Hall Ticket No: | | | | | | | | | | | **Question Paper Code: 18PHY103**

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Regular & Supplementary End Semester Examinations – DEC 2020

PHYSICS-ELECTROMAGNETIC THEORY

(ECE)

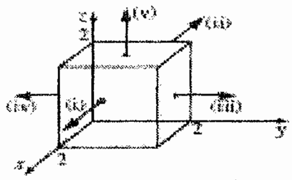
Time: 3Hrs **Max Marks: 60**

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

Q.1	i.	What is the physical significance of Divergence?	1M
	ii.	What is the condition for vector to be solenoidal?	1M
	~~iii.~~	~~Define Coulomb's law in electrostatics with units.~~	~~1M~~
	iv.	Write down Gauss's law in the presence of dielectrics.	1M
	v.	What is polarization?	1M
	vi.	What is dielectric constant in linear dielectrics?	1M
	vii.	What is cyclotron formula and provide a figurative sketch to indicate the directions of both electric and magnetic fields.	1M
	viii.	What do you mean by linear media?	1M
	ix.	Write Lorentz force equation.	1M
	x.	What is self-inductance?	1M

Q.2(A) i) Describe in detail about the Fundamental theorem for gradients. **3M**

ii) Calculate the surface integral of **7M**
$\vec{V} = 2xz\hat{\imath} + (x+z)\hat{\jmath} + y(Z^2-3)\hat{k}$
over five sides of the cubical box (2 units length)?



OR

Q.2(B) Explain spherical coordinate system. Define r, θ, ϕ using suitable diagram and find expressions for x, y, z in terms of r, θ, ϕ, Derive formulas for unit vectors $\hat{r}, \hat{\theta}, \hat{\phi}$ in terms of $\hat{x}, \hat{y}, \hat{z}$ **10M**

Q.3(A) i) Define Gauss's law in electrostatics? What are the limitations in it? **2M**

ii)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 $\sigma(r)$. **8M**

OR

Q.3(B) i) Obtain boundary conditions for electric field and electrostatic potential. (Use Gaussian pillbox) **5M**

ii) Deduce Poisson's equation and Laplace's equation for static electric field. Show the conditions Poisson's equation reduces to Laplace's equation. **5M**

Q.4(A)	*i*) Show that for a simple harmonic oscillator, mechanical energy remains constant and it is proportional to the square of the amplitude.	4M
	ii) Two vibrations at right angles to one another are described by the equations given be x =Cos (ωt) and y =Cos(ωt+π/2). Construct the Lissajous figure of the combined motion.	6M
	OR	
Q.4(B)	Discuss the various cases of damped harmonic oscillator by deriving the necessary expressions?	10M
Q.5(A)	Define Interference? Explain how the wavelength of source is determined by Newton's ring experiment?	10M
	OR	
Q.5(B)	With a suitable diagram, describe Fresnel's diffraction due to multiple slits (grating) and explain how the intensity is distributed in the diffracted spectrum.	10M
Q.6(A)	*i*) Derive the relation between the probabilities of spontaneous emission and stimulated emission in terms of Einstein's coefficients.	6M
	ii) What is population inversion? How it is achieved by optical pumping?	4M
	OR	
Q.6(B)	Describe the construction of He-Ne laser and explain the working principle with the help of energy level diagram.	10M

***** END*****

Hall Ticket No: | | | | | | | | | | | **Question Paper Code: 18PHY102**

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Regular & Supplementary End Semester Examinations – DEC 2020

MODERN PHYSICS

(Common to EEE, 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

Q.1	i.	A body is executing a simple harmonic motion. What is acceleration at mean position?	1M
	ii.	Define standing wave ratio (SWR).	1M
	iii.	What is Interference?	1M
	iv.	What is grating element?	1M
	v.	~~What is de-Broglie's hypothesis of matter waves?~~	1M
	vi.	Define wave function Ψ.	1M
	vii.	Write two examples of indirect bandgap semiconductor.	1M
	viii.	Differentiate n-type and p-type semiconductors.	1M
	ix.	Explain population inversion.	1M
	x.	Give any two applications of laser.	1M

Q.2(A)	What are Lissajous figures? Two SHMs at right angles to each other are $x = 5\cos\pi t$ and $y = 10\cos\pi t$. Construct the lissajous figure of the combined motions.	10M
	OR	
Q.2(B)	Deduce the solution for a damped harmonic oscillator and discuss small and heavy damping cases.	10M
Q.3(A)	Draw the diagram of Newton's ring set up and derive the expression of radius of curvature of plano-convex lens with necessary theory.	10M
	OR	
Q.3(B)	What is diffraction? With a suitable diagram, describe Fraunhofer diffraction due to single slit and plot the intensity distribution.	10M
Q.4(A)	What is the significance of wave function? Derive Schrodinger's time independent wave equation.	10M
	OR	
Q.4(B)	With the help of Schrodinger wave equation, explain the theory of a particle in an infinite potential well and obtain the energy eigen values and Eigen functions in the ground, 1st and 2nd excited states.	10M
Q.5(A)	i) On the basis of band theory, explain how the solids are classified into metals, semiconductors and insulators?	6M
	ii) Differentiate Intrinsic and Extrinsic semiconductors?	4M
	OR	
Q.5(B)	Discuss the formation of PN junction and Explain I-V Characteristics of a PN junction diode under forward bias and reverse bias.	10M
Q.6(A)	Explain the construction and operation of a helium–neon laser with a neat diagram.	10M
	OR	
Q.6(B)	i) Explain spontaneous and stimulated emission of radiation of laser.	4M
	ii) Draw a suitable diagram and describe the construction of Ruby laser.	6M

*** END***

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

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Regular &Supplementary End Semester Examinations –DEC 2020

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.1	i.	List out any two units for expressing hardness of water	1M
	ii.	What is brackish water?	1M
	iii.	~~State Paulis exclusion principle.~~	~~1M~~
	iv.	What is the geometry of methane?	1M
	v.	Mention one application of UV spectroscopy.	1M
	vi.	Write the formula to calculate the vibrational degrees of freedom for a linear molecule	1M
	vii.	Define entropy	1M
	viii.	What is a fuel cell?	1M
	ix.	How viscosity index is calculated?	1M
	x.	Write the Scherrer's equation.	1M

Q.2(A)	Describe the ion exchange process with a neat diagram. Write its advantages and disadvantages.	10M
	OR	
Q.2(B)	Define sterilization of water. Explain the sterilization of water by using chlorine and ozone.	10M
Q.3(A)	Write about S_N^1 and S_N^2 reaction of an organic molecule with example.	10M
	OR	
Q.3(B)	Illustrate the mechanism of free radical polymerization with a suitable example.	10M
Q.4(A)	Explain the principle of NMR spectroscopy and write its applications.	10M
	OR	
Q.4(B)	Write the principle and applications of IR spectroscopy.	10M
Q.5(A)	Derive an expression for the change in entropy at constant pressure and volume.	10M
	OR	
Q.5(B)	What are secondary batteries? Explain the working principle, construction and applications of Lithium ion battery.	10M
Q.6(A)	Discuss the manufacture of Portland cement with a neat diagram.	10M
	OR	
Q.6(B)	Describe the preparation of metal oxide nanoparticle by using sol gel method.	10M

***** END*****

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 18EEE101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Regular &Supplementary End Semester Examinations –DEC 2020

BASIC ELECTRICAL ENGINEERING

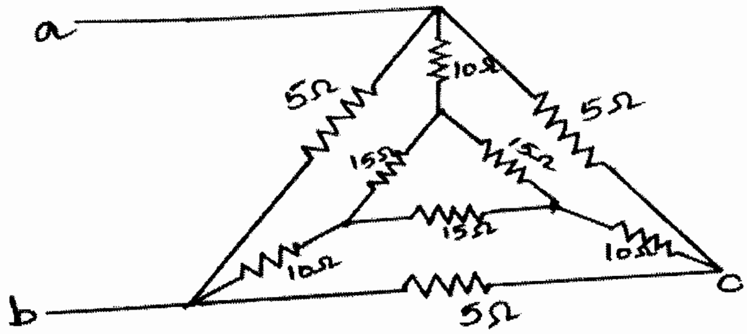
(Common to ALL)

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

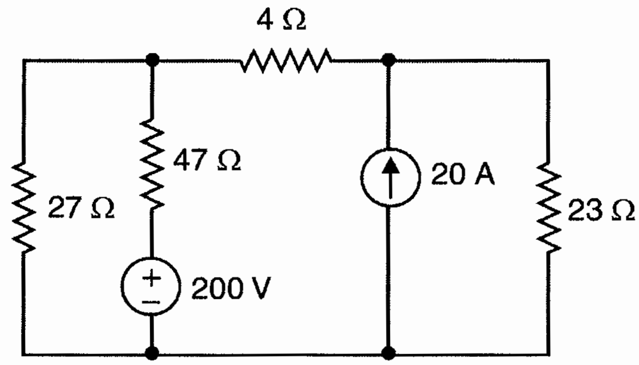
Q.1	i.	State of Kirchhoff's Current law.	1M
	ii.	A 100 W electric light bulb is connected to a 250V supply. Determine the resistance of the bulb.	1M
	iii.	Define Average Value?	1M
	iv.	Write Formula for Apparent Power?	1M
	v.	Write the relation between magnetic flux density and magnetic field intensity.	1M
	vi.	What are the losses of a Transformer?	1M
	vii.	Write EMF Equation of a DC Generator?	1M
	viii.	Define Slip?	1M
	ix.	Define Cut in Voltage?	1M
	x.	Mention different types of cables.	1M

Q.2(A) Determine the equivalent resistance between the points a and b. 10M



OR

Q.2(B) Apply superposition theorem, find the current in 23 Ω resistor in the circuit shown in Figure. 10M



Q.3(A)	(i) A coil, having both resistance and inductance, has a total effective impedance of 65 Ω and the phase angle of the current through it with respect to the voltage across it is 40° lag. The coil is connected in series with a 50 Ω resistor across a sinusoidal supply. The circuit current is 2.5A. Find (a) supply voltage and (b) circuit phase angle.	6M
	(ii) Describe the AC Analysis of Series RL Circuit.	4M
	OR	
Q.3(B)	(i) Write the advantages of 3-phase systems	4M
	(ii) Derive the relationship between phase and line voltages and currents in a balanced three phase delta connected system. Also write the expressions for active, reactive and apparent powers.	6M
Q.4(A)	(i) Draw and explain hysteresis loop of a Ferro magnetic material.	5M
	(ii) 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.	5M
	OR	
Q.4(B)	Describe Equivalent Circuit of a Transformer. (a) With respect to primary side (b) with respect to secondary side.	10M
Q.5(A)	Discuss Speed Control methods of a DC Shunt Motor?	10M
	OR	
Q.5(B)	Explain construction and operation of a Three Phase Induction Motors.	10M
Q.6(A)	Discuss in detail the operation of a Half Wave Rectifier with a neat circuit diagram and relevant waveforms.	10M
	OR	
Q.6(B)	Describe the working of a miniature circuit breaker with the help of neat diagram.	10M

***** END*****

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

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Regular &Supplementary End Semester Examinations –DEC 2020

C PROGRAMMING & DATA STRUCTURES

(Common to EEE, ME & CSE)

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.	Define a constant. List different constants in C.	1M
	ii.	Compare break and continue statements.	1M
	~~iii.~~	~~Define an array and its advantages.~~	~~1M~~
	iv	What is function prototype?	1M
	v.	Define Null pointers.	1M
	vi	What is self referential structure? Give example.	1M
	vii.	What is the difference between queue and Deque?	1M
	viii.	Give a brief note on ADT stack.	1M
	ix.	What are the different modes in opening a file?	1M
	x.	Write the syntax for any two file I/O functions.	1M

Q.2(A)	i) Explain the structure of a C program with an example.	5M
	ii) Write a C program to find the roots of quadratic equation.	5M
	OR	
Q.2(B)	What is a variable? How can variables be characterized? Give the rules for variable declaration.	10M
Q.3(A)	Explain different storage classes available in C. Provide a suitable example for the use of each class.	10M
	OR	
Q.3(B)	What is function? Explain function definition, function header, function body function declaration with an example.	10M
Q.4(A)	i) What is a pointer? How it is initialized? Explain	5M
	ii) Write a program to access the array elements using pointer.	5M
	OR	
Q.4(B)	Explain the pass by value and pass by parameters with an example.	10M
Q.5(A)	i) What are the operations of queue? Explain.	5M
	ii) Write short notes on Enqueue and Dequeue	5M
	OR	
Q.5(B)	List and explain the applications of the stack and queues.	10M
Q.6(A)	Write a C program to find given string is palindrome or not without using any string functions.	10M
	OR	
Q.6(B)	i) Distinguish binary file and text file.	5M
	ii) Write a C program to create a file and display its contents.	5M

*** END***

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

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I& II Semester (R18) Regular &Supplementary End Semester Examinations –DEC 2020

C PROGRAMMING & DATA STRUCTURES

(Common to CE, ECE, 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.	List the C Tokens available in c.	1M
	ii.	Compare = and ==.	1M
	iii.	Define insertion sort.	1M
	iv	Compare Predefined and User defined functions	1M
	v.	Can we store the address of pointer in another variable? Justify your answer.	1M
	vi	What is Dynamic memory allocation?	1M
	vii.	What are different storage classes?	1M
	viii.	What are the different types of queues?	1M
	ix.	Why files are necessary? Define file.	1M
	x.	How strcmp( ) function works?	1M

Q.2(A)	What are the different operators in C. Explain with an example.	10M
	OR	
Q.2(B)	Define Looping? Mention different forms of looping with an example for each in detail.	10M
Q.3(A)	Develop the code for Linear Search to find the particular key in a given array.	10M
	OR	
Q.3(B)	Explain the Function Declaration, Function Definition and Function Call with suitable example.	10M
Q.4(A)	i) How to increment the value of a variable using pointer? Give example	5M
	ii) Write a C program to print student grades given three subjects of marks using structures.	5M
	OR	
Q.4(B)	Difference between passing by reference and passing by value with example	10M
Q.5(A)	Explain the concept of stack, and its operations with an example.	10M
	OR	
Q.5(B)	Explain the concept of queue, and its operations with an example.	10M
Q.6(A)	List and explain the string handling functions.	10M
	OR	
Q.6(B)	i) Write a C program to check whether a string is palindrome	5M
	ii) Write a C program to count no of lines, words and characters in a file.	5M

*** END***

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 18MAT102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Regular & Supplementary End Semester Examinations – DEC 2020

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. Reduce the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 6 & 7 \\ 1 & 4 & 5 \end{bmatrix}$ to echelon form. 1M

ii. Calculate the eigenvalues of $A = \begin{bmatrix} -1 & 0 \\ 3 & 5 \end{bmatrix}$ 1M

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

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

v. Find complementary function for the Cauchy-Euler differential equation $x^2 \frac{d^2y}{dx^2} - x\frac{dy}{dx} + 2y = 0.$ 1M

vi. Form partial differential equation by eliminating arbitrary constants $z = ax + by + a^2 + b^2$. 1M

vii. Solve $2p + 3q = 1$. 1M

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

ix. Find complementary function of $(D^2 + DD' - 6D'^2)z = 0$ 1M

x. Write the D'Alembert's solution of the wave equation. 1M

Q.2(A) Using Gauss-Jordan method, find the inverse of the matrix $A = \begin{pmatrix} 2 & 1 & -1 \\ 1 & -2 & 1 \\ 5 & 2 & -3 \end{pmatrix}$ (if exists). 10M

OR

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

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

OR

Q.3(B) Solve the following differential equation (where $\frac{dy}{dx} = p$), $p\,y = 2px + y^2p^3$ 10M

Q.4(A) Find the solution of differential equation $y'' + 4y = \sec 2x$, using the method of variation of parameters. 10M

OR

Q.4(B) Solve the Euler-Cauchy equation $x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = x^3$. 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 $x\left(y^2+z\right)p - y\left(x^2+z\right)q = z\left(x^2-y^2\right)$ by Lagrange method. 10M

Q.6(A) Solve the partial differential equation $(D^2-2DD'+D'^2)z = e^{x+2y}$ 10M

OR

Q.6(B) Solve the partial differential equation by $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$ with the condition $u(0,y) = 8e^{-3y}$ 10M

*** END***

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 18MAT110

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester Regular & Supplementary End Semester Examinations – DEC 2020

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. When a linear system of non-homogeneous equations have unique solution 1M

ii. ~~Determine the characteristic roots of the matrix $A=\begin{bmatrix}1 & 2\\ 2 & 1\end{bmatrix}$~~ 1M

iii. State Rank-Nullity theorem 1M

iv Determine whether the set of vectors $\{(1,2,-1),(2,4,5),(0,0,0)\}$ form basis (or) not. 1M

v. Define Isomorphism of Linear transformation. 1M

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

vii. Write the standard basis with respect to R^3 1M

viii. Let $T:R^2\to R^2$ be the Linear transformation defined by $T(x_1,x_2)=(x_1+x_2,-x_1+x_2)$. Compute $[T^*]_{\alpha}$, for the standard basis $\alpha=\{e_1,e_2\}$. 1M

ix. Normalize the vector $u=(2,-1,-2)$ 1M

x. Check whether the matrix $\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$ is orthogonal or not. 1M

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

OR

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

Q.3(A) Are the vectors $v_1=(1,1,2,4)$ $v_2=(2,-1,-5,2)$ $v_3=(1,-1,-4,0)$ and $v_4=(2,1,1,6)$ are Linearly independent in R^4 or not. 10M

OR

Q.3(B) Find bases for the row space, the column space, and the null space for the given matrix, $A=\begin{bmatrix}1 & 3 & 2\\ 2 & 6 & 4\\ 3 & 9 & 6\end{bmatrix}$ 10M

Q.4(A) i. Let $T: R^3 \rightarrow R^3$ be a linear transformation given by $T(x,y,z)=(2y+z, x-4y, 3x)$. Find the matrix of transformation related to the basis $\alpha=\{(1,1,1),(1,1,0),(1,0,0)\}$ 5M

ii. Find the matrix of reflection about the line x-axis in R^2. 5M

OR

Q.4(B) Show that the linear transformation T on $\mathbb{R}^3$ is invertible and find a formula for T^{-1}. 10M
$T(x,y,z) = (2x, 4x - y, 2x + 3y - z)$.

Q.5(A) Consider the following ordered bases of R^3: $\alpha = \{e_1, e_2, e_3\}$ the standard basis and $\beta = \{u_1 = (1,1,1), u_2 = (1,1,0), u_3 = (1,0,0)\}$. 10M

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

Q.5(B) Let $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$ be the linear transformation defined by $T(x,y,z) = (2y + z, -x + 4y + z, x + z)$. Compute $[T]_\alpha$ and $[T^*]_{\alpha^*}$ for the standard basis $\alpha = \{e_1,\ e_2,\ e_3\}$. 10M

Q.6(A) Use the Gram-Schmidt orthogonalization on the Euclidean space R^4 to transform the basis $\{(0,1,1,0),(-1,1,0,0),(1,2,0,-1),(-1,0,0,-1)\}$ into an orthonormal basis. 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) Regular &Supplementary End Semester Examinations –DEC 2020

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. Reduce the matrix $A=\begin{bmatrix}0 & 4 & 0\\ 2 & 4 & 0\\ 2 & 4 & 11\end{bmatrix}$ into row echelon form and hence find the rank of the matrix. 1M

ii. Find the eigen values of A^2 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 $f(z)=z\cos\left(\frac{1}{z}\right)$. 1M

v. Find the Laplace transform of $e^{at}\cosh bt$ 1M

vi. State Convolution theorem 1M

vii. If $F[f(x)]=f(p)$ then $F[f(ax)]$ 1M

viii. Find the Fourier sine transform of $f(x)=\frac{1}{x}$ is 1M

ix. Find the value of Z-transform of n^2 1M

x. Define Z-transform Convolution theorem 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 Eigen values and Eigen vectors of the matrix $A=\begin{bmatrix}1 & -3 & 3\\ 3 & -5 & 3\\ 6 & -6 & 4\end{bmatrix}$ 10M

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

$f(z)=\begin{cases}\frac{\bar{z}^2}{z}, & when\ z\neq 0\\ 0, & when\ z=0\end{cases}$, yet $f'(0)$ does not exist.

OR

Q.3(B) Write the Laurent expansion of $f(z)=\dfrac{1}{(z-1)(z-2)}$ in the region (i) $1<|z|<2$ (ii) $|z|<1$ (iii) $|z|>2$ 10M

Q.4(A)

(i) Find the Laplace transform of $f(t)=e^{-4t}\int_0^t \frac{\sin 3t}{t}\,dt$. 5M

(ii) Find the Laplace transform of $f(t)=t\ e^{2t}\sin 3t$ 5M

OR

Q.4(B) Solve the equations by transform method: 10M

$y''-3y'+2y=e^{3t}$, $y(0) = 1$, $y'(0) = 0$

Q.5(A) Solve the integral equation $\int_0^\infty f(\theta)\cos\alpha\theta\ d\theta=\begin{cases}1-\alpha & for\ \ 0\le\alpha\le 1\\ 0 & for\ \ \alpha>1\end{cases}$ 10M

OR

Q.5(B) (i) Find the Fourier cosine transform of $e^{-ax}\cos ax, a>0$ 5M

(ii) Find the Fourier cosine transform of f(x) = $\begin{Bmatrix} x, for\ \ 0<x<1 \\ 2-x, for\ \ 1<x<2 \\ 0, for\ \ x>2 \end{Bmatrix}$ 5M

Q.6(A) Using inversion integral method, find the inverse Z-transform of $\dfrac{z}{(z-1)(z-2)}$. 10M

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

*** END***

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 18MAT107

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Regular & Supplementary End Semester Examinations – DEC 2020

LINEAR ALGEBRA, COMPLEX VARIABLES AND 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

Q.1

i. Reduce the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ to the reduced row Echelon form. 1M

ii. Find the eigenvalues of $adjA$, where the matrix $A = \begin{bmatrix} 2 & 0 \\ 5 & 4 \end{bmatrix}$ 1M

iii. Determine whether $f(z) = e^{\bar{z}}$ is analytic (or) not. 1M

iv. Find the value of $Log(-ei)$ 1M

v. State Cauchy integral formula 1M

vi. Find the residue at $z = 0$ of the function $f(z) = \dfrac{z + \cos z}{z}$ 1M

vii. Find the Complementary function of the differential equation $y'' + 4y' + 4y = e^x$ 1M

viii. Classify the difference between differential equation is linear or non-linear $(x^2 + ay)dx = (ax + y^2)dy$. 1M

ix. Define Wronskian in the differential equation 1M

x. State Convolution theorem 1M

Q.2(A) Find the inverse of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -2 & -4 \end{bmatrix}$ by Gauss Jordan method 10M

OR

Q.2(B) Determine the Eigenvalues and Eigenvectors of the matrix $A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 5 & -2 \\ 1 & 1 & 2 \end{bmatrix}$ 10M

Q.3(A) State and derive the Cauchy Riemann in polar coordinates. 10M

OR

Q.3(B) (i) Find a harmonic conjugate v(x, y) where, $u(x, y) = \sinh x \sin y$ 5M

(ii) Find all values of $\tan^{-1}(2i)$ 5M

Q.4(A) i. Evaluate $\int_c f(z)dz = \int_c \frac{e^{-z}}{(z-1)^2} dz$ where c:|z|=3 5M

ii. Evaluate $\int_c f(z)dz = \int_c \frac{(Z+1)}{(z^2-2Z)} dz$ where c:|z|=3 5M

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) Solve the following differential equation $x\frac{dy}{dx} + 4y = x^4y^2$. 10M

OR

Q.5(B) Solve the differential equation, $y - 2px = \tan^{-1}(xp^2)$ (where $\frac{dy}{dx} = p$) 10M

Q.6(A) Solve the differential equation $x^2y'' + xy' + y = log\ x\ sin(logx)$ 10M

OR

Q.6(B) Solve the following differential equation using the method of Laplace transforms 10M

$y''' + 2y'' - y' - 2y = 0$, given that $y(0) = y'(0) = 0\ and\ y''(0) = 6$

*** **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 – DEC 2020

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.1	i.	State Lagrange mean value theorem.	1M
	ii.	Find the length of the curve $y = x$ from $x = 0$ to $x = 4$.	1M
	iii.	Find the greatest value of the directional derivative of $f = x^2y^3z^4$ at (1,1,-1)	1M
	iv.	Find $\lim\limits_{\substack{x\to\infty \\ y\to 2}} \frac{xy+1}{x^2+2y^2}$	1M
	v.	Evaluate $\iint_R dA$, when $0 \le r \le 2, 0 \le \theta \le 2\pi$	1M
	vi.	State Greens theorem.	1M
	vii.	Write the general solution of second order differential equation.	1M
	viii.	What is particular integral of $y'' - 4y = e^x$	1M
	ix.	State Divergence theorem	1M
	x.	Test the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{n^{7/2}}$	1M

Q.2(A) Using Lagrange's theorem show that $\frac{x}{1+x} < \log(1+x) < x, \quad if \;\; f(x) = \log(1+x)$ 10M

OR

Q.2(B) Find the length of the one arch of the cycloid $x = a(t - \sin t)$, $y = a(1 - \cos t)$ 10M

Q.3(A) Examine $\frac{\partial w}{\partial r}$ and $\frac{\partial w}{\partial s}$ in terms of r and S if $w = x^2 + y^2$, $x = r - s$, $y = r + s$ 10M

OR

Q.3(B) Find the derivative of $f(x,y) = xe^y + \cos(xy)$ at the point (2,0) in the direction of v = 3i - 4j. 10M

Q.4(A) Change the order of integration and evaluate $\int_0^1 \int_{x^2}^{2-x} xy\,dx\,dy$ 10M

OR

Q.4(B) Verify the Stokes theorem for the hemisphere $S: x^2 + y^2 + z^2 = 9, z \ge 0$ its boundary circle $C: x^2 + y^2 = 9, z = 0$ and the field $F = y\bar{i} - x\bar{j}$. 10M

Q.5(A) i) Obtain the general solution of the D.E $\frac{dy}{dx} - 2xy = 6xe^{x^2}$ 5M

ii) Solve $e^y dx + (xe^y + 2y)dy = 0$ 5M

OR

Q.5(B) Find the general solution of $y'' + 10y' + 25y = 14e^{-5x}$ 10M

Q.6(A) (i) Form the partial differential equations by eliminating the arbitrary constants from $z = \log\left[\frac{b(y-1)}{1-x}\right]$. 5M

(ii) Form the partial differential equations by eliminating the arbitrary functions from $z = yf(x) + xg(y)$ 5M

OR

Q.6(B) (i)Determine the nature of the series using comparison test $\sum \frac{1}{n}\sin\frac{1}{n}$ 5M

(ii) Discuss the convergence of the series by ratio test, $\sum_{n=1}^{\infty} \frac{\angle n}{\left(n^n\right)^2}$ 5M

*** 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 – DEC 2020

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 Part-A or B only

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
	ii.	Find the value of $\int_0^1 x^2(1-x)^3\,dx$.	1M
	iii.	Determine the value of c for the function $f(x)=x^2$ in $[2,3]$	1M
	iv	State Lagrange's mean value theorem.	1M
	v.	Test the convergence of the series $\sum_{n=1}^{\infty}\frac{1}{n^{7/2}}$.	1M
	vi	Calculate the Fourier coefficient a_0, for $f(x)=x\sin x$ in $(0,\pi)$	1M
	vii.	Evaluate $\frac{dw}{dt}$ if $w=xy$, $x=\cos t$ and $y=\sin t$.	1M
	viii.	Find the local extreme values of $f(x,y)=x^2+y^2-4y+9$.	1M
	ix.	Evaluate $\iint_R dA$, when $0\le r\le 2, 0\le\theta\le 2\pi$	1M
	x.	Find $Curl F$ where $F=(x^2-z)i+xe^z j+xy\,k$.	1M

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

OR

Q.2(B) Define Gamma function and find the value of Γ(1/2) 10M

Q.3(A) i. Verify Rolle's theorem for $f(x)=(x+2)^3(x-3)^4$ in $(-2,3)$ 5M

ii. Verify the Cauchy's mean value theorem for the functions e^x and e^{-x} in the interval (a,b) 5M

OR

Q.3(B) Prove that $\log(1+\sin x)=x-\frac{x^2}{2}+\frac{x^3}{6}-\frac{x^4}{12}+---$ 10M

Q.4(A) Determine whether the following series converges or diverges. 10M

i) $\sum_{n=1}^{\infty}\frac{(n+1)(n+2)}{n!}$ (ii) $\sum_{n=0}^{\infty}\frac{x^n}{n!}$

OR

Q.4(B) Find the Fourier series expansion of the function $f(x)=x^2$ in $-\pi\le x\le\pi$. 10M

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

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

Q.6(A) Using polar coordinates, find the area of the region R in the xy-plane enclosed by the circle $x^2+y^2=4$, above the line y = 1 and below the line $y=\sqrt{3}\,x$ 10M

OR

Q.6(B) Use Green's theorem to find the counter clockwise 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

*** END***

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

Question Paper Code: 18ENG101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech. I Year I & II Semester (R18) Regular & Supplementary End Semester Examinations – DEC 2020

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. Write the correct form of the verb given in the brackets — 1M
I am not feeling hungry, I ________________ (take) heavy breakfast.

ii. ~~Change the verb in italics into the present perfect tense.~~ — 1M
I (*do*) my work.

iii. Fill in the blanks with appropriate answer from the given options. — 1M
My brother ______________ tomorrow
   a. Come
   b. Will come
   c. Coming
   d. Has come

iv. What is the synonym of the word 'extempore' — 1M

v. What is the antonym of the word 'accidental' — 1M

vi. Say whether the following statement is True/ False — 1M
If a person wants to be a good speaker, first he wants to be a good listener.

vii. Change the following sentence into indirect speech. — 1M
The patient said, 'Thank you doctor'.

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

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

x. What is Skimming? — 1M

Q.2(A) Write an essay on any one of the following topics. The word limit should not exceed 200. — 10M
   a. National Education Policy 2020.
   b. Impact of Corona Virus (Covid-19).

OR

Q.2(B) Read the following passage carefully and answer the questions below. — 10M

Yoga is the ancient Indian system to keep a person fit in body and mind. It is basically a system of self-treatment. According to the yogic view, diseases, disorders and ailments are the, result of some faulty ways of living, bad habits, lack of proper knowledge and unsuitable food. The diseases are thus the resultant state of a sort of prolonged malfunctioning of the body system. Since the root cause of a disease lies in the mistakes of the individual its cure also lies in correcting the mistakes by the same individual himself. The yoga expert shows only the path and works no more than as a counsellor. The yogic practice of treatment comprises three steps namely proper diet, proper yogic practice and proper knowledge of things about the self.

Questions

(1) How does yoga differ from other methods of treating a disease?
(2) How does our daily routine affect our lives?
(3) How can a teacher of yoga help a person practising yoga?
(4) Give the passage a suitable title.
(5) Find a word in the passage which means 'not working proper1y?

Q.3(A) Significance of Nonverbal Communication for Engineering graduates. 10M

OR

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

a. China Apps banned in India
b. One nation One election

Q.4(A) Imagine that you are facing an interview. The interviewer asked the question to introduce yourself. How are you going to answer effectively? (Unique answer) 10M

OR

Q.4(B) Write a conversation between two friends regarding planning to spend a weekend 10M

Q.5(A) Write a letter to the Municipal Commissioner of Madanapalle about the miserable condition of roads in your area, requesting him to undertake immediate repairs of the roads. 10M

OR

Q.5(B) Assume you are travelling to Delhi by train. Your co-passenger starts a conversation with you. Tell him about your personality, likes, dislikes, hobbies, interests etc. 10M

Q.6(A) Assume yourself to be a student who aspires to join in the communication skills advancement programme offered by Cambridge institute of English & Communication skills, New Delhi.
Draft an e-mail seeking the relevant information such as duration of the programme, course fee, batch timings and other necessary details. 10M

OR

Q.6(B) Imagine that you are the secretary of the student's union. Write a report to the principal of your college on the need of constructing indoor stadium in your college. 10M

***** END*****

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 18ME101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations –Dec 2020

ENGINEERING GRAPHICS

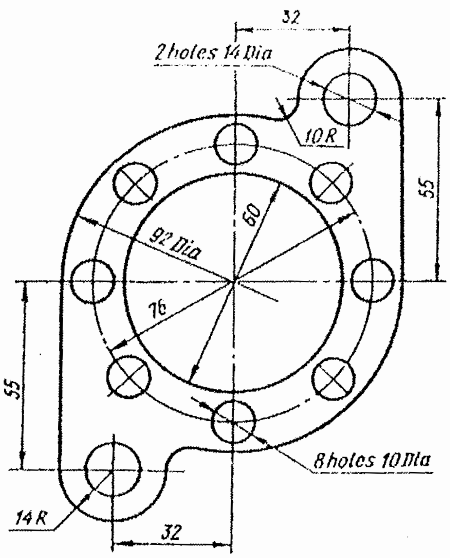
(Common to All)

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

Attempt all the questions. All parts of the question must be answered in one place only.

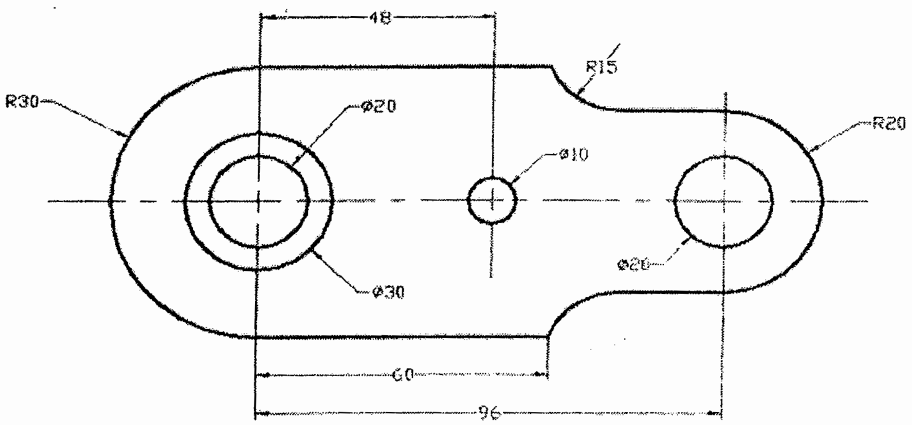
In Q.no 1 to 5 answer either Part-A or B only

Q.1(A) Draw the figure using Auto CAD commands 12M



OR

Q.1(B) Draw the figure using Auto CAD commands 12M



Q.2(A) A line AB 70mm long has its end A at 10 mm above H.P and 15 mm in front of V.P. Its front view and top view measures 50 mm and 60 mm respectively. Draw the projections of the line and determine its inclination with H.P and V.P. 12M

OR

Q.2(B) Draw the projections of the following points on the same ground line keeping the distance between the projectors as 50mm. Also name the quadrants in which they lie. 12M

1. Point A, 50mm in front of the V.P. and 30mm above the H.P.
2. Point B, 45mm below the H.P. and on the V.P.
3. Point C, 35mm below the H.P. and 40mm behind the V.P.
4. Point D, 50mm above the H.P. and 60mm in front of the V.P.

Q.3(A) A Hexagonal Pyramid of Base side 30mm and axis 60mm is lying on a slant edge on the H.P with the axis parallel to V.P. Draw its projections. 12M

OR

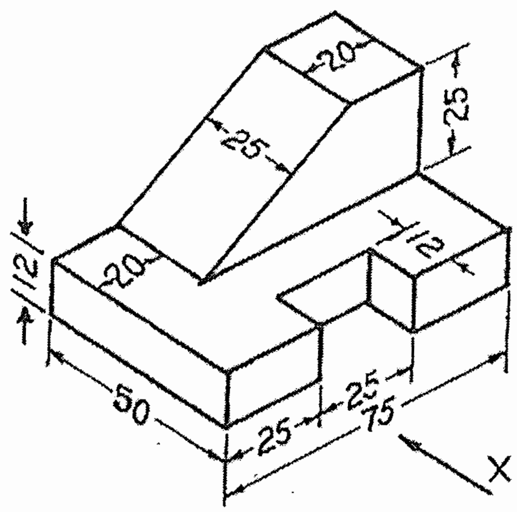
Q.3(B) A thin circular plate of 50 mm diameter is resting on its circumference such that its plane is inclined 40^0 to the H.P. and 45^0 to the V.P. Draw the projections of the plate. 12M

Q.4(A) A cylinder of base diameter 40 mm and height 80 mm rests on its base on HP. It is cut by a plane inclined 45^0 to HP and passing through a point 30mm from top base of the axis. Draw the front view, sectional top view and true shape. 12M

OR

Q.4(B) A Hexagonal prism of base side 40mm and height 60mm. Draw the development of the of the lateral surface of the prism. 12M

Q.5(A) Draw the front view, top view and the left side view for the figure shown 12M



OR

Q.5(B) A vertical cylinder, 50mm in diameter and 80 mm in length, is resting on its base, with its axis perpendicular to the HP. It is completely penetrated by another horizontal cylinder 45 mm in diameter and 80 mm in length. The axis of the horizontal cylinder is parallel to the VP and the wo axes bisect each other. Draw the projections showing the curves of intersection. 12M

*** END***