Hall Ticket No: ☐☐☐☐☐☐☐☐☐☐ Question Paper Code: 18ENG101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I Semester (R18) Supplementary End Semester Examinations, December – 2022
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 Part-A or B only

Q.No		Question	Marks	CO	BL
Q.1	i.	What are supporting details?	1M	2	2
	ii.	Change the verb in brackets into noun. I won first prize in singing (COMPETE)	1M	1	2
	iii.	What is a memo?	1M	5	3
	iv	Reframe the following sentence in to indirect speech She said " I am happy ".	1M	2	3
	v.	What is a nonverbal communication?	1M	3	2
	vi	Why do people play Pub g? State one reason.	1M	2	4
	vii.	Write a compound word for the word *Brain*	1M	1	5
	viii.	How do you introduce your friend to your parents. Write one expression.	1M	4	3
	ix.	How important are 'Recommendations' in a report?	1M	5	4
	x.	Add question tag to the following statement. He likes sweets.	1M	3	2

Q.2(A) **Fill in the blanks with appropriate verb forms**

i. My friends-----the prime minister yesterday(Meet)
ii. The earth---------round the sun(Moves)
iii. I-------English for five years(Learn)
iv. Don't disturb me. I--------my home work(Do)
v. The soup-----------good(Taste)
vi. I-----Rahim at the zoo(see)
vii. The plane ---------at 3.30(Arrive)
viii. When I go home, my dog---------at the gate(Wait)
ix. By 2050, robots-----many of the jobs that people do today(Take)
x. Look! The sun --------over the hills(Rise)

10M   1   3

OR

Q.2(B) **Write suitable dialogues for the following conversations.**
a) Harsh has been invited to a wedding reception at the far end of his city. He calls a friend who is also going to the reception to ask if he could go with him in his car.
b)) Neha meets her dentist at a bank. They greet each other, exchange a few words and take leave.

10M   4   3

Q.3(A) **Connect the following outlines to form a Readable story .**

A stag admires his horns---despises his ugly, long legs- once chased by hunters and dogs- his legs help him to flee- his horns get entangled in thickest bush-siezed-killed.   10M   2   4

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

Q.3(B) **(i)Write the synonyms for the following words**
1. Hastened
2. Meek
3. Crowd
4. Contended
5. Foul

(ii) Write the antonyms for the following words
    1. Coarse   10M   1   3
    2. Larger
    3. Virtuous
    4. Rash
    5. Cruel

Q.4(A) **A) Put the word in brackets into the correct form. You will have to use prefixes and/or suffixes.**
1. There were only a _____ of people at the match. (hand)
2. She arrived late at work because she was_____. (sleep)
3. The road was too narrow, so they had to _____ it. (wide)
4. He was acting in a very _____ way. (child)
5. The team that he supported were able to win

    the_____ (champion)   10M   1   2

B) Re arrange the following sentences into a meaningful paragraph.

a. When two men met it was the custom for them to hold each other's open hands to show there was no weapon there.
b. Thieves lurked about in the dark and men carried swords for defence.
c. Thus, through time, men came to regard the holding of each other's hands as a greeting and a sign of friend ship.
d. When they were gripping each other's hands, they know there could be no danger from one another.
e. In olden days there were no lighted streets and no police men.

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

Q.4(B) **Explain the various sub-skills that are essential in enhancing reading skills.**   10M   2   2

Q.5(A) You are the Training Co-coordinator. You have been asked to make arrangements for one day seminar at the Conference Centre. The seminar is for 25 Division Chiefs from various departments.   10M   5   6
Write a memo to the director of the Conference Centre, Mary-Ann Downs, making arrangements for space, tables, audio-visual equipment, and refreshments.

Q.5(B) With the advancement of social media, It is easier and cheap to communicate and connect with people across the world. Justify the statement in 200 words.   10M   5   1

Q.6(A) **Read the following passage and answer the questions given below.**
All spiders spin webs. That's because webs help spiders. Webs help spiders do three things. Webs help spiders hold eggs. Webs help spiders hide. And webs help spiders catch food. Webs help spiders hold eggs. Many spiders like to lay their eggs in their webs. The webs help keep the eggs together. Webs help spiders keep their eggs safe. Webs help spiders hide.

Most spiders are dark. They are brown, grey, or black. But spider webs are light. They are white and cloudy. When spiders hide in their webs, they are harder to see. Webs help spiders catch food.

Spider webs are sticky. When a bug flies into the web, it gets stuck. It moves around. It tries to get out. But it can't. It is trapped! Spiders can tell that the bug is trapped. That's because spiders feel the web move. And the spider is hungry. The spider goes to get the bug. As you can see, webs help spiders hold eggs. Webs help spiders hide. And webs help spiders catch food. Without webs, spiders would not be able to live like they do. Spiders need their webs to survive!   10M   1   1

Questions
1) This passage is mostly about
        A. spider colors   B. spider webs   C. spider eggs
2) As used in paragraph 4, the word trapped most nearly means
        A. stuck   B. hidden   C. eaten
3) How can spiders tell when something is trapped in their web?
        A. They hear it. B. They smell it.   C. They feel it.
4) Do you like spiders? Why or why not? Write the reason.
5) The passage lists three reasons why spiders spin webs. Of these reasons, which do you think is the most important?

OR

Q.6(B) You want to take up a summer internship with the local outlet of McDonald's. Write an e-mail to the Head of the outlet enquiring about the procedure to go ahead.   10M   5   3

*** END***

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

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – DEC 2022

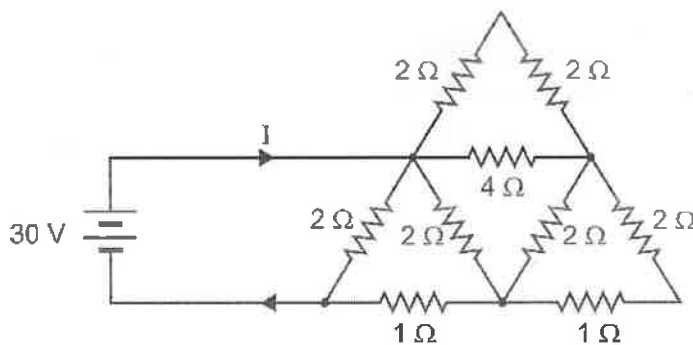## BASIC ELECTRICAL ENGINEERING
(Common to All)

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**

			Marks	CO	BL
Q.1	i.	What are active electrical elements?	1M	1	1
	ii.	Two resistors of resistance 3 Ω and 6 Ω, are connected in parallel across a battery having a voltage of 12V. Determine the total current supplied by the battery.	1M	1	2
	iii.	Determine the Peak value for a 230V(rms) main supply?	1M	2	2
	iv	Define Waveform.	1M	2	1
	v.	State Faraday's law of electromagnetic induction.	1M	3	1
	vi	Find the transformation ratio of a 230 V/2300 V, 50 Hz, single-phase transformer.	1M	3	2
	vii.	What is slip in an induction motor?	1M	4	1
	viii.	In a DC generator, which element is used to convert the A.C. voltage into D.C. voltage?	1M	4	2
	ix.	Expand MCB	1M	5	1
	x.	What is the knee-voltage value of Silicon P-N junction diode?	1M	5	2
Q.2(A)		Determine the power supplied by the source.	10M	1	3

OR

Q.2(B)	Find the current flowing through the 50Ω resistor by using node voltage analysis.	10M	1	3

Q.3(A)	400V (Line to Line) is applied to a three-phase Star connected with identical impedance each containing a 4Ω resistance in series with 3Ω inductive reactance. Find (a) Line current (b) power factor (c) power in each phase (d) total power supplied	10M	2	3

OR

Q.3(B)	(i)Write the advantages of 3-phase systems.	3 M	2	1
	(ii) Derive the relationship between phase and line voltages and currents in a balanced three-phase delta-connected system. Also, write the expressions for different powers.	7M	2	2

Q.4(A)	Explain the construction and working of a single-phase transformer.	10M	3	2

OR

Q.4(B)	(i) Derive an emf equation of a single-phase transformer.	6M	3	2
	(ii)A single-phase, 50 Hz transformer has 25 primary turns and 300 secondary turns. The cross-sectional area of the core is 300 cm2. When the primary winding is connected to a 250 V supply, determine (a) the maximum value of the flux density in the core, and (b) the voltage induced in the secondary winding.	4M	3	2

Q.5(A)	Discuss various methods which are used to control the speed DC shunt motor.	10M	4	2

OR

Q.5(B)	Explain the different starters of induction motors with a neat diagram.	10M	4	2

Q.6(A)	Discuss in detail the operation of a bridge rectifier with a neat circuit diagram and relevant waveforms.	10M	5	2

OR

Q.6(B)	With a neat sketch, explain the working of ELCB.	10M	5	2

*** END***

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 2022
ENGINEERING GRAPHICS
(Common to All)

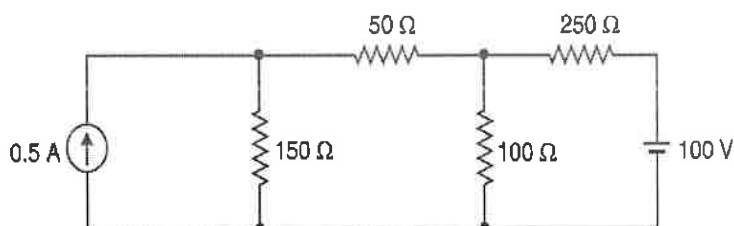**Time: 3Hrs**   **Max Marks: 60**

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

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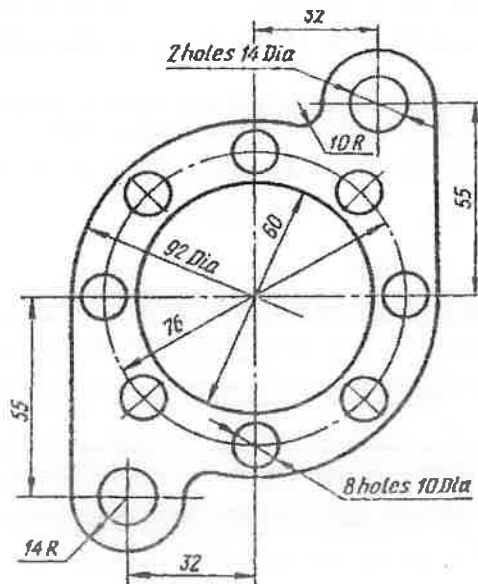
OR

| Q.1(B) | Draw the figure shown below using Auto CAD commands and dimension it. | 12M | 1 | |
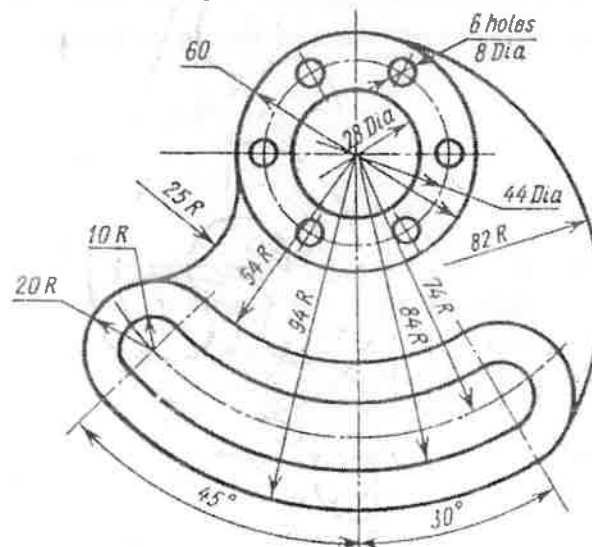
Q.2(A)	Two points F and G are on HP. Point F is 30mm in front of VP while G is 40mm behind VP. The line joining their top views makes an angle of 45 degrees with XY. Find the horizontal distance between two points.	12M	2

OR

Q.2(B)	Line AB 75mm long line makes 45° inclination with VP and its front view makes 55 degrees with XY. End A is 10mm above HP and 15mm in front of VP. Draw the projection and find its inclination with HP.	12M	2

Q.3(A)	A Hexagonal Pyramid with a base side of 30mm and an axis of 60mm has an edge of its base on the ground. Its axis is inclined at 30 degrees to the ground and parallel to VP. Draw its projections.	12M	3

OR

Q.3(B)	A square ABCD of 50mm side has its corner A in the H.P. its diagonal AC is inclined at 30^0 to the HP and the diagonal BD is inclined at 45^0 to the VP and parallel to H.P. Draw its projections.	12M	3

Q.4(A)	A Pentagonal Prism 30mm base side & 60mm axis is standing on HP on its base whose one side is perpendicular to VP. It is cut by a section plane 45° inclined to HP, through the mid-point of the axis. Draw FV, sec. TV and sec. Side View.	12M	4

OR

Q.4(B)	A Hexagonal Prism 30mm base side & 60mm axis is standing on HP on its base whose one side is perpendicular to VP. It is cut by a section plane 45° inclined to HP, through the mid-point of the axis. Draw the true shape of the section and the Development of surface of the remaining Solid.	12M	4

Q.5(A)	A vertical cylinder 50 mm diameter and 70 mm axis is completely penetrated by a square prism of 25 mm sides and 70 mm axis, horizontally. Both axes intersect and bisect each other. All faces of the prism are equally inclined to V.P. Draw the projections of solids, showing their curves of intersections.	12M	5

OR

Q.5(B)	Draw the front view, top view, and side view for the figure shown	12M	5
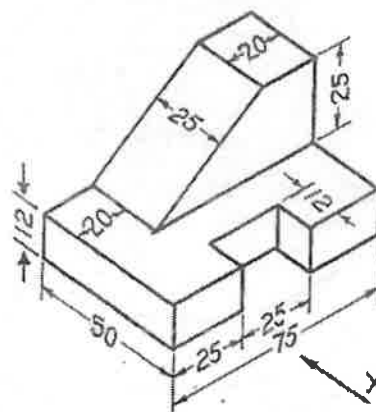
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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations –DEC'2022
ENGINEERING PHYSICS
(Common to CE & ME)

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.	$\hat{r}$ and $\hat{\theta}$ represent unit vectors in polar coordinate system. what s $\hat{r} \cdot \hat{\theta}$?	1M	1	1
	ii.	An object of mass M placed on the floor of an elevator accelerates upwards at a rate. Find N, the force exerted on an object by the floor of the elevator.	1M	1	2
	iii.	What is the minimum velocity required for a 100 kg object to escape from the surface of the Earth?	1M	2	2
	iv	State work-energy theorem	1M	2	1
	v.	What is the phase difference between two SHM described by equations $x = a \cos (\omega t)$ and $x = a \sin (\omega t + \pi/2)$.	1M	3	1
	vi	What are the characteristics of simple harmonic motion?	1M	3	1
	vii.	What is constructive interference?	1M	4	1
	viii.	What is Fraunhoffer diffraction?	1M	4	1
	ix.	Define stimulated emission of the laser.	1M	5	2
	x.	What is population inversion relating to laser action?	1M	5	2

Q.2(A)	i) Derive the expression for the acceleration in polar coordinates by starting from velocity expression in polar coordinates.	6M	1	2
	ii) A particle moves in a plane with constant radial velocity $\dot{r}$ = 4 m/s, starting from the origin. The angular velocity is constant and has magnitude θ = 2 rad/s. when the particle is 3 m from the origin, find the magnitude of (a) the velocity and (b) the acceleration.	4M		

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

Q.2(B)	i) Two blocks are in contact on a horizontal table. A horizontal force is applied to one of the blocks, as shown in the drawing. If m_1 = 2 kg, m_2 = 1 kg, and F = 6 N, find the force of contact between the two blocks.	4M	1	3
	ii) A block of mass M_1 rests on a block of mass M_2 which lies on a frictionless table. The coefficient of friction between the blocks is μ. What is the maximum horizontal force which can be applied to the blocks for them to accelerate without slipping on one another if the force is applied to (a) block1 and (b) block2?	6M		
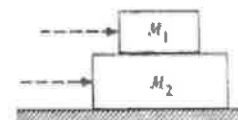
Q.3(A)	i) Derive fundamental rocket equation and obtain the final velocity of the rocket when it moves in free space and Gravitational field.	10M	2	3

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

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 forced oscillations? Derive the differential equation which represents forced oscillations. Discuss the condition for resonance in forced oscillators.	10M	3	4

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

Q.4(B)	i) What are Lissajous figures? On what factor Lissajous figure depends?	3M	3	3
	ii) Construct the Lissajous figures for the motion described by $x = \cos(2\omega t)$ $y = \cos(2\omega t - \pi/2)$.	7M		

Q.5(A)	Explain how the radius of curvature of plano-convex lens is determined by forming Newton's rings.	10M	4	3

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

Q.5(B)	Describe Fraunhoffer diffraction due to double slit with a suitable diagram. Derive the expression for its resultant intensity and discuss corresponding terms.	10M	4	3

Q.6(A)	Describe the principle, construction, and working of a He-Ne LASER.	10M	5	4

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

Q.6(B)	Explain the principle and working of Ruby laser.	10M	5	4

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

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations –DEC'2022
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.	What is the physical significance of divergence?	1M	CO1	1
	ii.	Evaluate the integral $\int_{-2}^{2}(x+5)\delta(2x)dx$ (use Dirac delta function)	1M	CO1	3
	iii.	Write Gauss's Law of electrostatics?	1M	CO2	1
	iv	Define coulomb's law.	1M	CO2	1
	v.	Define electric dipole moment?	1M	CO3	1
	vi	Relation between the electric displacement vector **D** and **P**?	1M	CO3	1
	vii.	Write the vectorial expression for current density **J**?	1M	CO4	1
	viii.	Define term "Magnetization"?	1M	CO4	1
	ix.	What is emf?	1M	CO5	1
	x.	Write the expression for Mutual-inductance?	1M	CO5	1

| Q.2(A) | 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. | 10M | CO1 | 3 |

OR

| Q.2(B) | With Neat diagram explain the spherical coordinate system and derive the unit vectors $(\hat{r}, \hat{\theta}, \hat{\phi})$ in terms of Cartesian unit vectors $(\hat{\imath}, \hat{\jmath}, \hat{k})$. | 10M | CO1 | 3 |

| Q.3(A) | a) Using coulomb's law of electrostatics calculate the electric field E for at a distance z above the midpoint of a straight-line segment of length $2L$ which carries a uniform line charge ? | 10M | CO2 | 2 |

OR

| Q.3(B) | i) Obtain Integral and differential form of Gauss's law. Mention the limitations in it? | 5M | CO2 | 2 |
| | ii) Describe the Poisson's equation and Laplace's equation in electrostatics. At what conditions Poisson's Equation reduces to Laplace's Equation? | 5M | CO2 | 3 |

Q.4(A)	The figure represents the uniformly polarized sphere of radius R, calculate the electric potential and field produced both inside and outside of the polarized sphere.	10M	CO3	3
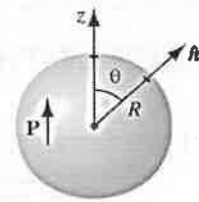
OR

Q.4(B)	i)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.	5M	CO3	3
	ii) Obtain a relation between electrical susceptibility χ and relative dielectric ϵ_r?	5M	CO3	3

Q.5(A)	Find the magnetic field using biot savart's law distance z above from a long straight wire (Fig.), carrying a steady current I?	10M	CO4	3
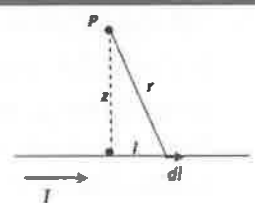
OR

Q.5(B)	What do you mean by magnetization? Derive the Ampere's law of magneto statics in materials? Differentiate the Para magnetism, diamagnetism, and ferromagnetism	10M	CO4	3

Q.6(A)	Write four Maxwell's equations in differential form and integral form. Mentions the modifications of Amperes law by Maxwell?	10M	CO5	2

OR

Q.6(B)	Derive the equation of electromagnetic waves in free space using Maxwell's equations and prove that velocity of EM wave is equal to light velocity (3×10^8 cm/sec). Show that the electric field **E** and magnetic field **B** were mutual perpendicular vectors and satisfies the three-dimensional wave equation.	10M	CO5	3

*** END ***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations -DEC'2022
MODERN PHYSICS
(Common to EEE, CSE, CST, CSIT)

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 Part B only. Q.no 6 which is a case study is compulsory.

			Marks	CO	BL
Q.1	i.	Define simple harmonic motion (SHM)	1 M	1	1
	ii.	Give an example of transverse wave motion.	1 M	1	1
	iii.	Name types of interference.	1 M	2	1
	iv	Write the relation between phase difference and path difference.	1 M	2	2
	v.	State Heisenberg's uncertainty principle	1 M	3	1
	vi	Wave function Ψ means?	1 M	3	1
	vii.	What is an energy band?	1 M	4	1
	viii	Draw the Fermi level in intrinsic semiconductors.	1 M	4	1
	ix.	Define Pumping.	1 M	5	1
	x.	Give any two applications of LASER.	1 M	5	1
Q.2(A)	i) What are Lissajous figures? On what factor does it depend?		2 M	1	3
	ii) Construct the Lissajous figures for the superimposed two perpendicular simple harmonic motions described by following equations. $x = 10 \, Cos(10\pi t)$ and $y = 10 \, Cos(10\pi t+\pi/2)$		8 M	1	

OR

Q.2(B)	Discuss damped harmonic oscillator. Explain the under, over and critical damping in detail?	10 M	1	4

Q.3(A)	Determine the radius of curvature of Plano-convex lens by the help of Newton's rings experiment.	8 M	2	4
	ii) In Newton's ring experiment the diameter of the 5th ring is 0.3cm and that of 25th ring is 0.8cm. If the radius of curvature of the lens is 100cm, find the wavelength of the light used.	2 M	2	

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.	10 M	2	3

Q.4(A)	(i) Show that the energies of a particle trapped in a potential well with infinite walls is quantized using Schrodinger's time independent wave equation.	7 M	3	4
	(ii) Calculate the first three energy levels for an electron in a quantum well of width 10Å with infinite walls.	3 M	3	3

OR

Q.4(B)	Derive Schrodinger's time independent and time dependent wave equations.	10 M	3	3

| Q.5(A) | i) Describe the construction and working of PN junction diode. | 6 M | 4 | 4 |
| | ii) Explain I-V Characteristics of a PN junction diode under forward bias and a reverse bias with suitable diagrams. | 4 M | 4 | 4 |

OR

| Q.5(B) | i) On the basis of band theory, explain how the solids are classified into metals, semiconductors and insulators? | 5 M | 4 | 3 |
| | ii) Distinguish between direct and indirect band gap semiconductors. | 5 M | 4 | 3 |

| Q.6(A) | Define spontaneous and stimulated emission. Derive the relation between the probabilities of spontaneous emission and stimulated emission in terms of Einstein's coefficients. | 10 M | 5 | 4 |

OR

| Q.6(B) | Describe the principle, construction and working of a He-Ne Laser. | 10 M | 5 | 4 |

*** END***

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

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – DEC'2022

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 answers either Part - A or B only

			Marks	CO	BL
Q.1	i.	Define Alkalinity of water	1 M	1	2
	ii.	What happens when OH^- and HCO_3^- exists together in water?	1 M	1	1
	iii.	First ionization energy is depended on the atomic radii of the element TRUE or FALSE	1 M	2	1
	Iv	Give the monomers of Nylon 6,6.	1 M	2	1
	v.	Hooke's law is the basis for _____ & _____ spectroscopies.	1 M	3	1
	Vi	Give any two applications of Rotational Spectroscopy.	1 M	3	1
	vii.	State and express the First Law of Thermodynamics.	1 M	4	1
	viii.	What is Electro Motive Force (EMF)?	1 M	4	1
	ix.	Define Flash point of lubricant	1 M	5	1
	x.	As size of the particle decreases, it _____ to volume ratio increases.	1 M	5	1
Q.2(A)		What is the Hardness of water and explain its determination process by EDTA method.	10 M	1	5
		OR			
Q.2(B)		What is sterilization of water and elaborate the break point chlorination process	10 M	1	6
Q.3(A)		Describe SN1 and SN2 reactions with suitable examples, mechanisms, and energy profiles.	10 M	2	4
		OR			
Q.3(B)		i) Write about E1 reaction with an example.	4 M	2	4
		ii) Draw the structure of the following molecules using VSEPR Theory (a) $BeCl_2$, (b) CH_4, (c) XeF_2	6 M	2	3
Q.4(A)		Discuss the IR Spectroscopy with appropriate illustrations.	10 M	3	6
		OR			
Q.4(B)		Describe the principles and applications of UV-VIS Spectroscopy.	10 M	3	5
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 with a neat diagram, the principle, construction, and applications of Lead Acid battery.	10 M	3	5
Q.6(A)		Explain the various process involved in the manufacturing of Portland Cement with neat diagram.	10 M	5	5
		OR			
Q.6(B)		Describe the Carbon Nanotube (CNT) growth process by a CVD method.	10 M	5	5

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R18) Supplementary- End Semester Examinations – DEC'2022
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 Part-A or B only**

			Marks	CO	BL
Q.1	i.	Find the characteristic polynomial of a matrix $A = \begin{bmatrix} 3 & 1 \\ -2 & 4 \end{bmatrix}$	1M	1	2
	ii.	What are the Eigen vectors of a matrix $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$?	1M	1	1
	iii.	Write the function $f(z) = e^z$ in the form $f(z) = u(x,y) + iv(x,y)$.	1M	2	1
	iv	State Cauchy's residue theorem.	1M	2	1
	v.	Find $L\left(\dfrac{\sin t}{t}\right)$	1M	3	2
	vi	Find $L^{-1}\left(\dfrac{1}{s^3}\right)$	1M	3	1
	vii.	State linearity property of Fourier transform.	1M	4	1
	viii.	Find the Fourier sine transform of $f(x) = x$	1M	4	2
	ix.	Find $Z(n^2)$	1M	5	1
	x.	Find $Z^{-1}\left(\dfrac{z}{(z-1)^2}\right)$	1M	5	2
Q.2(A)		Use Gauss-Jordan method find the inverse of a matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$	10M	1	3
		OR			
Q.2(B)		Find Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$	10M	1	3
Q.3(A)		Derive the polar form of CR equations and deduce that $\dfrac{\partial^2 u}{\partial r^2} + \dfrac{1}{r}\dfrac{\partial u}{\partial r} + \dfrac{1}{r^2}\dfrac{\partial^2 u}{\partial \theta^2} = 0$	10 M	2	3
		OR			
Q.3(B)		Expand $f(z) = \dfrac{1}{(z-1)(z-2)}$ in the region (a) $|z| < 1$. (b) $1 < |z| < 2$	10M	2	3

Q.4(A)　(i) Find the Laplace transforms of　$\dfrac{e^{at} - \cos bt}{t}$　10M　3　3

(ii) Find　$L\left\{ t\displaystyle\int_0^t \dfrac{e^{-t}\sin t}{t} dt \right\}$

OR

Q.4(B)　Solove by the method of transforms, the equations　10M　3　3

$y'' + 4y' + 3y = e^{-t}, \quad y(0) = y'(0) = 1$

Q.5(A)　Find the Fourier transform of $e^{-2(x-3)^2}$　10M　4　3

OR

Q.5(B)　Find the Fourier sine transform of　$\dfrac{e^{-ax}}{x}$　10M　4　3

Q.6(A)　Using inversion integral method, Find the inverse Z-transform of　10M　5　3
$\dfrac{2z}{(z-1)(z^2+1)}$

OR

Q.6(B)　Using Z-transform solve $u_{n+2} - 2u_{n+1} + u_n = 3n + 5$　10M　5　4

*** END ***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B. Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – DEC'2022
LINEAR ALGEBRA AND DIFFERENTIAL EQUATION
(CE)

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.	Define Orthogonal Matrix with an example.	1M	1	1
	ii.	Find the Eigenvalues of the matrix $A = \begin{pmatrix} 1 & 0 \\ 2 & -3 \end{pmatrix}$.	1M	1	1
	iii.	Find the order and degree of the differential equation $\dfrac{d^2 y}{dx^2} = \left(\dfrac{dy}{dx}\right)^{3/2}$	1M	2	1
	iv	Define the integrating factor of the differential equation.	1M	2	1
	v.	Find the complementary solution $y'' - 2y' + y = \sin x$.	1M	3	1
	vi	What is Wronskian in the differential equation	1M	3	1
	vii.	Find the Laplace transform of the $f(t) = e^{2t}$.	1M	4	1
	viii	Find $L^{-1}\left(\dfrac{1}{(s-5)}\right)$.	1M	4	1
	ix.	Write one example for non-linear PDE.	1M	5	1
	x.	Define the Laplace equation in one-dimensional space.	1M	5	1

Q.2(A)	Show that every square matrix can be expressed uniquely as the sum of a symmetric and skew-symmetric matrix and give one example.	10M	1	4

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

Q.2(B)	Show that the matrix $A = \begin{bmatrix} 1 & -2 & 2 \\ 1 & -2 & 3 \\ 0 & -1 & 2 \end{bmatrix}$ satisfies its characteristic equation. Hence find A^{-1}	10M	1	3

Q.3(A)	Solve the differential equation $(y \log y)\, dx + (x - loy\, y) dy = 0$	10M	2	3

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

Q.3(B)	Solve $x \log x \dfrac{dy}{dx} + y = \log x^2$.	10M	2	3

Q.4(A)	Solve the differential equation $x^2 y'' - 3xy' + 4y = 1 + x^2$.	10M	3	3
	OR			
Q.4(B)	Solve by using the method of variation of parameters $y'' + y = Co\sec x$	10M	3	3

Q.5(A)	Find the inverse Laplace transformation of $L^{-1}\left(\dfrac{1}{s^2\left(s^2 + a^2\right)}\right)$	10M	4	3
	OR			
Q.5(B)	Find the solution of the differential equation $y'' + y = t$ with the initial condition $y'(0) = 1, y(\pi) = 0$ by using the Laplace transformation.	10M	4	4

Q.6(A)	Form the partial differential equations by eliminating the arbitrary constants and functions from the following i) $z = f(x) + e^y g(x)$ ii) $z = xf(x+t) + g(x+t)$	10M	5	3
	OR			
Q.6(B)	Solve the partial differential equation by $3\dfrac{\partial u}{\partial x} + 2\dfrac{\partial u}{\partial y} = 0$ with the condition $u(x, 0) = 4e^{-x}$.	10M	5	4

*** END***

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

B.Tech I Year I & II Semester (R18) Supplementary- End Semester Examinations – DEC'2022

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 A or B only**

			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 eigenvalues of the matrix $A = \begin{bmatrix} 2 & 0 \\ 8 & -7 \end{bmatrix}$	1M	1	2
	iii.	Find the basis for the Null space of the matrix $A = \begin{bmatrix} -2 & 0 \\ 0 & 0 \end{bmatrix}$	1M	2	1
	iv	Determine the set of vectors $\{(1,2,-1),(2,4,5),(0,0,0)\}$ form basis (or) not.	1M	2	2
	v.	Find $T \circ S$ whenever it is defined $T(x,y,z)=(x-y+z,x+z)$, $S(x,y)=(x,x-y,y)$.	1M	3	1
	vi	Let $T: P_2(\mathbb{R}) \to P_3(\mathbb{R})$ be a linear transformation such that $T(1) = 1; T(x) = x^2$, and $T(x^2) = x^3 + x$. Find $T(ax^2 + bx + c)$.	1M	3	2
	vii.	Find the transition matrix $[Id]_\alpha^\beta$ from α to β, when $\alpha = \{(2,3)(0,1)\}$ and $\beta = \{(6,4)(4,8)\}$.	1M	4	2
	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	4	1
	ix.	Define Inner Product space	1M	5	1
	x.	Let $S = ((0,1,0),(0,0,1))$. Find a basis for $S^\perp$ with respect to the Euclidean Inner product space on R^3.	1M	5	2

		Marks	CO	BL
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	1	3

OR

		Marks	CO	BL
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)	In R^4, determine whether or not the set $\{e_1-e_2, e_2-e_3, e_3-e_4, e_4-e_1\}$ is Linearly dependent or not.	10M	2	3

OR

Q.3(B)	Find the basis for row space, column space and null space of the matrix $$A = \begin{bmatrix} 1 & 2 & 0 & 2 & 1 \\ -1 & -2 & 1 & 1 & 0 \\ 1 & 2 & -3 & -7 & 2 \\ 1 & 2 & -2 & -4 & 3 \end{bmatrix}$$	10M	2	3

Q.4(A)	Let $w_1 = (1,0)$, $w_2 = (2,-1)$, $w_3 = (4,3)$ be three vectors in $\mathbb{R}^2$. (a) Let $\alpha = \{e_1, e_2, e_3\}$ be the standard basis for 3-space $\mathbb{R}^3$, and let $T: \mathbb{R}^3 \to \mathbb{R}^2$ be the linear transformation defined by, $T(e_1) = w_1$, $T(e_2) = w_2$, $T(e_3) = w_3$. Find the formula for $T(x_1, x_2, x_3)$, and then use it to compute $T(2, -3, 5)$.	10M	3	3

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	3	3

Q.5(A)	Find the transition matrix $[Id]_\alpha^\beta$ from α to β, $[Id]_\beta^\alpha$ from β to α, $\alpha = \{(1,1,1), (1,1,0), (1,0,0)\}, \beta = \{(2,0,3), (-1,4,1), (3,2,5)\}$;	10M	4	3

OR

Q.5(B)	Let T be a linear transformation from R^3 into R^2 defined by $T(x_1, x_2, x_3) = (x_1 + x_2, 2x_3 - x_1)$. (a). For the standard ordered basis α and β for R^3 and R^2 respectively, find the associated matrix for T with respect to the basis α and β. (b). Let $\alpha = \{x_1, x_2, x_3\}$ and $\beta = \{y_1, y_2\}$, where $x_1 = (1,0,-1)$, $x_2 = (1,1,1)$, $x_3 = (1,0,0)$ and $y_1 = (0,1)$, $y_2 = (1,0)$. Find the associated matrices $[T]_\alpha^\beta$.	10M	4	3

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	5	3

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	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R18) Supplementary- End Semester Examinations – DEC'2022
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**

			Marks	CO	BL
Q.1	i.	Define orthogonal matrix with an example.	1M	1	1
	ii.	State the rank-nullity theorem for a linear transformation.	1M	1	1
	iii.	Show that the function $U(x,y) = 2x - 2xy$ is harmonic.	1M	2	1
	iv	Determine the residue of the function $f(z) = z\cos\frac{1}{z}$	1M	2	1
	v.	Write a differential equation with order 1 but not degree 1.	1M	3	1
	vi	State the Cauchy-Goursat theorem	1M	3	1
	vii.	Classify that the differential equation $\frac{dy}{dx} = y\,tanx - y^2\,sec\,x$ is linear or non-linear.	1M	4	1
	viii.	Write the general form of Bernoulli's differential equation	1M	4	1
	ix.	Write an example for the differential equation with order 2 and degree 2.	1M	5	1
	x.	Find complementary function for the equation $x^2\frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + 6y = x$.	1M	5	1

		Marks	CO	BL
Q.2(A)	Find the Eigen values and Eigen vectors of the matrix $A = \begin{pmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{pmatrix}$	10M	1	3

OR

		Marks	CO	BL
Q.2(B)	Find the values of k for which the system of equations $$(3k-8)x + 3y + 3z = 0$$ $$3x + (3k-8)y + 3z = 0$$ $$3x + 3y + (3k-8)z = 0$$ has a non-trivial solution.	10M	1	3

		Marks	CO	BL
Q.3(A)	State and derive Cauchy-Riemann (CR) equations in Cartesian coordinates.	10M	2	3

OR

		Marks	CO	BL
Q.3(B)	Find all roots $(z = x + iy)$ of the equation $\sin z = \cosh 4$ by equating the real and imaginary parts.	10M	2	3

Q.4(A) Evaluate $\oint_c f(z)dz$, where $f(z) = \begin{cases} 1, & when\ y < 0 \\ 4y, & when\ y > 0 \end{cases}$ and C is an arc   10M   3   3
from $z = -1 - i$ to $z = 1 + i$ along the curve $y = x^3$

OR

Q.4(B) Let C denote the positively oriented boundary of the square whose sides   10M   3   3
lie along the lines $x = \pm 2$ and $y = \pm 2$. Evaluate each of the following
integrals

(a) $\int_C \frac{e^{-z}}{z - i\frac{\pi}{2}} dz$ (b) $\int_C \frac{z}{2z+1} dz$

Q.5(A) Solve $x \log x \frac{dy}{dx} + y = \log x^2$ 10M   4   3

OR

Q.5(B) Solve $p^3 - 4xyp + 8 y^2 = 0$, (where $\frac{dy}{dx} = p$)   10M   4   3

Q.6(A) Solve $x^2 y'' - 3xy' + 4y = (1 + x^2)$ 10M   5   3

OR

Q.6(B) Solve the following differential equation using Laplace transform   10M   5   3
method

$$y'' + 2y' - 3y = sint\ ,\text{given that }y(0) = y'(0) = 0$$

*** END***

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

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – DEC'2022

ENGINEERING CALCULUS
(Common to CE, ECE, CSE, CST, CSIT, 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 Part-A or B only**

			Marks	CO	BL
Q.1	i.	Find the area between the curve $y = x^2$, $0 \le x \le 2$ and the x-axis.	1M	1	1
	ii.	Find the value of $\Gamma\left(\dfrac{7}{2}\right)$	1M	1	2
	iii.	State Rolle's theorem	1M	2	1
	iv	Evaluate $\underset{x \to 0}{Lt} \dfrac{\log x}{\cot x}$	1M	2	2
	v.	State Alternating series test	1M	3	1
	vi	If $f(x) = x^2$ in $-2 < x < 2$ then determine a_0.	1M	3	2
	vii.	If $f(x, y) = x \cos y + ye^x$ then find $\dfrac{\partial^2 f}{\partial x^2}$.	1M	4	2
	viii.	When a function $f(x, y)$ has saddle point at a point (a, b).	1M	4	1
	ix.	Evaluate $\int\limits_{1}^{3}\int\limits_{1}^{2} dx\,dy$	1M	5	2
	x.	Find the $Curl\,F$ when $F = xyi + yzj + zxk$	1M	5	2

Q.2(A)	Find the area and length of the polar curve $r = a\sin 3\theta$	10M	1	3

OR

Q.2(B)	Define Beta function. Show that $\int\limits_{0}^{\frac{\pi}{2}} \sqrt{\sin\theta}\,d\theta \times \int\limits_{0}^{\frac{\pi}{2}} \dfrac{d\theta}{\sqrt{\sin\theta}} = \pi$	10M	1	3

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

OR

Q.3(B)	Evaluate a) $\underset{x \to 0}{Lt} \dfrac{x\cos x - \sin x}{x^2 \sin x}$ b) $\underset{x \to 0}{Lt} \left(\dfrac{a^x + b^x + c^x + d^x}{4}\right)^{\frac{1}{x}}$	10M	2	3

| | | 10M | 3 | 4 |

Q.4(A) For what values of x do the power series converge? a) $\sum_{n=0}^{\infty} \dfrac{x^n}{n!}$ b) $\sum_{n=0}^{\infty} n! x^n$ 10M   3   4

OR

Q.4(B) Expand $f(x) = x \sin x$ as a cosine series in the interval $0 < x < \pi$ 10M   3   3

Q.5(A) Find the first order derivatives of i) $f(x,y) = \dfrac{2y}{y + \cos x}$ ii)   10M   4   3

$f(x,y) = y e^{x^2 - y}$

OR

Q.5(B) Find the point $P(x,y,z)$ on the plane $x + 2y + 3z = 13$ closest to the point   10M   4   3

$(1,1,1)$

Q.6(A) Change the Cartesian integral into an equivalent polar integral. Then   10M   5   3

evaluate the polar integral $\displaystyle\int_0^1 \int_0^{\sqrt{1-y^2}} (x^2 + y^2)\,dx\,dy$.

OR

Q.6(B) Verify Green's theorem for the vector field $F(x,y) = 2xi - 3yj$ and the   10M   5   4

region R bounded by the circle $C : r(t) = (a\cos t)i + (a\sin t)j, \ 0 \le t \le 2\pi$.

*** END***

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

B.Tech I Year I & II Semester (R18) Supplementary End Semester Examinations – DEC'2022

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

			Marks	CO	BL
Q.1	i.	List the C Tokens available in c	1M	1	1
	ii.	Compare = and = =	1M	1	2
	iii.	Define a function	1M	2	1
	iv	What is the precondition for Binary Search	1M	2	1
	v.	Define a pointer	1M	3	1
	vi	Compare array and structure	1M	3	2
	vii.	List out the operations performed in the stack	1M	4	1
	viii.	What are the different types of queues	1M	4	1
	ix.	What is a file?	1M	5	1
	x.	Which library function is used to locate a substring in a string?	1M	5	2
Q.2(A)	Explain in detail the structure of the C program with an example	10M	1	2
	OR			
Q.2(B)	Explain the branch statements and conditional statements in C.	10M	1	2
Q.3(A)	Illustrate the Linear search algorithm using an array with an example.	10M	2	2
	OR			
Q.3(B)	Explain different storage classes available in C. Provide a suitable example for the use of each class	10M	2	2
Q.4(A)	Develop a C program to print maximum marks in each subject along with the name of the student by using structures. Take 3 subjects and 3 students' records.	10M	3	3
	OR			
Q.4(B)	Explain dynamic memory allocation and related functions with examples.	10M	3	2
Q.5(A)	Develop a source code to implement stack using an integer array	10M	4	3
	OR			
Q.5(B)	Discuss in detail about queue and its implementation with a neat sketch.	10M	4	6
Q.6(A)	Explain any five string handling functions briefly.	10M	5	2
	OR			
Q.6(B)	Define file? Discuss with an example the different file opening modes in C.	10M	5	6

*** END***