is an equivalent circuit of transformer? Draw the equivalent circuit of a transformer with respect to (a) primary side (b) secondary side. | 10M | 3 | 2 |

OR

| Q.4(B) | Briefly explain the determination of efficiency and regulation of transformer with the relevant diagrams. | 10M | 3 | 2 |
|---|---|---|---|---|

| Q.5(A) | (i) Explain the principle of operation of three phase induction motor. | 6M | 4 | 2 |
| | (ii) A three-phase, four-pole induction motor is supplied from three phase, 50Hz AC supply. | 4M | 4 | 3 |
| | Calculate (a) synchronous speed, (b) rotor speed when slip is 4%, (c) rotor frequency when rotor runs at 600rpm. | | | |

<div align="center">OR</div>

| Q.5(B) | Explain the working of DOL starter. Also, write its advantages and disadvantages. | 10M | 4 | 2 |

| Q.6(A) | Discuss in details the operation of a bridge rectifier with a neat circuit diagram and relevant waveforms. | 10M | 5 | 3 |

<div align="center">OR</div>

| Q.6(B) | Discuss any TWO of the following | 10M | 5 | 2 |
| | (i) PN Junction diode | | | |
| | (ii) Earthing | | | |
| | (iii) Fuse | | | |

<div align="center">*** END***</div>

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
## B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024
## 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. | Solve the system $\begin{bmatrix} 3 & 1 \\ -2 & 4 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ | 1M | 1 | 2 |
| | ii. | What are the Eigen vectors of a matrix $A = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$? | 1M | 1 | 1 |
| | iii. | Determine the singular points of the function $f(z) = \dfrac{z^2 - 2z + 3}{(z+7)^2(z-1)}$ | 1M | 2 | 2 |
| | iv | Find the residue at $z = 0$ of the function $f(z) = z\sin\left(\dfrac{1}{z}\right)$ | 1M | 2 | 1 |
| | v. | Find $L\{\cos^2 t\}$ | 1M | 3 | 2 |
| | vi | Find $L^{-1}\left(\dfrac{120}{s^5}\right)$ | 1M | 3 | 1 |
| | vii. | If $F[f(x)] = f(p)$ then $F[f(x-a)]$? | 1M | 4 | 2 |
| | viii. | Find the Fourier cosine transform of $f(x) = x^2$. | 1M | 4 | 1 |
| | ix. | Find $Z\left((n+1)^2\right)$ | 1M | 5 | 1 |
| | x. | Find $Z^{-1}\left(\dfrac{z}{z+1}\right)$ | 1M | 5 | 2 |
| Q.2(A) | | Solve the following system of linear equations: $5x - 5y - 15z = 40$, $4x - 2y - 6z = 19$, $3x - 6y - 17z = 41$ using Gaussian Elimination | 10M | 1 | 3 |
| | | OR | | | |
| Q.2(B) | | Find eigenvalues and eigenvectors for the matrix $A = \begin{bmatrix} -4 & 8 & -12 \\ 6 & -6 & 12 \\ 6 & -8 & 14 \end{bmatrix}$ | 10M | 1 | 3 |
| Q.3(A) | | Evaluate $\displaystyle\int_c f(z)dz = \int_c \dfrac{e^{-2z}z^2}{(z-1)^3(z+2)}\,dz$ where c is $|z+2|=1$. | 10M | 2 | 3 |
| | | OR | | | |
| Q.3(B) | | Evaluate (a) $\displaystyle\int_c \dfrac{zdz}{(9-z^2)(z+i)}$, when $f(z) = \dfrac{z}{(9-z^2)}$ for $|z|=2$. | 10M | 2 | 3 |
| | | (b) $\displaystyle\int_c \dfrac{e^{2z}}{z^4}\,dz$, when $f(z) = e^{2z}$, for $|z|=1$. | | | |

| | | 10M | 3 | 3 |
|---|---|---|---|---|

Q.4(A)  Find the inverse Laplace transforms of $\dfrac{2s^2-6s+5}{s^3-6s^2+11s-6}$     10M   3   3

OR

Q.4(B)  Solove by the method of transforms, $y''+4y'+3y=e^{-t}$,   $y(0)=y'(0)=1$    10M   3   3

Q.5(A)  Find the Fourier transform of $e^{-a^2x^2}$, $\alpha<0$. Hence deduce that $e^{-x^2/2}$ is self-reciprocal in respect of Fourier transform.     10M   4   3

OR

Q.5(B)  Find the Fourier cosine transform of $f(x)=\begin{cases} x, & for\ 0<x<1 \\ 2-x, & for\ 1<x<2\,. \\ 0, & for\ x>2 \end{cases}$     10M   4   3

Q.6(A)  Find the Z-transform of the following:     10M   5   3

(a). $7n-4\sin\dfrac{n\pi}{4}+4a$

(b) $Z[(n+1)^2]$

OR

Q.6(B)  Find the response of the following system     10M   5   3
$y_{n+2}-5y_{n+1}+6y_n=1''$   $with\ y_0=0,\ y_1=1\ and\ y_n=1\ for\ \ n=0,1,2,3,\ldots\ldots$
by Z-transforms method.

*** END***

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
### (UGC-AUTONOMOUS)
## B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024
## 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 Diagonal and lower triangular matrices with examples. | 1M | 1 | 1 |
| | ii. | If 1,2,3 are eigenvalues of a matrix $A$ then find the eigenvalues of $A^2$? | 1M | 1 | 1 |
| | iii. | Find the order and degree of the differential equation $\frac{d^2y}{dx^2}+y^2=\sqrt{\left(\frac{dy}{dx}\right)}$ | 1M | 2 | 1 |
| | iv | Find the integrating factor of differential equation $\frac{dy}{dx}-xy=\sin x$. | 1M | 2 | 1 |
| | v. | Find the solution of $y'''-6y''+11y'-6y=0$. | 1M | 3 | 1 |
| | vi | Determine the Wronskian of $y_1=e^x$ and $y_2=\sin x$. | 1M | 3 | 2 |
| | vii. | Find the Laplace transform of the $f(t)=e^{-t}t$. | 1M | 4 | 2 |
| | viii. | Find inverse Laplace transform of $L^{-1}\left(\frac{1}{(s+2)^2}\right)$. | 1M | 4 | 2 |
| | ix. | Write a PDE with order 2 and degree 1. | 1M | 5 | 1 |
| | x. | Define the wave equation in one dimensional space. | 1M | 5 | 1 |
| Q.2(A) | | Test for consistency of the following set of equations and solve them if they are consistent: $5x+3y+7z=4, 3x+26y+2z=9, 7x+2y+10z=5$ | 10M | 1 | 3 |

OR

| | | | | | |
|---|---|---|---|---|---|
| Q.2(B) | | Find the eigenvalues and eigenvectors of the following matrix: $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ | 10M | 1 | 3 |
| Q.3(A) | | Solve the differential equations | | | |
| | | (i) $y'+2xy=2e^{-x^2}$ | 5M | 2 | 3 |
| | | (ii) $(x^2+y^2)dx=2xydy$ | 5M | 2 | 3 |

OR

| | | | | | |
|---|---|---|---|---|---|
| Q.3(B) | | Solve $e^x\frac{dy}{dx}=2xy^2+ye^x$ | 10M | 2 | 3 |

Q.4(A)  Solve differential equation $\dfrac{d^2y}{dx^2} - 2\dfrac{dy}{dx} + y = xe^x \sin x$     10M   3   3

OR

Q.4(B)  Solve by the method of variation of parameters $(D^2 - 2D + 1)y = e^x \log x$     10M   3   3

Q.5(A)  Find the Laplace transformation of the following:     10M   4   4

(i) $f(t) = \dfrac{e^{-t} \sin t}{t}$.   (ii) $L^{-1}\left(\dfrac{s^2 - 3s + 4}{s^3}\right)$.

OR

Q.5(B)  Using Laplace transformation Solve :     10M   4   4

$\dfrac{d^2x}{dt^2} + 9x = \cos 2t$   , if $x(0) = 1$, $x\left(\dfrac{\pi}{2}\right) = -1$

Q.6(A)  Solve the partial differential equation $\dfrac{\partial u}{\partial x} = 2\dfrac{\partial u}{\partial t} + u$ where $u(x,0) = 6e^{-3x}$     10M   5   3

OR

Q.6(B)  Find the Eigenvalues and Eigen function of $y'' + \lambda y = 0$ with condition     10M   5   4

$y(0) = 0, y'\left(\dfrac{\pi}{2}\right) = 0$.

*** END***

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
## (UGC-AUTONOMOUS)
### B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024
### LINEAR ALGEBRA, COMPLEX VARIABLE 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 consistent solution for a system of linear equations. | 1M | 1 | 1 |
| | ii. | State the rank-nullity theorem for a linear transformation. | 1M | 1 | 1 |
| | iii. | Find the principal argument of $z = -1 + i$. | 1M | 2 | 1 |
| | iv | Find singular points of $f(z) = \frac{1}{z^2+2z+2}$. | 1M | 2 | 2 |
| | v. | Find order and degree of a differential equation $(x^2 + 1)\frac{d^2y}{dx^2} - (2x - 1)\frac{dy}{dx} = e^x$. | 1M | 3 | 1 |
| | vi | Classify that the differential equation $\frac{dy}{dx} = y\,tanx - y^2\,sec\,x$ is linear or non-linear. | 1M | 3 | 1 |
| | vii. | Write the general form of Bernoulli's differential equation. | 1M | 4 | 1 |
| | viii. | Find Wronskian of the functions $y_1 = \cos 3x$ and $y_2 = \sin 3x$. | 1M | 4 | 1 |
| | ix. | Find particular integral of the differential equation $(D^2 + D)y = cosx$. | 1M | 5 | 1 |
| | x. | Define linear differential equation with an example. | 1M | 5 | 1 |

| | | | | | |
|------|------|----------|-------|----|----|
| Q.2(A) | | Using Gauss-Jordan method, find the inverse of the following matrix: $$A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}.$$ | 10M | 1 | 1 |

OR

| | | | | | |
|------|------|----------|-------|----|----|
| Q.2(B) | | Find the Eigen values and Eigen vectors of the following matrix: $$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$ | 10M | 1 | 3 |

| | | | | | |
|------|------|----------|-------|----|----|
| Q.3(A) | | Verify Cauchy Riemann equations at $z = (0,0)$ for the function defined by $$f(z) = \begin{cases} (\bar{z})^2/z, & \text{when } z \neq 0 \\ 0, & \text{when } z = 0 \end{cases}$$ and show that $f'(z)$[first order derivative] does not exist at $z = (0,0)$. | 10M | 2 | 4 |

OR

| | | | | | |
|------|------|----------|-------|----|----|
| Q.3(B) | | (a) Show that $u(x,y) = \sinh x \sin y$. is harmonic in some domain and find a harmonic conjugate v(x, y). <br> (b) Show that $\log (1 - i) = \frac{1}{2}ln2 - \frac{\pi}{4}i$. | 10M | 2 | 3 |

| Q.4(A) | Evaluate $\oint_C f(z)dz$ where $f(z) = \pi \exp(\pi \bar{z})$ 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 | 3 | 3 |
|---|---|---|---|---|

OR

| Q.4(B) | | 10M | 3 | 3 |
|---|---|---|---|---|

Determine the order of the pole and the corresponding residue

i) $f(z) = \frac{\sinh z}{z^6}$ and ii) $f(z) = \frac{1-\exp 2z}{z^4}$.

| Q.5(A) | Solve the differential equation $(x^3y^2 + x)dy + (x^2y^3 - y)dx = 0$. | 10M | 4 | 3 |
|---|---|---|---|---|

OR

| Q.5(B) | Solve the differential equation $(px - y)(px + x) = a^2 p$, (where $\frac{dy}{dx} = p$). | 10M | 4 | 3 |
|---|---|---|---|---|
| Q.6(A) | Solve the differential equation $x\frac{d^2y}{dx^2} - 2\frac{y}{x} = x + \frac{1}{x^2}$. | 10M | 5 | 4 |

OR

| Q.6(B) | Find the solution of differential equation $y'' - 2y' + 2y = e^x \tan x$ using the method of variation of parameters. | 10M | 5 | 4 |
|---|---|---|---|---|

*** END***

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
## B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024
## LINEAR ALGEBRA
(Common to CSE, CST, CSO, CAI, CSD, CSC)

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 are said to be consistent | 1M | 1 | 1 |
| | ii. | Determine the characteristic roots of the matrix $A = \begin{bmatrix} 2 & 5 \\ 0 & 7 \end{bmatrix}$ | 1M | 1 | 2 |
| | iii. | Find a polynomial $p(x) = a + bx + cx^2$ that satisfies $p(0) = 1, p'(0) = 2, p(1) = 4$. | 1M | 2 | 1 |
| | iv | Find the basis for row space for the matrix $A = \begin{bmatrix} 1 & 3 \\ 2 & 6 \end{bmatrix}$ | 1M | 2 | 2 |
| | v. | Define Isomorphism of Linear transformation. | 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 $T(x, y) = (2y, 3x - y)$ on $R^2$ with respect to the standard basis $\{e_1, e_2\}$ | 1M | 4 | 1 |
| | viii. | Find the transition matrix $[Id]_\alpha^\beta$ from $\alpha$ to $\beta$, when $\alpha = \{(5,1)(1,2)\}$ and $\beta = \{(1,0)(0,1)\}$. | 1M | 4 | 2 |
| | ix. | Determine whether $\{(1,0),(0,3)\}$ in $R^2$ is orthogonal, orthonormal nor neither with respect to the Euclidean inner product space. | 1M | 5 | 2 |
| | x. | Determine $k$ so that the vectors are orthogonal with respect to Euclidean inner product space of $R^4$ $\{(2,8,4,k),(2,-6,2,k)\}$ | 1M | 5 | 1 |
| Q.2(A) | | Find the inverse of the following matrix (if exists): $$A = \begin{bmatrix} 1 & 1 & 0 & 3 \\ 2 & 1 & -1 & 1 \\ 3 & -1 & -1 & 2 \\ -1 & 2 & 3 & -1 \end{bmatrix}$$ | 10M | 1 | 3 |

OR

| Q.2(B) | | Find the eigenvalues and eigenvectors of the matrix, $A = \begin{bmatrix} 1 & -3 & 3 \\ 0 & -5 & 6 \\ 0 & -3 & 4 \end{bmatrix}$ | 10M | 1 | 3 |

Q.3(A)  Let $W$ be the subspace of $\mathbb{R}^4$ spanned by the vectors    10M    2    3
$x_1 = (1, -2, 5, -3), x_2 = (0, 1, 1, 4)$ and $x_3 = (1, 0, 1, 0)$. Find a basis for $W$ and extend it to a basis for $\mathbb{R}^4$.

OR

Q.3(B)  Find    bases    for $R(A)$,    $N(A)$    and    $C(A)$ of    the    matrix    10M    2    3

$$A = \begin{bmatrix} 1 & -2 & 0 & 0 & 3 \\ 2 & -5 & -3 & -2 & 6 \\ 0 & 5 & 15 & 10 & 0 \\ 2 & 6 & 18 & 8 & 6 \end{bmatrix}.$$

Q.4(A)  If $T : R^3 \to R^3$ is defined by $T(x, y, z) = (2x - z, 3x - 2y, x - 2y + z)$    10M    3    3
     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

Q.4(B)  Find the unique linear transformation $T : R^3 \to R^2$ so that $M = \begin{bmatrix} 4 & 2 & 1 \\ 0 & 1 & 3 \end{bmatrix}$    10M    3    3

is the matrix of $T$ with respect to the bases
$\alpha_1 = \{(1,0,0), (1,1,0), (1,1,1)\}$ , $\alpha_2 = \{(1,0), (1,1)\}$ and find $T(x, y, z)$.

Q.5(A)  Find the transition matrix $[Id]_\alpha^\beta$ from $\alpha$ to $\beta$ and $[Id]_\beta^\alpha$ from $\beta$ to $\alpha$    10M    4    3

when $\alpha = \{(1,1,1), (1,1,0), (1,0,0)\}, \beta = \{(2,0,3), \ (-1,4,1), (3,2,5)\};$

OR

Q.5(B)  Let $T : R^3 \to R^3$ be the linear transformation defined by $T(x_1, x_2, x_3) =$    10M    4    4
$(x_1 + 2x_2 + x_3, -x_2, x_1 + 4x_3)$. Let $\alpha$ 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 $R^3$. Find the associated matrix of $T$ with respect to $\alpha$ and the associated matrix of $T$ with respect to $\beta$. Are they similar?

Q.6(A)  Let $W$ be the subspace of $\mathbb{R}^3$ spanned by the vectors    10M    5    3

$x_1 = (2, 0, 3, -6), \ x_2 = (-3, 6, 8, 0)$ and $b = (-1, 2, -1, 1)$. Find the projection matrix P for the subspace W.

OR

Q.6(B)  Find all the least square solutions to $Ax = b$, where    10M    5    4

$$A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 2 \\ -1 & 1 & -1 \\ -1 & 2 & 0 \end{bmatrix}, b = \begin{bmatrix} 3 \\ -3 \\ 0 \\ -3 \end{bmatrix}$$

*** END ***

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
## B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024
## 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**

| Q.No | | Question | Marks | CO | BL |
|---|---|---|---|---|---|
| Q.1 | i. | State Taylor's series expansion. | 1M | 1 | 1 |
| | ii. | Sketch the curve $y = x$ on the coordinate system. | 1M | 1 | 1 |
| | iii. | Write Mixed derivative theorem. | 1M | 2 | 1 |
| | iv | Define Limit of a function. | 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 Greens Theorem. | 1M | 3 | 1 |
| | vii. | Define 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 Root 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) | | Evaluate $\int_0^{\pi/2} \frac{\sqrt{Sinx}}{\sqrt{Sinx} + \sqrt{Cosx}} dx$ | 10M | 1 | 3 |
| | | OR | | | |
| Q.2(B) | | Sketch the polar curve $r = a(1-\cos\theta)$ | 10M | 1 | 3 |
| Q.3(A) | | Express $\frac{\partial w}{\partial r}$ and $\frac{\partial w}{\partial s}$ in terms of $r$ and $s$ if $w = x + 2y + z^2, x = \frac{r}{s}$, $y = r^2 + \log s$ and $z = 2r$. | 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 $f(x,y) = 100 - 6x^2 y$ 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 $e^y dx + (xe^y + 2y)dy = 0$ | 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: | 10M | 5 | 3 |

$$i)\ (x-a)^2 + (y-b)^2 + z^2 = r^2 \qquad ii)\ z = xy + f\left(x^2 + y^2\right)$$

OR

| | | | | |
|---|---|---|---|---|
| Q.6(B) | Use any method to determine the series converges or diverges. | 10M | 5 | 3 |

$$\sum_{n=1}^{\infty} \frac{(n+1)(n+2)}{n!}$$

*** END***

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
## B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024
## ENGINEERING CALCULUS
(Common to CE, ME, ECE, CSE, CST, IOT, AI, DS, CS)

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. | Write the formula for volume 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. | Find the value of $\Gamma\left(\dfrac{7}{2}\right)$ | 1M | 1 | 2 |
| | iii. | State the Lagrange's mean value theorem | 1M | 2 | 1 |
| | iv | Evaluate $\underset{x \to 0}{Lt} \dfrac{x - \sin x}{x^2}$ | 1M | 2 | 2 |
| | v. | State Alternating Series test | 1M | 3 | 1 |
| | vi | If $f(x) = e^{2x}$ in $0 < x < 1$ then determine $a_0$ | 1M | 3 | 1 |
| | vii. | If $f(x,y) = x + y + xy + \sin(x+y) + e^{2y}$ then find $\dfrac{\partial^2 f}{\partial y^2}$ | 1M | 4 | 2 |
| | viii. | Write a chain rule for $\dfrac{dz}{dt}$; when $z = f(x,y,z)$, $x = g(t)$, $y = h(t)$ and $z = k(t)$ | 1M | 4 | 1 |
| | ix. | Evaluate $\displaystyle\int_{1}^{\sqrt{3}} \int_{1}^{2x} dy\,dx$ | 1M | 5 | 2 |
| | x. | State Stoke's theorem | 1M | 5 | 1 |
| 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. | 10 M | 1 | 3 |

OR

| | | | | | |
|---|---|---|---|---|---|
| Q.2(B) | Define Gamma function and find the value of $\Gamma\left(\dfrac{1}{2}\right)$ | 10M | 1 | 3 |

| | | | | | |
|---|---|---|---|---|---|
| Q.3(A) | If $f(x) = Sin^{-1}x$, $(0 < a < b < 1)$, prove that $\dfrac{b-a}{\sqrt{1-a^2}} < \sin^{-1}b - \sin^{-1}a < \dfrac{b-a}{\sqrt{1-b^2}}$ | 10M | 2 | 3 |

OR

| | | | | | |
|---|---|---|---|---|---|
| Q.3(B) | A rectangular sheet of metal of length 6 meters and width 2 meters is given. Four equal squares are removed from the corners. The sides of this sheet are now removed from the corners. The sides of this sheet are now turned up to form an open rectangular box. Find approximately the height of the box, such that the volume of the box is maximum. | 10M | 2 | 3 |

| Q.4(A) | Determine the following series converges or diverges: | 10M | 3 | 4 |
|---|---|---|---|---|

$$\text{a) } \sum_{n=1}^{\infty} \frac{3^n}{n^3 2^n} \quad \text{b) } \sum_{n=1}^{\infty} \frac{n^2 (n+2)!}{n! 3^{2n}}$$

OR

| Q.4(B) | Find half-range cosine series for $f(x) = (x-1)^2$ in $0 < x < 1$. | 10M | 3 | 3 |
|---|---|---|---|---|

| Q.5(A) | Find all second order derivatives of | 10M | 4 | 3 |
|---|---|---|---|---|

(i). $f(x,y) = x^2 y + \cos y + y \sin x$

(ii) $f(x,y) = e^x + x \ln y + y \ln x$    and hence verify mixed derivative theorem.

OR

| Q.5(B) | Find the point on the sphere $x^2 + y^2 + z^2 = 4$ farthest from the point $(1,-1,1)$. | 10M | 4 | 3 |
|---|---|---|---|---|

| Q.6(A) | (i) Sketch the region of integration, reverse the order of integration, and evaluate the integral $\int_{0}^{1}\int_{1}^{e^x} dy\,dx$ | 5M | 5 | 3 |
|---|---|---|---|---|

| | (ii) Change the Cartesian integral $\int_{0}^{2}\int_{0}^{x} y\,dy\,dx$ into an equivalent polar integral. Then evaluate the polar integral. | 5M | 5 | 3 |
|---|---|---|---|---|

OR

| Q.6(B) | Verify Green's theorem for the vector field $F(x,y) = 2xi - 3yj$ and the region R bounded by the circle $C : r(t) = (a\cos t)i + (a\sin t)j, \quad 0 \le t \le 2\pi$ | 10M | 5 | 4 |
|---|---|---|---|---|

*** END***

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

**B.Tech I Year I & II Semesters (R20) Supplementary End Semester Examinations,
January – 2024**

## 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**

| Q.No | | Question | Marks | CO | BL |
|---|---|---|---|---|---|
| Q.1 | i. | State the difference between compiler and interpreter. | 1M | 1 | 2 |
| | ii. | List out the various data types available in C. | 1M | 1 | 1 |
| | iii. | Define an array and its advantages | 1M | 2 | 2 |
| | iv | What is meant by selection sort? | 1M | 2 | 1 |
| | v. | How do we access variables through pointers? | 1M | 3 | 1 |
| | vi | How can you declare a pointer variable? Give an example. | 1M | 3 | 1 |
| | vii. | Why files are necessary? Define file | 1M | 4 | 2 |
| | viii. | Outline the difference between 'w' and 'a' mode in files. | 1M | 4 | 1 |
| | ix. | Abbreviate LIFO and FIFO. | 1M | 5 | 1 |
| | x. | Which operation is used to insert element in stack? | 1M | 5 | 2 |
| Q.2(A) | | i) Explain the different types of looping statements with examples. <br> ii) Develop a C program to display biggest among three numbers. | 10M | 1 | 3 |
| | | OR | | | |
| Q.2(B) | | i) Write a C program to check the integer is Palindrome or not. <br> ii) Write a C program to find the sum of 10 non – negative numbers entered by the user. | 10M | 1 | 4 |
| Q.3(A) | | Illustrate and build a code to perform linear search for the following data to find the key value 82. A[10] = {36, 9, 97, 56, 21, 82, 120, 43,25,6} | 10M | 2 | 3 |
| | | OR | | | |
| Q.3(B) | | Explain multidimensional arrays with an example. | 10M | 2 | 4 |
| Q.4(A) | | How are the pointers declared and initialized? Explain how to access variables using pointer with example program. | 10M | 3 | 2 |
| | | OR | | | |
| Q.4(B) | | Explain any five string handling functions with example. | 10M | 3 | 4 |
| Q.5(A) | | Define a structure. Describe how to declare and initialize structure and its Member with an example program. | 10M | 4 | 4 |
| | | OR | | | |
| Q.5(B) | | (i)Discuss in detail about how to access members of a structure. <br> (ii) Write a C program to get 10 student details using Structures from the user and display those details on the screen. | 10M | 4 | 2 |
| Q.6(A) | | Discuss the concept of queue with a neat diagram. List the available types of queue. | 10M | 5 | 4 |
| | | OR | | | |
| Q.6(B) | | Illustrate and develop source code for implementation of stack using an array. | 10M | 5 | 3 |

*** END***

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
### (UGC-AUTONOMOUS)
## B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024
## 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**

| Q.No | | Question | Marks | CO | BL |
|---|---|---|---|---|---|
| Q.1 | i. | Why does combination of hydroxide and bicarbonate ions not exist together in alkalinity? | 1M | 1 | 2 |
| | ii. | Why is chlorination preferred over adding bleaching powder for sterilization process? | 1M | 1 | 2 |
| | iii. | Define nucleophile with a suitable example. | 1M | 2 | 2 |
| | iv | Draw the Lewis dot structure of $NH_3$. | 1M | 2 | 1 |
| | v. | Write the mathematical expression for Beer-Lamberts Law. | 1M | 3 | 1 |
| | vi | Name the reference compound used for recording NMR spectrum. | 1M | 3 | 2 |
| | vii. | Write Mayer's relation. | 1M | 4 | 2 |
| | viii. | What is a fuel cell? Give one example. | 1M | 4 | 1 |
| | ix. | What do you mean by viscosity index? | 1M | 5 | 2 |
| | x. | Name a photocatalyst used in dye-degradation technique. | 1M | 5 | 1 |
| Q.2(A) | | Explain ion exchange process with a neat diagram. Also mention any two advantages and disadvantages of this process. | 10M | 1 | 3 |
| | | **OR** | | | |
| Q.2(B) | | Explain the different steps involved in the municipal water treatment process. | 10M | 1 | 2 |
| Q.3(A) | | Discuss the $S_N1$ and $S_N2$ reaction mechanism, with suitable examples? | 10M | 2 | 3 |
| | | **OR** | | | |
| Q.3(B) | | (i) Elaborate on the oxidation state of the elements in periods and groups and compare the similarities among the elements in the groups and periods.<br>(ii) Narrate the anomalous behaviour exhibited by Copper and Chromium in their electronic configuration. | 10M | 2 | 2 |
| Q.4(A) | | Write the principle and applications of IR Spectroscopy. | 10M | 3 | 2 |
| | | **OR** | | | |
| Q.4(B) | | Discuss the principle and applications of Raman Spectroscopy. | 10M | 3 | 2 |
| Q.5(A) | | Define entropy. Explain how the entropy of the system can be estimated at pressure, temperature, and volume. | 10M | 4 | 2 |
| | | **OR** | | | |
| Q.5(B) | | Discuss the construction, charging and discharging processes and applications of Lithium –ion batteries. | 10M | 4 | 3 |
| Q.6(A) | | Describe the methodology to produce carbon nanotubes with a neat diagram and its applications. | 10M | 5 | 2 |
| | | **OR** | | | |
| Q.6(B) | | Explain the manufacturing, hardening, and settling process of cement. | 10M | 5 | 2 |

*** END***

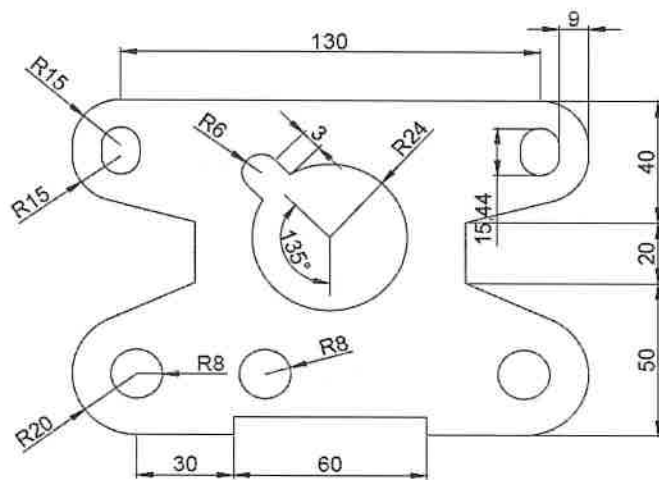Hall Ticket No: ☐☐☐☐☐☐☐☐☐☐      Question Paper Code: 20ME101

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

### B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024
## ENGINEERING GRAPHICS
(Common to all branches)
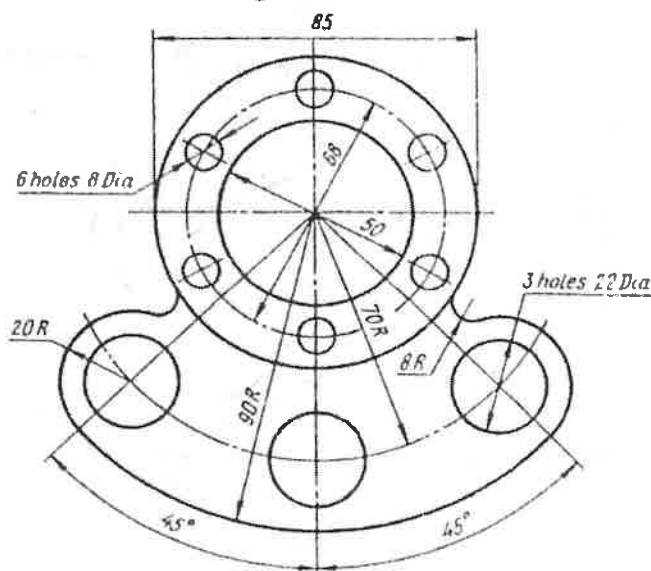
Time: 3Hrs            Max Marks: 60

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

| Q.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 |

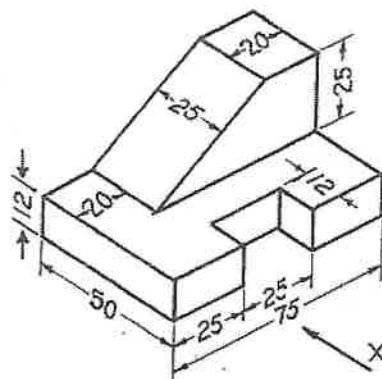| | | | | |
|---|---|---|---|---|
| Q.2(A) | The Top view of a 85mm long line measures 55mm. While the length of its Front view is 45mm. Its one end A is in H.P and 20mm infront of V.P. Draw the projections of AB and determine its inclinations with H.P and V.P <br> OR | 12M | 2 | 3 |
| Q.2(B) | Draw the projections of the following points on the same reference line XY by keeping the distance between the projectors are 40mm. <br>   ➤  Point A, 40mm above the H.P. and 30mm in front of the V.P. <br>   ➤  Point B, 50mm below the H.P. and 40mm behind the V.P. <br>   ➤  Point C, 35mm above the H.P. and 55mm behind the V.P. | 12M | 2 | 3 |
| Q.3(A) | A square ABCD of 50mm side has its corner A in the H.P. its diagonal AC is inclined at $30^0$ to the H.P and the diagonal BD inclined at $45^0$ to the VP and parallel to H.P. Draw its projections. <br> OR | 12M | 3 | 3 |
| Q.3(B) | A Hexagonal prism of base edge 30 mm and axis 70 mm has an edge of its base in the V.P such that the axis is inclined at $30^0$ to V.P and parallel to H.P. Draw its projections. | 12M | 3 | 3 |
| Q.4(A) | A hexagonal prism of base side 30mm and height 80 mm resting on its base on H.P with one rectangular face perpendicular to V.P. It is cut by a section plane inclined at 45 degrees to the H.P and passing though the midpoint of the axis. Draw the development of the lateral surface of the truncated prism. <br><br> OR | 12M | 4 | 3 |
| Q.4(B) | A cylinder of base diameter 40 mm and height 80 mm rests on its base on HP. It is cut by section plane perpendicular to VP and inclined at 45° to HP and passing through the axis at a distance 40 mm from base. Draw the front view and sectional top view. | 12M | 4 | 3 |
| Q.5(A) | Draw front view ,topview and sideviewfor the isometric view given below | 12M | 5 | 3 |



OR

| | | | | |
|---|---|---|---|---|
| Q.5(B) | A vertical square prism, base 50mm side and height 90mm has a face inclined at $30^0$ to the VP. It is completely penetrated by another square prism, base 40mm side and 100mm 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 |

*** END***

Hall Ticket No:

Question Paper Code: 20ME101

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

**B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024**

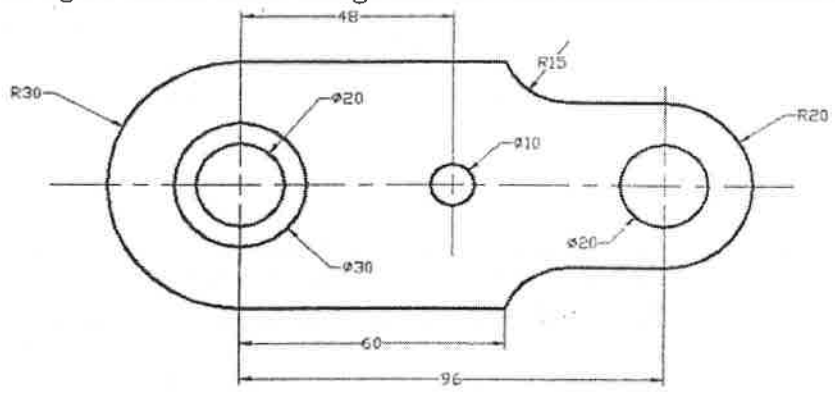## ENGINEERING GRAPHICS
(Common to all branches)

Time: 3Hrs

Max Marks: 60

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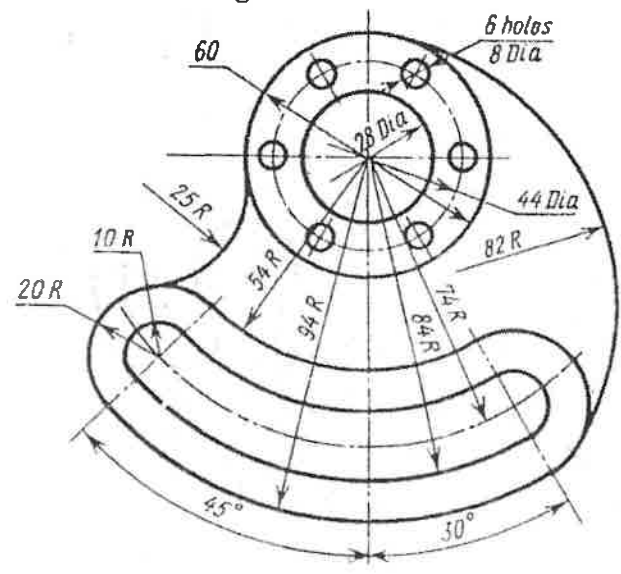**In Q.no 1 to 5 answer either A or B only**

| Q.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 80mm long is inclined at an angle of 30° to HP and 45° to VP. The point C is 30mm above HP and 40mm in front of VP. Draw the projection of the straight line and find its apparent inclinations. | 6M | 2 | 3 |

OR

| | | | | |
|---|---|---|---|---|
| Q.2(B) | Draw the projections of the following points on the same ground line. Name the quadrants. <br> ➢ Point A, 20mm in front of the V.P. and 60mm above the H.P. <br> ➢ Point B, 25mm below the H.P. and on the V.P. <br> ➢ Point C, 15mm below the H.P. and 50mm behind the V.P. | 12M | 2 | 3 |

| | | | | |
|---|---|---|---|---|
| Q.3(A) | Draw the projections of a regular pentagon of 25mm 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 30 mm and height 60mm 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 30mm side and axis 65mm has its base horizontal and an edge of the base parallel to V.P. A horizontal section plane cuts it at a distance of 25mm above the base. Draw its front view and sectional top view. | 12M | 4 | 3 |

OR

| | | | | |
|---|---|---|---|---|
| Q.4(B) | A cylinder of base 50mm and axis 60mm is resting on ground with its axis vertical. 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 90mm has a face inclined at $30^0$ to the VP. It is completely penetrated by another square prism, base 40mm side and 100mm 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

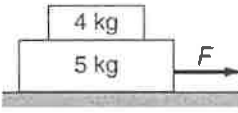| | | | | |
|---|---|---|---|---|
| Q.5(B) | Draw Front view ,Topview and sideview for the given isometric view. | 12M | 5 | 3 |
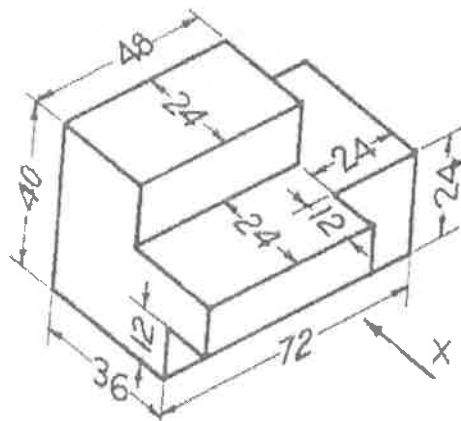


*** END***

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
## B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024
## ENGINEERING PHYSICS
(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 Newton's third law | 1M | 1 | 1 |
| | ii. | Write the expression for velocity in polar coordinates. | 1M | 1 | 1 |
| | iii. | Define work-energy theorem? | 1M | 2 | 1 |
| | iv | Define orbital velocity | 1M | 2 | 2 |
| | v. | Define simple harmonic motion. | 1M | 3 | 1 |
| | vi | Define standing wave ratio. | 1M | 3 | 1 |
| | vii. | Define Half wave plate? | 1M | 4 | 1 |
| | viii. | What is grating element? | 1M | 4 | 1 |
| | ix. | What are the characteristics of laser light? | 1M | 5 | 2 |
| | x. | What is total internal reflection? | 1M | 5 | 1 |
| Q.2(A) | | Derive the equation of motion of an electron of charge -e in the ionosphere and mass m which is initially at rest, and which is suddenly subjected to an electric field $E = E_o \sin \omega t$ ($\omega$ is the frequency of oscillation in radians per second). | 10M | 1 | 3 |
| | | OR | | | |
| Q.2(B) | | Mass $M_1$ = 4 kg rests on mass $M_2$ = 5 kg that rests on a frictionless table. The blocks just start to slip when the horizontal force applied to the lower block is 27 N. What is its maximum force for the upper block to slide without slipping? | 10M | 1 | 4 |
| Q.3(A) | | Derive the rocket equation and show that final velocity is independent of how the mass is released when it moves in a free space? | 10M | 2 | 4 |
| | | OR | | | |
| Q.3(B) | | Deduce the expression for escape velocity for an object of mass m projected upward from the earth at some angle, using work-energy theorem. | 10M | 2 | 3 |
| Q.4(A) | | What are transverse waves? Explain the solution of wave equation and velocity of a transverse wave along a stretched string?. | 10M | 3 | 3 |
| | | OR | | | |
| Q.4(B) | | (i) What are Lissajous plots? What are the factors they depend on? | 4M | 3 | 3 |
| | | (ii) What are forced oscillations? Derive the differential equation which represents forced oscillations. | 6M | | |
| Q.5(A) | | What is meant by Diffraction? and Explain fraunhofer diffraction due to a single slit? | 10M | 4 | 3 |

OR

| | | | | |
|---|---|---|---|---|
| Q.5(B) | (i). What is Brewster's law? Show that when a ray is incident at the polarizing angle, the reflected ray is perpendicular to the refracted ray. | 6M | 4 | 3 |
| | (ii). Calculate the minimum thickness to construct a half wave plate for the incidence of unpolarized light of wavelength $5 \times 10^{-5}$ cm, and refractive indices of ordinary and extraordinary rays are 1.4 and 1.5 respectively | 4M | | |
| Q.6(A) | Explain the construction and working of He-Ne laser with the help of a neat energy level diagram. | 10M | 5 | 4 |

OR

| | | | | |
|---|---|---|---|---|
| Q.6(B) | (i). Explain the principle, Construction and working of optical fiber? | 6M | 5 | 4 |
| | (ii). A glass fiber has a core material of refractive index 1.45 and cladding material of refractive index 1.40. If it is surrounded by air, calculate the critical angle at the core-cladding boundary and cladding-air boundary. | 4M | | |

*** END***

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
## B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024
## APPLIED PHYSICS
(Common to EEE, ECE, and 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**

| Q.No | | Question | Marks | CO | BL |
|---|---|---|---|---|---|
| Q.1 | i. | Find the velocity of a transverse wave moving with time period 0.5 sec and having wavelength 0.1m | 1M | 1 | 2 |
| | ii. | A particle of mass M undergoes Simple Harmonic Motion. Find its potential energy at mean position. | 1M | 1 | 2 |
| | iii. | Why we get circular fringes in Newton's Ring experiment? | 1M | 2 | 2 |
| | iv | Give an example for interference formed by division of amplitude? | 1M | 2 | 1 |
| | v. | What is de Broglie's hypothesis? | 1M | 3 | 1 |
| | vi | What are the properties of wave function? | 1M | 3 | 2 |
| | vii. | Define Fermi energy level? | 1M | 4 | 1 |
| | viii. | Distinguish intrinsic and extrinsic semiconductors. | 1M | 4 | 2 |
| | ix. | What is the principle of light propagation in an optical Fiber? | 1M | 5 | 1 |
| | x. | Give an example for a gas LASER? | 1M | 5 | 1 |
| Q.2(A) | | i) What is Simple harmonic motion? Derive differential form of equation of motion for one dimensional SHO. | 5M | 1 | 2 |
| | | ii) Explain Potential and Kinetic energy with respect to position of a simple harmonic oscillator. | 5M | | |
| | | **OR** | | | |
| Q.2(B) | | Discuss the various cases of damped harmonic oscillator by deriving the necessary expressions? | 10M | 1 | 2 |
| Q.3(A) | | Describe the formation of Newton's rings with necessary theory. And mention a few applications of Newton's rings. | 10M | 2 | 3 |
| | | **OR** | | | |
| Q.3(B) | | Describe Fraunhofer diffraction due to single slit with a suitable diagram. And obtain the conditions for maxima, minima, and secondary maxima intensities in the diffracted spectrum | 10M | 2 | 2 |
| Q.4(A) | | i) What are the characteristics of wave function? | 4M | 3 | 2 |
| | | ii) Derive time independent Schrodinger wave equation? | 6M | | |
| | | **OR** | | | |
| Q.4(B) | | Obtain the allowed wave functions and eigen energies for a particle bounded in an one dimensional infinite height potential well. | 10M | 3 | 3 |
| Q.5(A) | | On the basis of band theory, explain how the solids are classified int semiconductors and insulators? | 10M | 4 | 3 |
| | | **OR** | | | |
| Q.5(B) | | (i) Distinguish between direct and indirect band gap semiconductors. | 4M | 4 | 3 |
| | | (ii) Explain Hall effect and its importance. | 6M | | |
| Q.6(A) | | Discuss the principle, construction and working of a He-Ne LASER? | 10M | 5 | 3 |
| | | **OR** | | | |
| Q.6(B) | | Demonstrate the fiber optic communication system with a neat diagram. | 10M | 5 | 3 |

*** END***

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
## B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, January – 2024
## 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. Kishore -----------(**receive**) the parcel just now. | 1M | 1 | 1 |
| | ii. | Add an appropriate suffix to convert the verb "invest" into a noun. | 1M | 1 | 1 |
| | iii. | Reframe the given sentence in to past simple. *They will go to college.* | 1M | 1 | 1 |
| | iv | Define the term 'Scanning' | 1M | 1 | 1 |
| | v. | Add a suffix to the verb "*Intend*" to form a meaningful word. | 1M | 1 | 1 |
| | vi | Fill in the most appropriate word to make it a formal request. "_____ you please lend me a pen?" | 1M | 3 | 1 |
| | vii. | Write a question tag for the following statement. They play football on Sundays. | 1M | 2 | 2 |
| | viii. | What is a topic sentence in a paragraph? | | | 2 |
| | ix. | Convert the following sentence into indirect speech He said " I have been reading since morning" | 1M | 1 | 2 |
| | x. | Do you think appropriate recommendations are required in Report writing? Yes / No | 1M | 1 | 2 |
| Q.2(A) | | Fill in the blanks with appropriate tense forms using the verbs given within the brackets: | 10M | 1 | 3 |

Q.2(A)
within the brackets:
  i.   Rina always .......... her work sincerely. (do)
  ii.  We ........ when you visited home yesterday. (study)
  iii. My brother and I ............. good cricket players. (be)
  iv.  You ............. since morning (sleep)
  v.   Giri ............. a horror novel now. (read)
  vi.  Actor Satyadev ...... our college last month. (visit)
  vii. Right now, I ........ orange juice. (drink)
  viii. Australia ....... the ODI cricket world cup five times. (won)
  ix.  She ........ the parcel by post already.(send)
  x.   The gardener .......... the plant everyday.(water)

OR

Q.2(B)  Write appropriate **synonyms**for the words from the paragraph.      10M   1   3

Yoga has (a) **numerous** benefits if we (b)**look** at it closely. You will get relief when you practice it (c) **regularly**. As it keeps away the ailments from our mind and body. In addition, when we practice several asanas and postures, it strengthens our body and gives us a feeling of well-being and healthiness.(d) **Furthermore,** yoga helps in sharpening our mind and improving our (e) **intelligence**. We can achieve a higher level of concentration through yoga and also learn how to steady our (f)**emotions**. It connects us to nature like never before and enhances our social well-being.In addition, you can develop self-discipline and self-awareness from yoga if practiced regularly. You will gain a sense of (g) **power** once you do it (h)**consistently** and help you lead a healthy life free from any

problems. Anyone can practice yoga no matter what your age is or whichever religion you follow.21st of June is (i)**celebrated** as International Day of Yoga where people are made aware of the benefits of yoga. Yoga is a great gift to mankind which helps us keep better and maintain our health. You also develop a (j)**higher** patience level when you practice yoga which also helps in keeping the negative thoughts away. You get great mental clarity and better understanding.

| | | | | |
|---|---|---|---|---|
| Q.3(A) | Write a paragraph with proper examples on the following topics. <br> (i) The importance given to social media than books, is it a threat to students. <br> (ii) Electric vehicles and Petrol engines vehicles. <br><center>OR</center> | 10M | 5 | 5 |
| Q.3(B) | **(i)**Write the synonyms for the following words <br>     Awful <br>     Generous <br>       Furious <br>       Destroy <br>       Capable <br> (ii) Write the antonyms for the following words <br>     Success <br>     Comic <br>     Narrow <br>     Accurate <br>     Satisfy | 10M | 1 | 2 |
| Q.4(A) | Express your opinions on the following topics. (150 words each) <br> "Wealth can buy health" <br> "Technology will replace jobs in the future". <br><br><center>OR</center> | 10M | 3 | 5 |
| Q.4(B) | Explain various Reading strategies in detail.. | 10M | 2 | 2 |
| Q.5(A) | Develop the following situation into meaningful conversation. <br><br> Imagine you are a pilgrim to visit Tirumala from Hyderabad. You would like to visit nearby pilgrimages from there. Ask your known fried about the nearby pilgrimages, tourist spots and details of conveyance. <br><br><center>OR</center> | 10M | 2 | 3 |
| Q.5(B) | Write a Memo to your workers and request them to come to office on time for a new project which is to be installed this week. | 10M | 2 | 3 |
| Q.6(A) | You are the Secretary of the Cultural club, MITS, Madanapalle. Your college organized a debate on the topic, **'The impact of reality shows on the younger generation'**. Write a report to **The Regional Manager** of **The Times of India**, Tirupati in 100-150 words. <br><center>OR</center> | 10M | 5 | 3 |
| Q.6(B) | Draft an E-mail seeking information regarding Internship opportunities in the Department of Computer Science& Engineering, to the Head of the department at IIT, Kharagpur. | 10M | 5 | 3 |

<center>*** END***</center>