MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, June – 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 form of the verb given within the brackets: Tina _____ (turn up) late to my house on that day.	1M	1	1
	ii.	Add an appropriate suffix to convert the verb "invest" into a noun.	1M	1	1
	iii.	Change the following sentence into indirect speech: She said to me, "I will see you tomorrow."	1M	1	1
	iv	Complete the given conditional sentence. If I were rich, _____	1M	1	1
	v.	Explain scanning (a reading technique) with an example.	1M	2	2
	vi	Fill in the most appropriate word to make it a formal request. "_____ you please lend me a pen?"	1M	3	1
	vii.	Fill in the blank with two words to make it an informal phrase which is often used when you meet someone after a long time. "Long time _____ _____"	1M	3	1
	viii.	My favourite sport is football. (Make a Wh question)	1M	4	2
	ix.	Write a suitable subject for an email to your class teacher seeking leave for two days.	1M	5	2
	x.	What is a memo?	1M	5	1
Q.2(A)		Fill in the blanks with appropriate tense forms using the verbs given within the brackets: i. Dina 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. Ravi .... 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**	10M	1	3
Q.2(B)		Form ten compound words using the following list of words: **(Do not write more than ten answers)** cake hand chair shake snow stick chop man spoon coffee fly moon fruit mug liptea full pan wheelfireiced Example: pancake (this word will not be considered for evaluation)	10M	1	3
Q.3(A)		Write a paragraph on the following topics. i) Terrorism ii) Artificial intelligence	10M	2	4

Q.3(B)   **Read the following passage and answer the questions**   10M   2   4

Leading investors have joined the growing chorus of concern about governments and companies rushing into producing biofuels as a solution for global warming, saying that many involved in the sector could be jeopardising future profits if they do not consider the long-term impact of what they are doing carefully.

It is essential to build sustainability criteria into the supply chain of any green fuel project in order to ensure that there is no adverse effect on the surrounding environment and social structures. The report produced by the investors expresses concern that many companies may not be fully aware of the potential pitfalls in the biofuel sector.

Production of corn and soya beans has increased dramatically in the last years as an eco-friendly alternative to fossil fuels but environmental and human rights campaigners are worried that this will lead to destruction of rain forests. Food prices could also go up as there is increased competition for crops as both foodstuffs and sources of fuel. Last week, the UN warned that biofuels could have dangerous side effects and said that steps need to be taken to make sure that land converted to grow bio-fuels does not damage the environment or cause civil unrest. There is already great concern about palm oil, which is used in many foods in addition to being an important biofuel, as rain forests are being cleared in some countries and people driven from their homes to create palm oil plantations.

An analyst and author of the investors' report says that bio-fuels are not a cure for climate change but they can play their part as long as governments and companies manage the social and environmental impacts thoroughly. There should also be greater measure taken to increase efficiency and to reduce demand.

1.   Provide a suitable topic for the above passage.
2.   ____ are worried about the boom in bio-fuels.
3.   Biofuel producers ____ know about the possible problems.
     a. do not   b. might not   c. must not
4.   Environmentalists believe that increased production of corn and soya ____
     (i)   has destroyed rain forests.
     (ii)   may lead to the destruction of rain forests.
     (iii) will lead to the destruction of rain forests.
5.   Bio-fuels might _____
     (i)   drive food prices up.
     (ii)   food prices down.
     (iii) have little or no impact on food prices.
6.   How can production of bio-fuels affect food prices?
7.   The increased production of palm oil _____
     (i) just affects the environment.
     (ii) just affects people.
     (iii)affects both people and the environment.
8.   The author of the report says that bio-fuels _____
     (i)   have no role to play in fighting global warming.
     (ii) can be effective in fighting global warming on their own.
     (iii) should be part of a group of measures to fight global warming.

Q.4(A)   Express your opinions on the following topics. (150 words each)   10M   3   5
         "Wealth can buy health"
         "Technology will replace jobs in the future".

OR

Q.4(B)	Assume that your family is on a tour, and you meet your school-day friend who also is on a tour with their family. Write a conversation with your friend discussing the places you both have visited so far and your further plans during the vacation. Write a minimum of twelve exchanges.	10M	3	3
Q.5(A)	Imagine that you are the president of Students' clubs. Write dialogues with the members of various clubs for conducting activities with a minimum of twelve exchanges.	10M	4	3

OR

Q.5(B)	Imagine that you are the representative of your class and you are meeting your professor to organize an industrial visit to ISRO Sriharikota. Write a formal conversation (dialogue) featuring questions (and answers) about: • Permissions required from your college and ISRO, • Transport and food arrangements • Financial needs for the trip. (Minimum 12 exchanges)	10M	4	4
Q.6(A)	Draft an email inviting your principal for a quiz competition that you have organized (assume that you are the quiz club coordinator of the college. Explain the event to your principal. Include date, venue and time of the competition).	10M	5	3

OR

Q.6(B)	Write a report (of about 200 words) to the principal about the the orientation/student induction program held for the fresher students. Elaborate about the lectures, trips, cultural and sport events held during the orientation.	10M	5	3

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, June – 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.	List out two disadvantages of using hard water in boiler.	1 M	1	2
	ii.	What is coagulation? Give an example for coagulant.	1 M	1	1
	iii.	Name the monomers used in synthesis of Nylon 6,6.	1 M	2	1
	iv	Find the oxidation state of oxygen in OF_2 molecule.	1 M	2	2
	v.	Why colorimetric graph must pass through origin?	1 M	3	2
	vi	Name the reference compound used for recording NMR spectrum.	1 M	3	2
	vii.	Write the Nernst equation for Daniel Cell.	1 M	4	1
	viii.	Define enthalpy of a system.	1 M	4	1
	ix.	Why we need to add gypsum during the manufacturing of Portland cement?	1 M	5	2
	x.	Distinguish the Flash & Fire point of a lubricant.	1 M	5	1
Q.2(A)		Explain ion exchange process with a neat diagram.Also mention any two advantages and disadvantages of this process.	10 M	1	2
		OR			
Q.2(B)		Define alkalinity. Discuss the method for the determination of alkalinity.	10 M	1	3
Q.3(A)		Explain S_N1 and S_N2 reaction mechanism in alkyl halides.	10 M	2	3
		OR			
Q.3(B)		Predict the structure and bond angle of the following molecules using VSEPR Theory (a) PCl_5, (b) CH_4, (c) SF_6, (d) XeF_2, (e) NH_3	10 M	2	3
Q.4(A)		Write the principle and applications of IR Spectroscopy.	10 M	3	2
		OR			
Q.4(B)		Brief out the principles and applications of UV-Vis Spectroscopy.	10 M	3	2
Q.5(A)		Derive the expression for entropy change of an isothermal, isobaric, and isochoric processes.	10 M	4	3
		OR			
Q.5(B)		(i)Explain the principle and construction of H_2-O_2 fuel cell.	5 M	4	2
		(ii)Elaborate the charging&discharging mechanisms of Lead-acid battery.	5 M	4	3
Q.6(A)		Explain the preparation of Portland Cement with neat diagram.	10 M	5	2
		OR			
Q.6(B)		Describe the Carbon Nanotube (CNT) growth process by CVD method.	10 M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

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

APPLIED PHYSICS

(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.	In SHM at which positions the velocity will be maximum and minimum	1M	1	1
	ii.	What is Standing wave Ratio (SWR)?	1M	1	1
	iii.	Calculate the thickness of the half wave plate for sodium light of wavelength 5893 Å whose refractive indices 1.64 and 1.60.	1M	2	2
	iv	What is constructive interference and write the condition.	1M	2	1
	v.	State the uncertainty principle for momentum and position.	1M	3	1
	vi	What do you mean normalization of wave function Ψ.	1M	3	1
	vii.	What is Fermi energy level?	1M	4	1
	viii	Give examples for direct band gap semiconductor?	1M	4	1
	ix.	What is numerical aperture for optical fiber	1M	5	1
	x.	Draw profile of step index fiber	1M	5	1
Q.2(A)		What are Lissajous figures? On what factors they depend? Construct the Lissajous figures for the superimposed two perpendicular simple harmonic motions described by following equations $x = 2Cos(\omega t)$ and $y = 2Cos(\omega t + \frac{\pi}{4})$	10 M	1	2
		OR			
Q.2(B)		Discuss the various cases of damped harmonic oscillator by deriving the necessary expressions?	5M	1	3
		Derive the expression for velocity of transverse waves in streched string.	5M	1	3
Q.3(A)		i) Explain how the radius of curvature of the given plano-convex lens is determined using Newton's rings experiment. How do you calculate the radius of curvature of planoconvex lens using newton's ring experiment.	10M	2	3
		OR			
Q.3(B)		Describe Fraunhoffer 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	4
Q.4(A)		Derive Schrödinger's time dependent and time independent wave equations?	10M	3	3
		OR			
Q.4(B)		Write down Schrodinger equation for a quantum mechanical particle confined in a potential box defined as $V(x) = 0$ for $0 \le x \le a$ and $V(x) = \infty$ otherwise. Obtain the energy eigenvalues and Eigen functions for this particle in the ground, 1st and 2nd excited states.	10M	3	3
Q.5(A)		Explain the Quantum free electron theory. How the quantum free electron theory overcome the drawbacks of classical free electron theory	10M	4	3

OR

Q.5(B)	Define the drift and diffusion in semiconductors. Discuss Hall effect and drive an expression of Hall coefficients for an n-type semiconductor.	10M	4	3
Q.6(A)	Discuss the principle, construction and working of a Ruby LASER?	10M	5	2

OR

Q.6(B)	What is the principle of optical fiber construction? Draw the block diagram of an optical fiber communication system and explain the function of each block.	10M	5	2

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(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, June – 2024
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

Q.No		Question	Marks	CO	BL
Q.1	i.	Define law of force.	1M	1	1
	ii.	Write the expression for velocity in polar coordinates.	1M	1	1
	iii.	What is conservation of linear momentum?	1M	2	1
	iv	Explain the stability of the system in terms of potential energy.	1M	2	2
	v.	Define simple harmonic motion.	1M	3	1
	vi	Define standing wave ratio.	1M	3	1
	vii.	Mention any two important conditions to get interference pattern.	1M	4	1
	viii.	What is grating element?	1M	4	1
	ix.	What are the characteristics of laser light?	1M	5	2
	x.	Which material is used for active medium in Ruby Laser?	1M	5	1
Q.2(A)		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 forceapplied to the lower block is 27 N. What is its maximum force for the upper block to slide without slipping?	10 M	1	3

OR

Q.2(B)	i) A particle moves in a plane with constant radial velocity 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	1	4
	ii) Mass M is fixed to the end of a rod of length l and negligible mass that is pivoted to swing from the end of a hub that rotates at constant angular frequency ω, as shown in the drawing. The mass moves with steady speed in a circular path of constant radius. The problem is to find a, the angle the rod makes with the vertical.	6M		

Q.3(A)	Derive rocket equation and discuss the motion of a rocket under a constant gravitational field?	10M	2	3

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)	i) Explain under damping, heavily damping and critical damping with physical examples.	3M	3	3
	ii) Construct the Lissajous figures for the superimposed two perpendicular simple harmonic motions described by following equations? x = A Cos(5ωt) and y = A Cos(10ωt+π/2)	7M		

Q.4(B)	i) Derive transverse wave velocity in the stretched string in terms of linear density and tension.	7M	3	3
	ii) Write differences longitudinal and transverse waves?	3M		

Q.5(A)	i) Describe the arrangement to observe Newton's rings by reflected light. Obtain an expression for the radius of curvature of a Plano-convex lens?	8M	4	3
	ii) The ratio of intensity of the maxima and minima of interference fringes is 25:9. Determine the ratio between the amplitude and intensities of the tw interference beams?	2M		

Q.5(B)	Give the construction and theory of a plane diffraction grating of the transmission type and explain the formation of spectra by it?	10M	4	3

Q.6(A)	Explain the construction and working of He-Ne laser with the help of a neat energy level diagram.	10M	5	4

Q.6(B)	*i)* Explain functioning of communication system with optical fiber?	7 M	5	4
	ii) Calculate the refractive index of core and cladding of an optical fiber with a numerical aperture of 0.44 and their fractional change in the refractive indices being 0.015?	3 M		

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

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

ENGINEERING GRAPHICS

(Common to All)

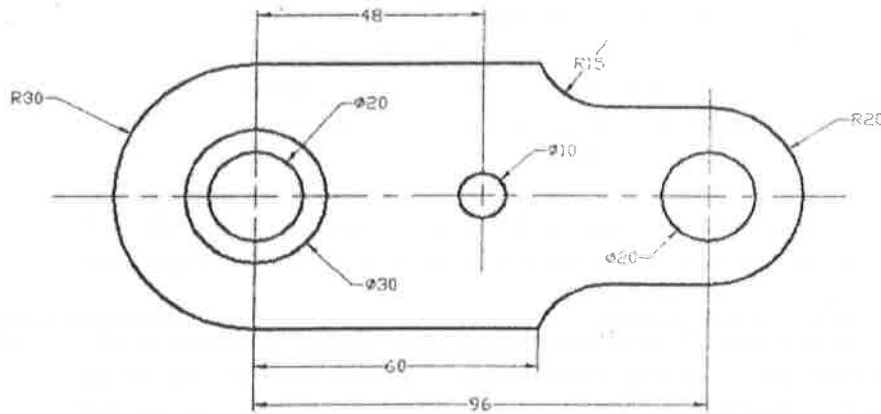**Time: 3Hrs**   **Max Marks: 60**
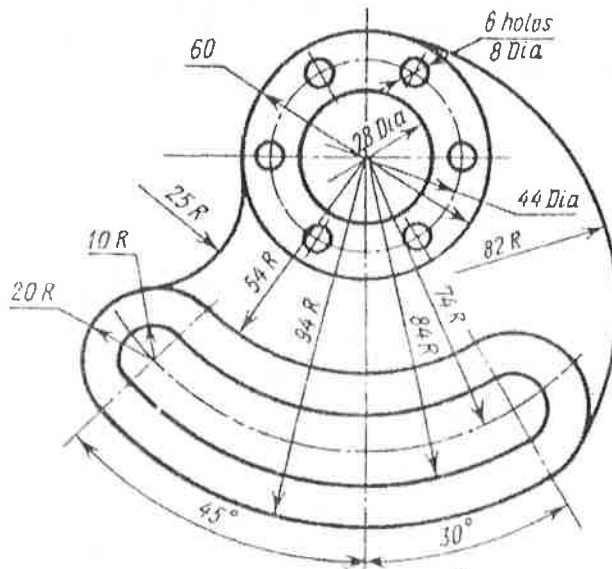
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

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

OR

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

Q.2(A)	A line CD 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.
	  ➢ Point A, 20mm in front of the V.P. and 60mm above the H.P.
	  ➢ Point B, 25mm below the H.P. and on the V.P.
	  ➢ Point C, 15mm below the H.P. and 50mm 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.	12M	3	3

OR

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.	12M	4	3

OR

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)	A vertical square prism, base 50mm side and height 90mm. 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 intersection.	12M	5	3

OR

Q.5(B)	Draw Front view ,Topview and side view for the given isometric view.	12M	5	3
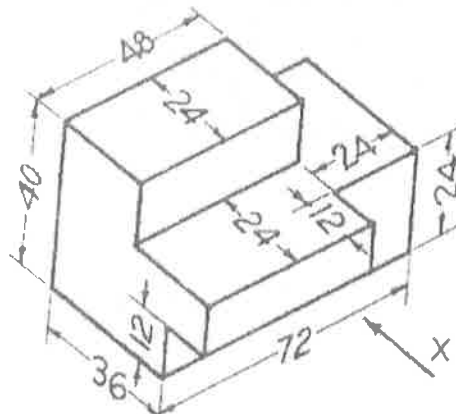
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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, June – 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.	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
	ii.	State Kirchhoff's voltage law.	1M	1	1
	iii.	Define frequency of AC signal?	1M	2	1
	iv.	Define Instantaneous value for an AC waveform.	1M	2	2
	v.	Define flux density in a magnetic material.	1M	3	1
	vi.	What is an ideal 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.	Determine the synchronous speed of a 4-pole, 400 V, 50 Hz three-phase induction motor.	1M	4	2
	ix.	What is value of voltage drop across a non-ideal P-N junction silicon diode in forward-bias condition?	1M	5	1
	x.	What is the purpose of fuse?	1M	5	1
Q.2(A)		(i) The current in the 6Ω resistor of the network shown in figure is 2A. Determine the current in all branches.	5M	1	3

(applied voltage)
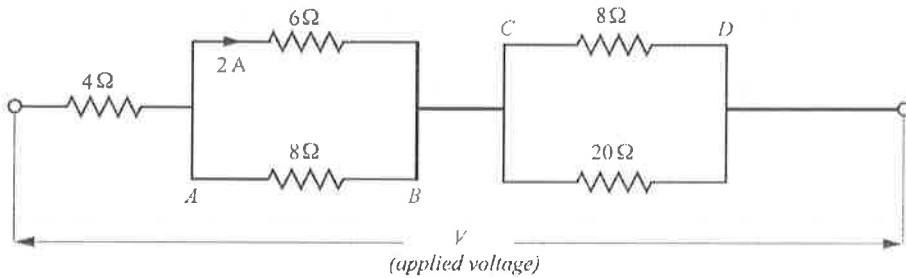
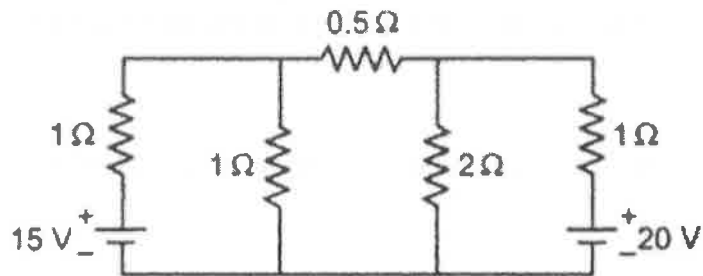|					
		(ii) Determine the resistance between the terminals A and B of the network shown in Figure.	5M	1	3
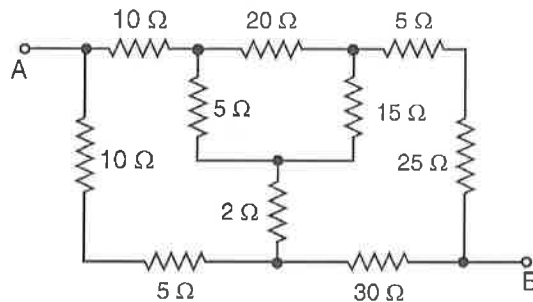
OR

Q.2(B)	Apply mesh current method, Find the current through 0.5Ω resistor in the circuit shown below	10M	1	3

Q.3(A)	A circuit consisting of a resistor in series with a capacitor takes 100 watts at a power factor of 0.5 from a 100 V, 60 Hz supply. Find (a) the current flowing, (b) the phase angle, (c) the resistance, (d) the impedance, and (e) the capacitance.	10M	2	2

OR

Q.3(B)	(i) Write the advantages of 3-phase systems	3M	2	2
	(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.	7M	2	2

Q.4(A)	Draw and explain hysteresis loop of a ferro magnetic material.	10M	3	2

OR

Q.4(B)	(i) Derive the emf equation of a 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)	Explain the construction details of DC Generator with the help of neat diagram.	10M	4	2

OR

Q.5(B)	Explain the construction and principle of operation of three phase induction motor.	10M	4	2

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

OR

Q.6(B)	What is earthing? Explain with the help of neat sketch. Also, write the importance of earthing.	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, June – 2024
LINER ALGEBRA COMPLEX VARIABLES AND 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.	When a system of non-homogenous equations will have unique solution.	1M	1	1
	ii.	Find Eigen values of the matrix $A = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$	1M	1	1
	iii.	Define Analytic function	1M	2	1
	iv.	Determine the residue of the function $f(z) = \frac{1}{z(z-2)(z-5)}$ at all singular points.	1M	2	2
	v.	Write a differential equation with order 1 and degree 2.	1M	3	1
	vi.	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	2
	vii.	Classify that the differential equation $\frac{dy}{dx} = y\,\tan x - y^2\,\sec x$ is linear or non-linear.	1M	4	2
	viii	Write the general form of Bernoulli's differential equation.	1M	4	1
	ix.	Find Wronskian of the functions $y_1 = \cos 3x$ and $y_2 = \sin 3x$.	1M	5	1
	x.	Find Particular Integral of the differential equation $(D^2 + D)y = cosx$	1M	5	2
Q.2(A)		Using Gauss-Jordan method, find the inverse of the matrix $A = \begin{pmatrix} 2 & 1 & -1 \\ 0 & 2 & 1 \\ 5 & 2 & -3 \end{pmatrix}$	10M	1	2
		OR			
Q.2(B)		Find the Eigen values and Eigen vectors of the matrix $A = \begin{pmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ 1 & -2 & 0 \end{pmatrix}$.	10M	1	3
Q.3(A)		State and derive Cauchy-Riemann (CR) equations in polar Coordinates.	10M	2	3
		OR			
Q.3(B)		i) Show that $\log e = 1 + 2n\pi i$, $(n = 0, \pm1, \pm2, \pm3, \dots\dots)$.	5M	2	3
		ii) Show that $\log(1-i) = \frac{1}{2}ln2 - \frac{\pi}{4}i$	5M	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 counterclockwise direction.	10M	3	4
		OR			
Q.4(B)		Find the value of the integral of $f(z)$ around the circle $|z - i| = 2$ in the positive sense when	5M	3	3
		i)　　$f(z) = \frac{1}{(z^2+4)}$ and			
		ii)　　$f(z) = \frac{1}{(z^2+4)^2}$	5M	3	3

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

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

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

Q.6(A)	Solve the differential equation $x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 2\ cos^2(logx)$	10M	5	4

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

Q.6(B)	Find the solution of differential equation $y'' + y = tan\ x$, using the method of variation of parameters.	10M	5	3

<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, June – 2024
LINER ALGEBRA AND DIFFERENTIAL EQUATIONS
(CE andME)

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 Symmetric Matrix with an example.	1M	1	1
	ii.	If the Eigenvalues of the matrix A are 1,3. Then what are the Eigen values of A^{-1}.	1M	1	1
	iii.	Describe the order and degree of the differential equation $$\frac{d^2 y}{dx^2} + \frac{dy}{dx} = (xy)^{3/2}$$	1M	2	1
	iv	Find the integrating factor of differential equation $$\frac{dy}{dx} - y\tan x = e^x.$$	1M	2	1
	v.	Write the complementary solution of $y'' - 2y' + y = \sin x$.	1M	3	1
	vi	If $R(x) = e^x$ and $f(D) = D^2 + 2D + 1$ then what is y_p?	1M	3	1
	vii.	Find the Laplace transform of the $f(t) = e^{at}$.	1M	4	1
	viii	Evaluate $L^{-1}\left(\dfrac{1}{(s-5)}\right)$.	1M	4	1
	ix.	Write a PDE with order 2 and degree 1.	1M	5	1
	x.	Define Laplace equation in one dimensional space.	1M	5	1
Q.2(A)		Show that every square matrix can be expressed uniquely as sum of a symmetric and skew symmetric matrix and give one example.	10M	1	4
		OR			
Q.2(B)		Find the Eigen values and Eigen vectors of the matrix $A = \begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$.	10M	1	3
Q.3(A)		Solve the differential equation $(y\log y)\,dx + (x - loy\, y)dy = 0$	10M	2	3
		OR			
Q.3(B)		Solve $y' + y = \dfrac{1}{1 + e^{2x}}$	10M	2	3
Q.4(A)		Find the general solution of $y'' + 10y' + 25y = 14e^{-5x}$.	10M	3	3
		OR			
Q.4(B)		Solve by using method of variation of parameters $y'' - 2y' + y = e^x \log x$	10M	3	3
Q.5(A)		Find the Laplace Transform of $1.\, x^5 e^{-2x}$ $2.\, e^{3x}\cos x$	10M	4	3
		OR			
Q.5(B)		Find solution of differential equation $y'' - y = t$ with initial condition $y(0) = 1, y'(0) = 2$ by using Laplace transformation.	10M	4	4

Q.6(A) Solve the partial differential equation by $3\dfrac{\partial u}{\partial x} + 2\dfrac{\partial u}{\partial y} = 0$ with the   10M   5   3

condition $u(\mathrm{x},0) = 4e^{-x}$.

OR

Q.6(B)   10M   5   4

Solve the partial differential equation $\dfrac{\partial^2 z}{\partial x \partial x} = \sin x \sin y$ for which

$\dfrac{\partial z}{\partial y} = -2\sin y$ when $x = 0$.

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, June – 2024
LINER ALGEBRA
(Common to CSE, CST, CSE-AI, CSE-DS, CSE-IOT, CSE-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.	Find the reduced row echelon form of the matrix $A = \begin{bmatrix} 1 & -3 & 2 \\ 3 & -9 & 10 \\ 2 & -6 & 4 \end{bmatrix}$	1M	1	2
	ii.	State Cayley-Hamilton theorem	1M	1	1
	iii.	Define subspace of the vector space	1M	2	1
	iv	Determine whether the given set of vectors $\{[1,2,-1],[3,6,-3]\}$ is Linearly Independent (or) not.	1M	2	2
	v.	Define Range of a 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 $T(x,y) = (2x+y, 3x-y)$ on R^2 with respect to the standard basis $\{e_1, e_2\}$	1M	4	2
	viii.	Let $T : R^2 \to R^2$ be the Linear transformation defined by $T(x,y) = (2y, -x+4y)$. Compute $[T^*]_\alpha$ for the standard basis $\alpha = \{e_1, e_2\}$.	1M	4	2
	ix.	Determine k so that the vectors are orthogonal with respect to Euclidean inner product space of R^4 $\{(-5,3,k,1),(4,k,3,2)\}$	1M	5	2
	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	1
Q.2(A)		For what values of 'a' does the following system of equations have no solution, unique solution, or infinitely many solutions. $x + 2y - 3z = 4$; $3x - y + 5z = 2$; $4x + y + (a^2 - 14)z = a + 2$	10M	1	3
		OR			
Q.2(B)		Find the eigenvalues and eigenvectors of the matrix, $A = \begin{bmatrix} 3 & -2 & 0 \\ -2 & 3 & 0 \\ 0 & 0 & 5 \end{bmatrix}$	10M	1	3
Q.3(A)		Show that the vectors $v_1 = (1,2,1), v_2 = (2,9,0)$ and $v_3 = (3,3,4)$ in the 3-space $\mathbb{R}^3$ form a basis.	10M	2	3
		OR			

Q.3(B)	Find the bases for Row Space, Column Space and Null Space of the matrix $A = \begin{bmatrix} 1 & -2 & 0 & 0 & 3 \\ 2 & -5 & -3 & -2 & 6 \\ 0 & 5 & 15 & 10 & 0 \\ 2 & 6 & 18 & 8 & 6 \end{bmatrix}$.	10M	2	3

Q.4(A)	If $T: R^3 \to R^3$ is defined by $T(x,y,z) = (2x - z, 3x - 2y, x - 2y + z)$ i) Determine the null-space N(T) of T. ii) Determine whether T is one-to-one. iii) Find a basis for N(T)	10M	3	3

OR

Q.4(B)	Find the unique linear transformation $T: R^3 \to R^2$ so that $M = \begin{bmatrix} 4 & 2 & 1 \\ 0 & 1 & 3 \end{bmatrix}$ is the matrix of T with respect to the bases $\alpha_1 = \left\{ \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \right\}$, $\alpha_2 = \left\{ \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \end{bmatrix} \right\}$ and find $T(x,y,z)$.	10M	3	3

Q.5(A)	Consider the following ordered bases of R^3: $\alpha = \{e_1, e_2, e_3\}$ the standard basis and $\beta = \{u_1 = (1,1,1), u_2 = (1,1,0), u_3 = (1,0,0)\}$.
	   i. Find the transition matrix P from α to β.
	  ii. Find the transition matrix Q from β to α.
	 iii. Show that $[T]_\beta = Q^{-1}[T]_\alpha Q$ for the linear transformation T defined by $T(x,y,z) = (2y + x, x - 4y, 3x)$
		10M	4	4

OR

Q.5(B)	Let D be the differential operator on the vector space $P_2(R)$. Given two ordered basis $\alpha = \{1, x, x^2\}$ and $\beta = \{1, 2x, 4x^2 - 2\}$ for $P_2(R)$. Find the associated matrix of D with respect to α and the associated matrix of D with respect to β. Are they similar?	10M	4	4

Q.6(A)	Find an orthogonal basis for the column space $C(A)$ of $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 2 \\ 1 & 0 & 4 \\ 1 & 1 & 0 \end{bmatrix}$.	10M	5	3

OR

Q.6(B)	Find all the least square solutions to $Ax = b$, where $A = \begin{bmatrix} 1 & -2 & 1 \\ 2 & -3 & -1 \\ -1 & 1 & 2 \\ 3 & -5 & 0 \end{bmatrix}, b = \begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \end{bmatrix}$	10M	5	4

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, June – 2024
LINER ALGEBRA AND TRANSFORM CALCULUS
(Electrical & Electronics Engineering)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	Find the characteristic polynomial of a matrix $A = \begin{bmatrix} 3 & 1 \\ -2 & 4 \end{bmatrix}$	1M	1	2
	ii.	What are the Eigen vectors of a matrix $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$?	1M	1	1
	iii.	Determine the singular points of the function $f(z) = \dfrac{z^2 - 2z + 3}{(z-2)^2(z+1)}$	1M	2	1
	iv	Find the residue at $z = 0$ of the function $f(z) = z\cos\left(\dfrac{1}{z}\right)$	1M	2	1
	v.	Find $L\{\cos^2 t\}$	1M	3	2
	vi	Find $L^{-1}\left(\dfrac{s^2 - 3s + 4}{s^3}\right)$	1M	3	1
	vii.	What is a change scale property for Fourier transform?	1M	4	1
	viii.	Find the Fourier sine transform of $f(x) = \dfrac{1}{x}$	1M	4	2
	ix.	Find the value of Z-transform of 1.	1M	5	1
	x.	Find $Z^{-1}\left(\dfrac{z}{(z+7)}\right)$	1M	5	2
Q.2(A)		Use Gauss-Jordan method find the inverse of a matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$	10M	1	3

OR

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

Q.3(A)	Show that $f(x) = \sqrt{|xy|}$ is not analytic at the origin even though C.R equations are satisfied thereof.	10 M	2	3

OR

Q.3(B)	Find Taylor's expansion of $f(z) = \sin z$ about the point z=0.	10M	2	3

Q.4(A)	Find the Laplace transforms of (a). $t^3 e^{-3t}$ (b). $t^2 e^{-3t}\sin 2t$	10M	3	3

OR

Q.4(B)   Apply Convolution theorem to evaluate   10M   3   3

(a). $L^{-1}\dfrac{s}{(s^2+a^2)^2}$ (b). $L^{-1}\dfrac{s^2}{(s^2+a^2)(s^2+b^2)}$

Q.5(A)   Find the Fourier transform of   10M   4   3

$f(x)=\begin{cases}1 & for\ |x|<1 \\ 0 & for\ |x|>1\end{cases}$. Hence evaluate $\displaystyle\int_0^\infty \dfrac{\sin x}{x}dx$.

OR

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

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

(a). $3n-4\sin\dfrac{n\pi}{4}+5a$ (b) . $\cosh n\theta$

OR

Q.6(B)   Solve $y_{n+2}+6y_{n+1}+9y_n=2^n$ with $y_0=y_1=0$, using Z-transforms.   10M   5   4

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, June – 2024
ENGINEERING CALCULUS
(Common to CE, ME, ECE, CSE, CST, CSE-AI, CSE-DS, CSE-IOT, CSE-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 surface area of the solid generated by the revolution of the arc of the curve $r = f(\theta)$ about the initial line, from $\theta = \alpha$ to $\theta = \beta$	1M	1	1
	ii.	Find the value of $\int_0^1 x^3 (1-x)^5 \, dx$	1M	1	2
	iii.	State the Cauchy's mean value theorem	1M	2	1
	iv	Evaluate $\underset{x \to 0}{Lt} \dfrac{5^x - 2^x}{x}$	1M	2	2
	v.	State Ratio Test	1M	3	1
	vi	Obtain a_0 for the Fourier series of $f(x) = x \sin x$ in $0 < x < \pi$.	1M	3	2
	vii.	If $f(x,y) = x \cos y + y \sin x$ then find $\dfrac{\partial^2 f}{\partial x \partial y}$	1M	4	2
	viii.	Write a chain rule for $\dfrac{dz}{dt}$; when $z = f(x,y)$, $x = g(t), y = h(t)$ and $z = k(t)$	1M	4	1
	ix.	Evaluate $\int_{\theta=0}^{\pi} \int_{r=0}^{2} r \, dr \, d\theta$	1M	5	2
	x.	Find the $Curl F$ when $F = x^2 i + y^2 j + z^2 k$	1M	5	2
Q.2(A)		Find the length of one arch of the cycloid $x = a(t - \sin t)$, $y = a(1 - \cos t)$	10M	1	3
		OR			
Q.2(B)		Define Beta function. Show that $\int_0^{\frac{\pi}{2}} \sqrt{\sin \theta} d\theta \times \int_0^{\frac{\pi}{2}} \dfrac{d\theta}{\sqrt{\sin \theta}} = \pi$	10M	1	3
Q.3(A)		If $f(x) = \sin^{-1}(x)$ (if $0 < a < b < 1$), Use mean value theorem to 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 metres and width 2 metres 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)	Discuss the convergence of the series a) $\sum_{n=1}^{\infty} \dfrac{n(n+1)}{(n^2+1)(n-1)}$ b) $\sum_{n=1}^{\infty} \dfrac{\cos n\pi}{n\sqrt{n}}$	10M	3	3

OR

Q.4(B)	Express $f(x)=x$ as a half-range cosine and sine series in $0<x<2$.	10M	3	3

Q.5(A)	Express $\dfrac{\partial w}{\partial r}$ and $\dfrac{\partial w}{\partial s}$ in terms of r and s if $w=x+2y+z^2$, $x=\dfrac{r}{s}$, $y=r^2+\ln s$ and $z=2r$.	10M	4	3

OR

Q.5(B)	A delivery company accepts only rectangular boxes the sum of whose length and girth (perimeter of cross section) does not exceed 108 in. Find the dimensions of an acceptable box of largest volume.	10M	4	3

Q.6(A)	Change the Cartesian integral $\displaystyle\int_{0}^{2}\int_{0}^{x} y\,dy\,dx$ into an equivalent polar integral. Then evaluate the polar integral.	10M	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 Semester (R20) Supplementary End Semester Examinations, June – 2024
CALCULUS AND DIFFERNTIAL 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 Cauchy's mean value theorem.	1M	1	1
	ii.	Find the area of the curve $y = x$ from $x = 0$ to $x = 4$.	1M	1	1
	iii.	Define the mixed derivative theorem.	1M	2	1
	iv	Find $\lim\limits_{\substack{x \to 2 \\ y \to 2}} \dfrac{xy+1}{x^2+2y^2}$	1M	2	1
	v.	Evaluate $\iint\limits_{R} dA$, when $0 \le x \le 2, 0 \le y \le 2$	1M	3	2
	vi	Find the gradient of the function $f(x,y) = y - x$ at $(1,1)$	1M	3	1
	vii.	What is the exactness condition of a differential equation.	1M	4	1
	viii.	Find the solution of $y'' + y' - 6y = 0$.	1M	4	1
	ix.	Write one example for a linear P.D.E.	1M	5	1
	x.	Test the convergence of the series $\sum\limits_{n=1}^{\infty} \dfrac{1}{n+4}$	1M	5	1
Q.2(A)		Evaluate $\int\limits_{0}^{\pi/2} \dfrac{\sqrt{Sinx}}{\sqrt{Sinx}+\sqrt{Cosx}} dx$	10M	1	3
		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	1	3
Q.3(A)		Find $\dfrac{\partial f}{\partial x}, \dfrac{\partial f}{\partial y}, \dfrac{\partial^2 f}{\partial x^2}, \dfrac{\partial^2 f}{\partial y^2}, \dfrac{\partial^2 f}{\partial x \partial y}$ and $\dfrac{\partial^2 f}{\partial y \partial x}$ for the function $f(x,y,z) = \log(x + 2y + 3z)$	10M	2	3
		OR			
Q.3(B)		Find the derivative of $f(x,y) = xe^y + \cos(xy)$ at the point (2,0) in the direction of v = 3i - 4j.	10M	2	3
Q.4(A)		Calculate $\iint\limits_{R} f(x,y)dA$ 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)		Evaluate $\iint\limits_{R} e^{x^2+y^2} dy\, dx$, where R is the semicircular region bounded by the X-axis and the curve $y = \sqrt{1-x^2}$ by using polar coordinates	10M	3	3
Q.5(A)		Solve $\dfrac{dy}{dx} - 2xy = 6xe^{x^2}$	10M	4	3

Q.5(B) Solve $y'' + y = Co\sec x$ using the method of variation of parameter. 10M 4 3

Q:6(A) Form the partial differential equations by eliminating the arbitrary 10M 5 3
constants and functions from the following   .

  i) $(x-a)^2 + (y-b)^2 + z^2 = r^2$ ii) $z = f(x) + e^y g(x)$

Q.6(B) 10M 5 3

  Show that the $p-$series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^p} = \frac{1}{1^p} + \frac{1}{2^p} + \frac{1}{3^p} + - - - - + \frac{1}{n^p} + - - - -$

  (*p a real constant*) converges if $p > 1$, and diverges if $p \leq 1$.

*** END***

Hall Ticket No: ☐☐☐☐☐☐☐☐☐☐   Question Paper Code: 20CSE102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I & II Semesters (R20) Supplementary End Semester Examinations, June – 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.	Differentiate between break and continue statement in C programming language.	1M	1	1
	ii.	What is a variable?	1M	1	1
	iii.	What is an array? Write the syntax to declare one dimensional array using example.	1M	2	1
	iv	Define Insertion 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.	What is structure? State its syntax.	1M	4	1
	viii.	Name various File opening modes.	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)		Explain the structure of C program and write the various steps involved in executing a C program.	10M	1	4
		OR			
Q.2(B)		Describe the various conditional statements in C with an example.	10M	1	3
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)		Explain different string manipulation functions with suitable examples	10M	3	3
		OR			
Q.4(B)		Elaborate on the different types of dynamic memory allocation functions with example.	10M	3	3
Q.5(A)		Explain the difference between structure and union.	10M	4	2
		OR			
Q.5(B)		Discuss about the fopen(), fclose(), fprintf(), fscanf(), fgetc() and fputc() functions with example.	10M	4	4
Q.6(A)		Discuss the concept of queue with a neat diagram. List the available types of queue.	10M	5	3
		OR			
Q.6(B)		Illustrate and develop source code for implementation of stack using an array.	10M	5	3

*** END***