Hall Ticket No: ☐☐☐☐☐☐☐☐☐☐   Question Paper Code: 20CHE101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I Semester (R20) Regular & Supplementary End Semester Examinations, March- 2023
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.	Alkalinity of water cannot be due to the simultaneous presence of OH^-, CO_3^{2-} and HCO_3^-. Give the reason	1M	1	4
	ii.	What is brackish water?	1M	1	1
	iii.	Predict the oxidation state of oxygen in H_2O_2?	1M	2	3
	iv	Give two examples for addition polymers.	1M	2	2
	v.	Define anti stokes lines in Raman spectra	1M	3	1
	vi	Define chemical shift in NMR spectroscopy?	1M	3	3
	vii.	State first law of thermodynamics.	1M	4	1
	viii.	Define electrode potential.	1M	4	1
	ix.	Give any two properties of lubricants.	1M	5	2
	x.	Write any two applications of Nanomaterials.	1M	5	2
Q.2(A)		0.5g of $CaCO_3$was dissolved in HCL and the solution is made to 500mL with distilled water. 50mL of the solution is required 48mL of EDTA solution for titration. 50mL of hard water sample required 15mL of the EDTA and after boiling and filtering required 10mL of EDTA. Calculate the total hardness, non-carbonate and carbonate hardness.	10M	1	3
		OR			
Q.2(B)		Explain the softening of water by ion exchange method.Write the advantages of ion exchange method over other methods.	10M	1	2
Q.3(A)		Draw the Lewis structures of the following molecules and Predict their shape using VSEPR theory (i) NH_3 (ii) . CH_4 (iii). CO_2 (iv). BF_3 (v). PCl_5	10M	2	3
		OR			
Q.3(B)		Describe the mechanism of SN^1 and SN^2 reactions with suitable example	10M	2	4
Q.4(A)		Illustrate different types of vibrational modes in IR Spectroscopy with neat diagrams.	10M	3	2
		OR			
Q.4(B)		Discuss the principle and applications of Raman Spectroscopy.	10M	3	2

Q.5(A)	Derive the expression of entropy change for an ideal gas in Isothermal, Isobaric and isochoric process.	10M	4	2

OR

Q.5(B)	Explain the working of Li-Ion battery during charging and discharging process with a neat sketch. Give the applications of Li-Ion batteries.	10M	4	2

Q.6(A)	Describe with a neat diagram how Portland cement is manufactured by wet process. Explain the chemical reactions involved in them.	10M	5	2

OR

Q.6(B)	Illustrate the preparation of carbon nanotubes using chemical vapor deposition method.	10M	5	2

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
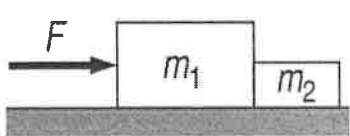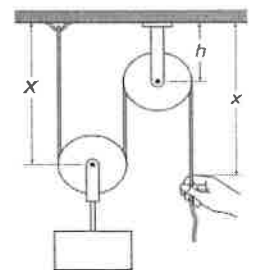**B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, March - 2023**
ENGINEERING PHYSICS
(Common to CE and ME)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	What is the velocity a freely falling body at time t under influence of gravitational field?	1M	1	1
	ii.	Find the normal force on the mass M placed on the wedge making angle θ with the ground.	1M	1	2
	iii.	Give examples for conservative forces?	1M	2	1
	iv	What is orbital velocity?	1M	2	2
	v.	Give two examples for resonance.	1M	3	1
	vi	Explain damping with simple example?	1M	3	1
	vii.	What is Fraunhoffer diffraction?	1M	4	2
	viii.	What is grating element?	1M	4	1
	ix.	What is stimulated emission?	1M	5	1
	x.	What is acceptance angle?	1M	5	1
Q.2(A)		Derive the expression for velocity and acceleration in polar coordinates by starting from position $\vec{r} = r\hat{r}$ of the particle.	10M	1	3

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

		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.	6M	1	3

Q.2(B)		ii) Write constraint equation (in accelerations) for the pulley system which is shown in the sketch.	4M		

Q.3(A)		i) Derive fundamental rocket equation.	6M	2	4
		ii) Find the final velocity of the rocket moving in uniform gravitational field, if the rocket starts from the rest initially?	4M		

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

Q.3(B)	What is escape velocity? Deduce the expression for escape velocity for an object of mass 'm' projected upward from the earth at some angle.	10M	2	3
Q.4(A)	Define transverse waves? Derive transverse wave velocity in the stretched string in terms of linear density and tension.	10M	3	3
	OR			
Q.4(B)	i) What are Lissajous figures? On what factor Lissajous figure depends?	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(5ωt+π/4)	7M		
Q.5(A)	Explain the phenomenon of constructive interference? Derive the expression for the radius of curvature of plano convex lens is determined by forming Newton's rings.	10M	4	3
	OR			
Q.5(B)	i) What is Brewster's law? Show that when a ray is incident at the polarizing angle, the reflected ray is perpendicular to the refracted ray.	6M	4	3
	ii) Describe the construction of quarter wave and half wave plates with diagram.	4M		
Q.6(A)	Explain the construction and working of solid state laser with neat diagrams?	10M	5	4
	OR			
Q.6(B)	i) Write the construction and principle of the optical fibers with diagrams.	7M	5	4
	ii) The refractive index of core and cladding of a step index optical fiber are 1.56 and 1.50, respectively. Calculate a) numerical aperture and b) acceptance angle.	3M		

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I Semester (R20) Regular End Semester Examinations, March- 2023
APPLIED PHYSICS
(Common to CSE, CSE -AI, CSE-DS, and 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.	What are Lissajous figures? Discuss the factors that can influence the shape of the figures.	1M	1	2
	ii.	Write down the expression velocity of a transverse wave along a stretched string	1M	1	1
	iii.	Define interference.	1M	2	1
	iv	List various methods to produce polarization.	1M	2	1
	v.	Mention the postulates of quantum mechanics.	1M	3	2
	vi	Define tunnelling phenomenon.	1M	3	1
	vii.	Write down the expressions for drift velocity and electrical conductivity.	1M	4	2
	viii.	What are intrinsic and extrinsic semiconductors?	1M	4	2
	ix.	What is population inversion?	1M	5	2
	x.	Define acceptance angle.	1M	5	1
Q.2(A)		(i) Derive an expression for simple harmonic motion and obtained displacement. Find the relation between displacement and velocity.	4M	1	3
		(ii) Define damped harmonic oscillator. Discuss the conditions heavy damping and critical damping.	6M	1	2
		OR			
Q.2(B)		(i) Define waves. Discuss the characteristics of travelling or progressive waves.	4M	1	2
		(ii) What is wave equation? Derive the solution for one dimensional wave equation.	6M	1	3
Q.3(A)		Explain the construction and working of Newton's rings experiment with suitable schematics. Deduce an expression for wavelength using this experiment.	10M	2	3
		OR			
Q.3(B)		(i) What is double refraction? Discuss about Nicol prism with necessary diagrams.	8M	2	3
		(ii) A beam of plane polarized light is changed into circularly polarized light by passing it through a slice of quarter wave crystal 0.003 cm thick. Calculate the birefringence of the crystal assuming this to be the minimum thickness that will produce the effect, ($\lambda = 6 \times 10^{-5}$ cm).	2M	2	2

Q.4(A)	(i) Define matter waves? Discuss the De Broglie's hypothesis for matter waves.	4M	3	2
	(ii) State and explain the Heisenberg's uncertainty principle and mention the relationships.	6M	3	3
	OR			
Q.4(B)	Deduce an expression for the energy of particles trapped in an infinite potential well and show that the energies are quantized.	10M	3	4
Q.5(A)	(i) Using the classical free electron theory of metals, derive expressions for dri Velocity and electrical conductivity.	4M	4	4
	(ii) based on the band structure, classify metals, semiconductors and insulators with necessary diagrams.	6M	4	3
	OR			
Q.5(B)	(i) Discuss the dependence of Fermi level on carrier concentration.	4M	4	3
	(ii) Explain (a) Drift current, (b) Diffusion current and (c) Hall effect	6M	4	2
Q.6(A)	Explain the construction and working of Ruby laser with suitable energy level diagram. Mention any four salient features of Ruby laser.	10M	5	
	OR			
Q.6(B)	(i) With necessary schematics, discuss the working of optical communication system and functioning of each block.	8M	5	3
	(ii) A fibre cable has an acceptance angle of 30° and a core index of refraction of 1.4. Calculate the refractive index of the cladding.	2M	5	2

*** END***

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

B.Tech I Year I Semester (R20) Regular & Supplementary, II Semester (R20) Supplementary
End Semester Examinations, March- 2023

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 appropriate conditional. If I was there, it _____ (not, happen) like this	1M	1	2
	ii.	Write the verb in brackets in the future perfect tense He (finish) the race by this time tomorrow.	1M	3	2
	iii.	Add a suitable prefix for bold word given below in the sentence She is **vegetarian**	1M	1	3
	iv	Frame a meaningful word that ends with suffix – 'tion'	1M	1	3
	v.	Choose the right auxiliary verb (shouldn't, will, might, need) This is not all the good procedure, you _____ do the work like this	1M	1	3
	vi	Frame a "Wh" question for the following statement: "He prays on Sundays only".	1M	1	2
	vii.	Create a "Yes/No" question for the statement: "He is not regular to the class".	1M	1	3
	viii	How do you introduce yourself in an interview?	1M	5	1
	ix.	Define communication?	1M	3	2
	x.	What is an e-mail?	1M	5	2
Q.2(A)		Complete the sentences given below with **suitable verb** forms for the words given in brackets. 1. Rita ____ a mile every day. (walks/walk) 2. The sun ____ in the east. (rises/rise) 3. He ____ biryani yesterday (eats /ate) 4. We ____ in the park daily. (sing/sung) 5. Romeo __ Royal Enfield. (ride/rides) 6. They ____ the beautiful flowers (love/ loves) 7. Amy ___the work very fast. (do/does) 8. You can ____ the medal. (achieve/achieved) 9. Have you ____ the baby? (kiss/kissed) 10. Susheela has____ so well just now (sing/sung)	10M	1	2

OR

Q.2(B)		**Develop a story by connecting the hints below:** A rich farmer - lot of land - cattle and servants - two sons - happy life - After some years younger son unhappy - asked for his share of the property – wouldn't listen to father's advice - got his share - sold them all - went away to another country - fell into bad ways - soon all money gone - poor - no one to help him - understood his mistake.	10M	1	3

Q.3(A)	**Write a paragraph on the following topics.** i) WhatsApp. ii) Covid 19	10M	2	3
	OR			
Q.3(B)	What is Reading Comprehension? and Explain various strategies in Reading?	10M	2	2

Q.4(A)	Write the importance of the following in the professional life.
	    i) Self Confidence
	    ii) Facial expressions
	    iii) Gestures & Postures
	    iv) Professionalism
	    v) Stage dynamics
		10M	3	5

	OR			
Q.4(B)	Write suitable dialogues for the following situation. A conversation between a conductor and a student who wants the details of bus timings, bus pass, and its application process. Write at least 10 exchanges	10M	3	3
Q.5(A)	At work, there is very little healthy food to eat in the cafeteria, and you would like that to Change. Write a **memo** to your boss asking for a larger healthy alternatives to the junk food that's currently available.	10M	4	5
	OR			
Q.5(B)	Imagine that you are the HOD of your department and you would like to implement a plan for the development of English language skills of the students. Write dialogues with the members of students' council, discussing the elaborate plan with a minimum of twelve exchanges.	10M	4	3
Q.6(A)	You are the class representative. Your class is planning an industrial tour for three days. Write a report to the Principal using the following points: · Explain the importance and reasons of your tour. · Provide the dates and places of your visit. · Give details of planning and preparation you are doing	10M	5	3
	OR			
Q.6(B)	Draft an e-mail to your HOD on seeking guidance regarding course details of I B.Tech II semester.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I Semester (R20) Regular & Supplementary End Semester Examinations, March- 2023
ENGINEERING CALCULUS
(Common to CE, ME, ECE, CSE, CST, AI, DS, CS)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	Find the area of the curve $y = x^2$ between $x = 0$ and $x = 4$.	1M	1	2
	ii.	Compute the value of $\beta(3,2) + \beta(2,3)$	1M	1	2
	iii.	Determine the value of c for the function $f(x) = x^2$ in $[2,3]$	1M	2	2
	iv	Evaluate $\underset{x \to \pi/2}{Lt} \dfrac{\log(\sin x)}{(x - (\pi/2))}$	1M	2	2
	v.	Test the convergence of the series $\sum\limits_{n=1}^{\infty} \dfrac{1}{n+3}$	1M	3	2
	vi	Write the formula for half range cosine series for the function $f(x)$ in $(0,l)$	1M	3	1
	vii.	Find f_x and f_y, if $f(x,y) = \ln(7x + 2y)$	1M	4	2
	viii.	Find the gradient of the function $f(x,y) = y^2 - x^2$ at $(2,1)$	1M	4	1
	ix.	Evaluate $\iint\limits_{R} dA$, when $0 \le x \le 2, 0 \le y \le 2$	1M	5	2
	x.	If $F = xy\,i + yz\,j + zx\,k$, then calculate $\nabla \times F$	1M	5	2
Q.2(A)		Find the surface area of the solid generated by revolving one arch of cycloid $x = a(\theta + \sin\theta), y = a(1 + \cos\theta)$ about the base.	10M	1	3
		OR			
Q.2(B)		Show that $\int\limits_{0}^{1} x^{q-1}\left(\log\left(\dfrac{1}{x}\right)\right)^{p-1} dx = \dfrac{\Gamma(p)}{q^p}$, where $p > 0, q > 0$ and hence evaluate $\int\limits_{0}^{1} x^5 \left(\log\left(\dfrac{1}{x}\right)\right)^3 dx$.	10M	1	3
Q.3(A)		Expand $e^{x\sin x}$ by Maclaurin's series up to the term containing x^4	10M	2	3
		OR			
Q.3(B)		A rectangular sheet of metal of length 6 meters and width 2 meters is given. Four equal squares are removed from the corners. The sides of this sheet are now removed from the corners. The sides of this sheet are now turned up to form an open rectangular box. Find approximately the height of the box, such that the volume of the box is maximum.	10M	2	3

Q.4(A) For what values of x do the power series converge? 10M 3 3

a) $\sum_{n=1}^{\infty}(-1)^{n-1}\dfrac{x^n}{n}$ b) $\sum_{n=1}^{\infty}(-1)^{n-1}\dfrac{x^{2n-1}}{2n-1}$

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) (i) Using the implicit derivative, find $\dfrac{\partial z}{\partial x}$ and $\dfrac{\partial z}{\partial y}$ at $(0,0,0)$, if 5M 4 3

$x^3 + z^2 + ye^{xz} + z\cos y = 0$.

(ii) Find the derivative of $f(x,y,z) = xy + yz + zx$ at the point (1, -1, 2) in the 5M 4 3

direction of $u = 3i + 6j - 2k$.

OR

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

$(1,-1,1)$.

Q.6(A) Find the volume of the region D enclosed by the surfaces $z = x^2 + y^2$ and 10M 5 3

$z = 8 - x^2 - y^2$.

OR

Q.6(B) Use Divergence theorem to evaluate outward flux of $F = x^2 i + y^2 j + z^2 k$ 10M 5 4

a. through the surface of the cube cut by the planes
$x = \pm 1$, $y = \pm 1$, $z = \pm 1$.

b. through the region cut from the solid cylinder $x^2 + y^2 \le 4$ by the
planes $z = 0$ and $z = 1$. (use cylindrical coordinate system).

*** END ***

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

B.Tech I Year I Semester (R20) Regular & Supplementary End Semester Examinations, March- 2023

CALCULUS AND DIFFERENTIAL EQUATIONS
(Electrical & Electronics Engineering)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	State Lagrange's mean value theorem.	1M	1	1
	ii.	Find the area between the curve $y = \sqrt{x}$, $0 \le x \le 4$ and the x-axis.	1M	1	2
	iii.	What is the value of f_y, if $f(x,y) = x^2 + 3xy + y^3 - 2xy^2$	1M	2	1
	iv	Find ∇f if $f(x,y) = x^2 e^y + \tan y + \ln xy$ at $(2,2)$	1M	2	2
	v.	Evaluate $\iint_R dA$, when $0 \le x \le 2, 0 \le y \le 4$	1M	3	2
	vi	State Green's theorem.	1M	3	1
	vii.	Write the Particular integral of $\left(D^2 - 3D + 2\right)y = e^{2x}$.	1M	4	2
	viii.	Find the complementary function of $x^2 y'' - xy' + y = 0$.	1M	4	2
	ix.	Define non-linear partial differential equation with example.	1M	5	1
	x.	Test the convergence of the series $\sum_{n=1}^{\infty} \dfrac{1}{n^{100}}$	1M	5	2
Q.2(A)		Prove that (if $0 < a < b < 1$), $\dfrac{b-a}{\sqrt{1-a^2}} < \sin^{-1} b - \sin^{-1} a < \dfrac{b-a}{\sqrt{1-b^2}}$	10M	1	3

OR

Q.2(B)	Find the volume of the solid generated by the revolution of the cardioid $r = a\left(1 - \cos\theta\right)$ about the initial line.	10M	1	3

Q.3(A)	i. Examine $\dfrac{\partial w}{\partial r}$ and $\dfrac{\partial w}{\partial s}$ in terms of r and s if $w = x^2 + y^2$, $x = r - s$, $y = r + s$	5M	2	3
	ii. Find all the second order derivatives of $f(x,y,z) = \log(x + 2y + 3z)$ and also verify the mixed derivative theorem.	5M	2	3

OR

Q.3(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	2	3

Q.4(A)	Sketch the region of integration for the integral $\displaystyle\int_0^2 \int_{x^2}^{2x} (4x+2)\,dy\,dx$, change the order of integration and hence evaluate the integral.	10M	3	3

Q.4(B)	Evaluate both sides of stokes theorem for the hemisphere $S : x^2 + y^2 + z^2 = 9$; $z \geq 0$ its boundary circle $C : x^2 + y^2 = 9$, $z = 0$ and the field $F = y\bar{i} - x\bar{j}$.	10M	3	3

Q.5(A)	Solve (i) $y \log y \, dx + (x - \log y) dy = 0$	10M	4	3

$$(ii)\,(2y\sin x + \cos y)dx = (x\sin y + 2\cos x + \tan y)dy$$

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

Q.6(A)	Find whether the series converges or diverges, a) $\sum\limits_{n=1}^{\infty}\dfrac{n-2}{n^4-4n^2+3}$ b)	10M	5	3

$$\sum_{n=1}^{\infty}\frac{2^n}{3+4^n}$$

Q.6(B)	Solve(i) $p \tan x + q \tan y = \tan z$ (ii) $p^2 + pq = z^2$	10M	5	3

*** END***

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

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

B.Tech I Year I Semester (R20) Regular & Supplementary End Semester Examinations –March 2023

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	BL

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

OR
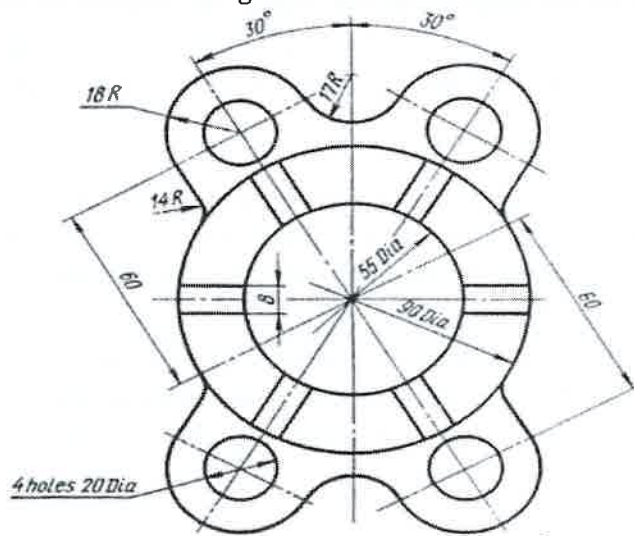
Q.1(B)   Draw the figure shown below using Auto CAD commands and dimension it.   12M   1   3
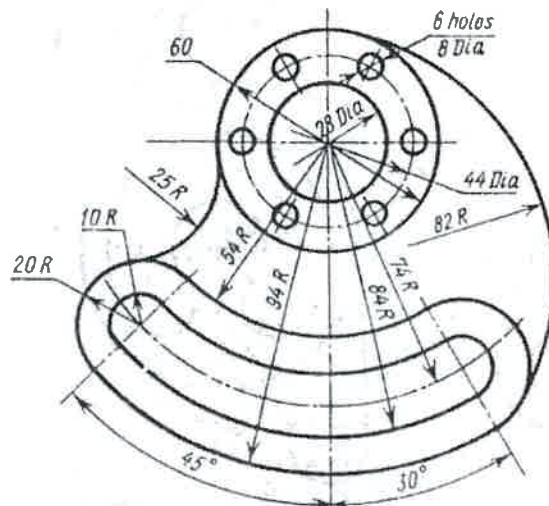
Q.2(A)	i. A point G is 20 mm above H.P, 25mm in front of V.P and 30mm in front of P.P. Draw front view, top view and left side view of the point.	6M	2	3
	ii.A point H is 35mm below H.P, 30mm behind V.P and 40mm in front of P.P. Draw front view, top view and left side view of the point.	6M	2	3

OR

Q.2(B)	A line AB 70mm long is inclined at an angle of 30^0 to H.P and 45^0 to V.P. The point A is 30mm above H.P and 30mm in front of V.P. Draw its Projections and find the apparent inclinations with F.V&T.V.	12M	2	3
Q.3(A)	A pentagonal pyramid side of base 30 mm and axis 65 mm is resting with one of its slant edge on the HP. The axis of the pyramid is parallel to VP. Draw its projections.	12M	3	3

OR

Q.3(B)	Draw the projections of a regular hexagon of 25mm side having one of its sides in the H.P and inclined at 60^0 to V.P and its surface making an angle of 45^0 with H.P.	12M	3	3
Q.4(A)	A Pentagonal prism of base edge 30mm side and axis 65mm has its base horizontal and an edge of the base parallel to V.P. A horizontal section plane cuts it at a distance of 25mm above the base. Draw its front view and sectional top view.	12M	4	3

OR

Q.4(B)	A cylinder of base 50mm and axis 60mm is resting on ground with its axis vertical. It is cut by a section plane perpendicular to V.P and inclined at 45^0 to H.P passing through the top of the generator and cuts all other generators. Draw its development of its lateral surface.	12M	4	3
Q.5(A)	A Vertical cylinder of 100mm diameter is completely penetrated by another cylinder of 70mm diameter with their axes bisecting each other at 90^0. Draw their projections showing curves of penetration, assuming the axis of penetrating cylinder to be parallel to the V.P.	12M	5	3

OR

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

*** END***

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

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I Semester (R20) Regular & Supplementary End Semester Examinations –March 2023
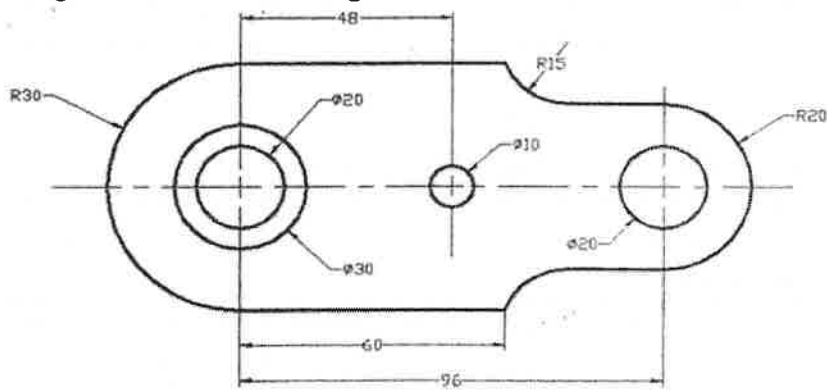## ENGINEERING GRAPHICS
(Common to all)

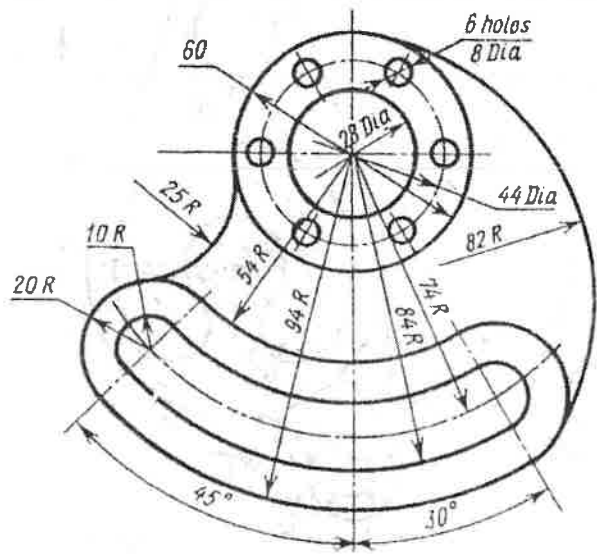**Time: 3Hrs**   **Max Marks: 60**

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 | 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   6M   2   3
          C is 30mm above HP and 40mm in front of VP. Draw the projection of the straight
          line and find its apparent inclinations.

|				

Q.2(B)	Draw the projections of the following points on the same ground line. Name the quadrants.
	   ➤ 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)	Draw the projections of a regular pentagon of 25mm side, which is resting with its base side on the HP. The surface of the pentagon is inclined at 45^0 to the HP and the base side resting on the HP is inclined at 60^0 to the VP.	12M	3	3
	OR			
Q.3(B)	A Hexagonal Pyramid of base edge 30 mm and height 60mm has a triangular face on the ground and the axis is parallel to V.P. Draw its projections.	12M	3	3
Q.4(A)	A Pentagonal prism of base edge 30mm side and axis 65mm has its base horizontal and an edge of the base parallel to V.P. A horizontal section plane cuts it at a distance of 25mm above the base. Draw its front view and sectional top view.	12M	4	3
	OR			
Q.4(B)	A cylinder of base 50mm and axis 60mm is resting on ground with its axis vertical. It is cut by a section plane perpendicular to V.P and inclined at 45^0 to H.P passing through the top of the generator and cuts all other generators. Draw its development of its lateral surface.	12M	4	3
Q.5(A)	A vertical square prism, base 50mm side and height 90mm long. It is completely penetrated by another square prism, base 40mm side and 90mm 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 left sideview for the given isometric view.	12M	5	3
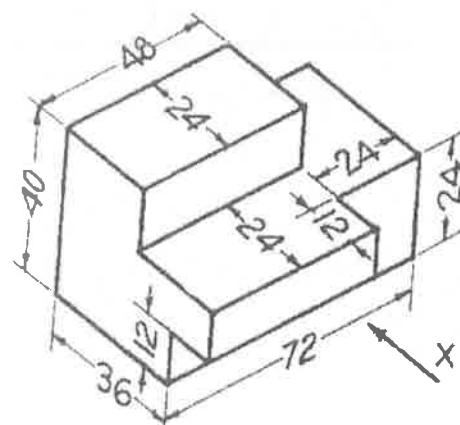
*** END***

Hall Ticket No: [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]   Question Paper Code: 20ME101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I Semester (R20) Regular End Semester Examinations –March 2023
ENGINEERING GRAPHICS
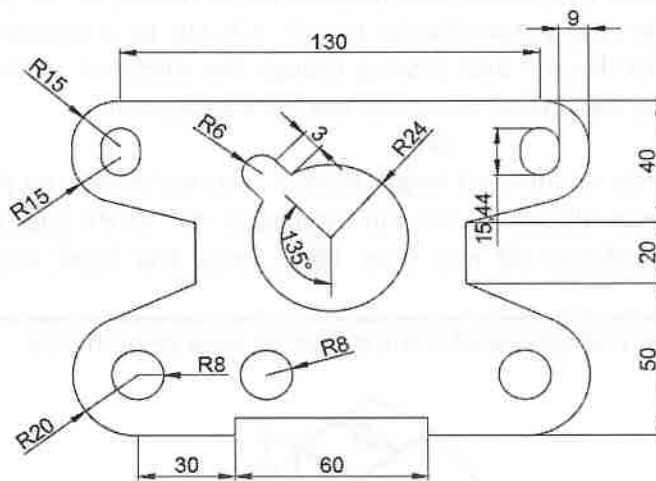(Common to CE and ECE)

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 1 to 5 answer either Part-A or B only

	Marks	CO	BL

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

OR

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

Q.2(A)	The Top view of a 85mm long line measures 55mm. While the length of its Front view is 45mm. Its one end A is in H.P and 20mm infront of V.P. Draw the projections of AB and determine its inclinations with H.P and V.P	12M	2	3
	OR			
Q.2(B)	Draw the projections of the following points on the same reference line XY by keeping the distance between the projectors are 40mm.	12M	2	3

    ➤ Point A, 40mm above the H.P. and 30mm in front of the V.P.
    ➤ Point B, 50mm below the H.P. and 40mm behind the V.P.
    ➤ Point C, 35mm above the H.P. and 55mm behind the V.P.

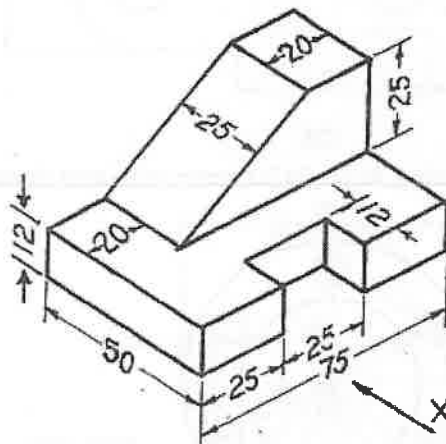|				
Q.3(A)	A square ABCD of 50mm side has its corner A in the H.P. its diagonal AC is inclined at 30^0 to the H.P and the diagonal BD inclined at 45^0 to the VP and parallel to H.P. Draw its projections.	12M	3	3
	OR			
Q.3(B)	A Hexagonal prism of base edge 30 mm and axis 70 mm has an edge of its base 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)	Draw front view ,topview and sideviewfor the isometric view given below	12M	5	3

OR

Q.5(B)	A Vertical cylinder of 80mm diameter is completely penetrated by another cylinder of 60mm diameter, their axes bisecting each other at right angles. Draw their projections showing curves of penetration, assuming the axis of penetrating cylinder to be parallel to the V.P.	12M	5	3

*** END***

Hall Ticket No: [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]   Question Paper Code: 20ME101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I Semester (R20) Regular End Semester Examinations –March 2023
ENGINEERING GRAPHICS
(Common to CE and ECE)

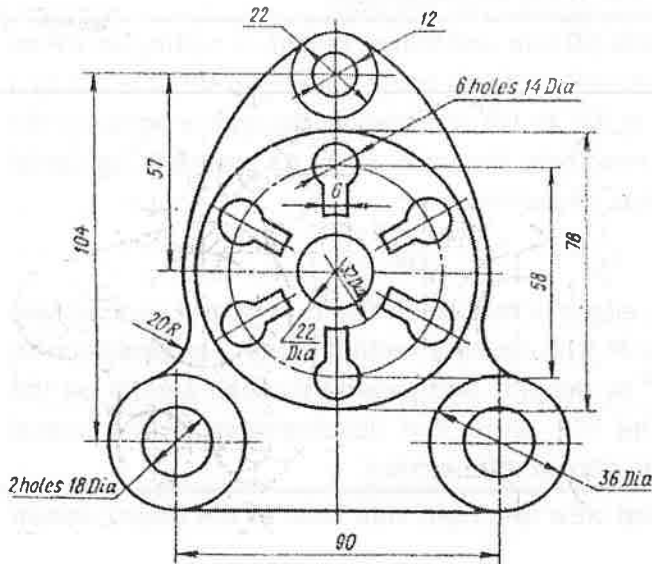Time: 3Hrs   Max Marks: 60

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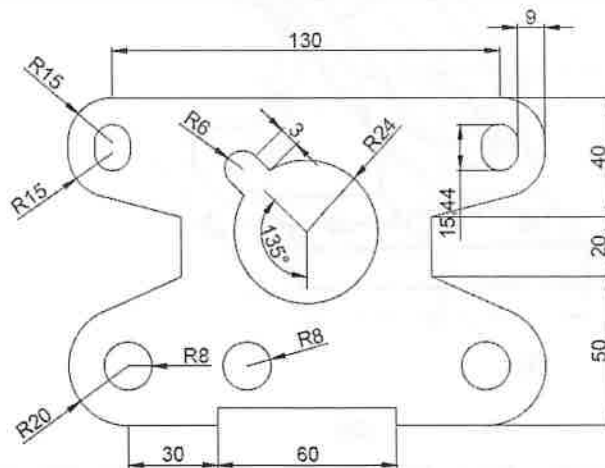**All parts of Q.no 1 are compulsory. In Q.no 1 to 5 answer either Part-A or B only**

		Marks	CO	BL
Q.1(A)	Draw the below figure using Auto CAD commands.	12M	1	3

OR

| Q.1(B) | Draw the below figure using Auto CAD commands(Assume suitable data if any missed) | 12M | 1 | 3 |

| Q.2(A) | i. Two points A and B are on H.P; the point A being 30mm in front of V.P, while B is 45mm behind V.P. The joining their top views makes an angle of 45º with xy. Find the horizontal distance between two points. | 6M | 2 | 3 |
| | ii. A point B is 20mm above H.P, 10mm in front of V.P and 30mm in front of P.P. Draw front view, top view and left side view of the point. | 6M | | |

Q.2(B)	Draw the projection of line AB 90mm long, its midpoint M being 50mm above H.P and 40mm in front of V.P. The end A is 20mm above H.P and 10mm infront of the V.P. Show the inclinations of the line with H.P and 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 is inclined at 45^0 to the V.P and parallel to H.P. Draw its projections.	12M	3	3	

OR

Q.3(B)	A triangular prism, base 40mm side and height 65mm, is resting on H.P on one of its base edges. The axis of the prism is inclined at 40^0 to the H.P and parallel to the V.P. Draw its projections.	12M	3	3	

Q.4(A)	A hexagonal prism of side 50 mm and 60mm height, is resting on HP on one of its base with two vertical faces being parallel to VP. It is cut by a vertical plane inclined at 45° to HP and passing through a point on the axis at distance of 30 mm from the base. Draw its top view, sectional front view and true shape of section.	12M	4	3	

OR

Q.4(B)	A cube of 50 mm long edges is resting on the H.P. with a vertical face inclined at 30^0 to the V.P. It is cut by a section plane, perpendicular to the V.P. inclined at 30^0 to the H.P. and passing through a point on the axis, 38 mm above the H.P. Draw the development of the lateral surface of the remaining portion of the cube.	12M	4	3	

Q.5(A)	Draw the front view, top view and right side view of the object shown below.	12M	5	3	
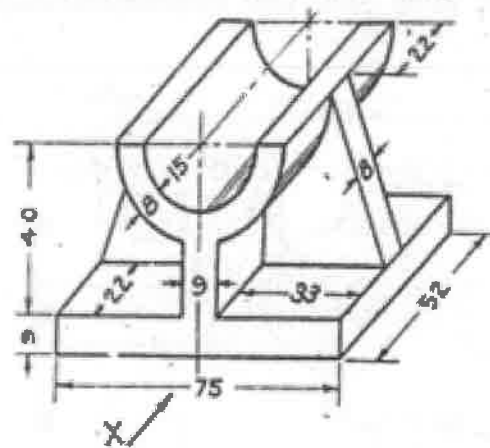
OR

Q.5(B)	A vertical square prism, base 50mm side and height 90mm is completely penetrated by another square prism, base 40mm side and 90mm 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	

*** END***

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

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I Semester (R20) Regular End Semester Examinations –March 2023
ENGINEERING GRAPHICS
(Common to ME and CST)
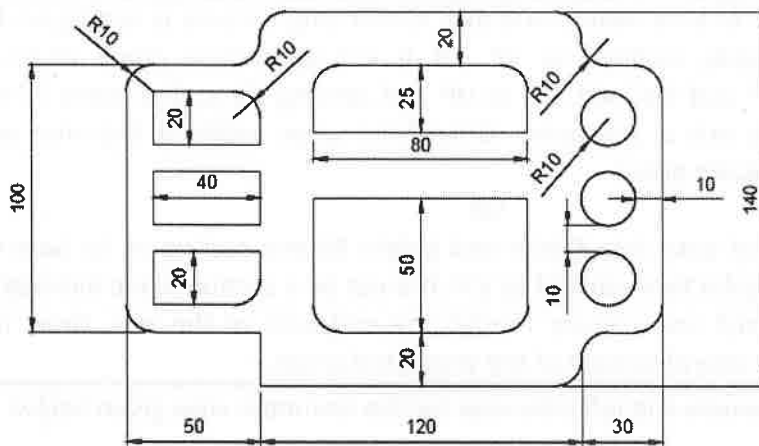
Time: 3Hrs   Max Marks: 60

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

	Marks	CO	BL

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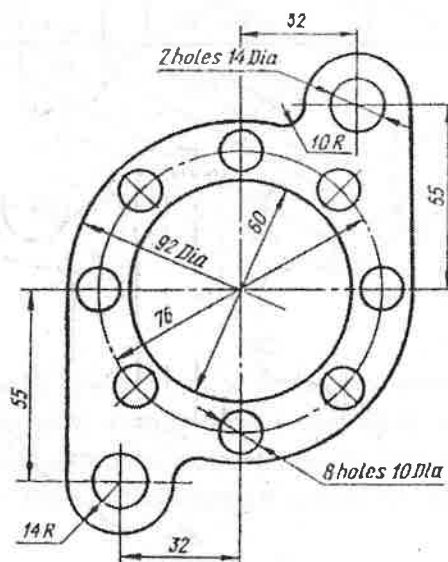

OR

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

Q.2(A)	Two points C and D are in the H.P. The point C is 30mm in front of V.P and D is behind the V.P. the distance between their projectors is 40mm and line joining their top views makes an angle of 40^0 with XY. Find the distance of the point D from the V.P. Also state the quadrants in which point C and D lies.	12M	2	3
	OR			
Q.2(B)	A line CD, 90mm long, measures 72mm in front view and 65mm in top view. Draw the two views of the line if it fully lies in the first quadrant. Also, find the true inclinations of the line. Point C lies at a distance 20mm from the reference planes.	12M	2	3
Q.3(A)	Draw the projections of a circle of 50mm diameter resting in the H.P on a point A on the circumference. Its plane is inclined at 45^0 to the HP and the top view of the diameter AB making an angle of 30^0 with the VP.	12M	3	3
	OR			
Q.3(B)	A Pentagonal pyramid of base side 30mm and axis 65mm has an edge of its base on the ground. The axis is inclined at 40^0 to the ground and parallel to V.P. Draw its projections.	12M	3	3
Q.4(A)	A square prism side of base 40mm and axis 70mm long Its base is resting on HP and its face is equally inclined to VP. It is cut by section plane which is perpendicular to VP and inclined $45°$ to HP and passing through a point 25mm from the top of the axis of the prism. Draw front view, sectional top view and true shape of the square prism	12M	4	3
	OR			
Q.4(B)	A Hexagonal prism of base side 30mm and height 80 mm resting on its base on H.P with the rectangular face parallel 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
Q.5(A)	Draw front view ,topview and left side view for the isometric view given below	12M	5	3

OR
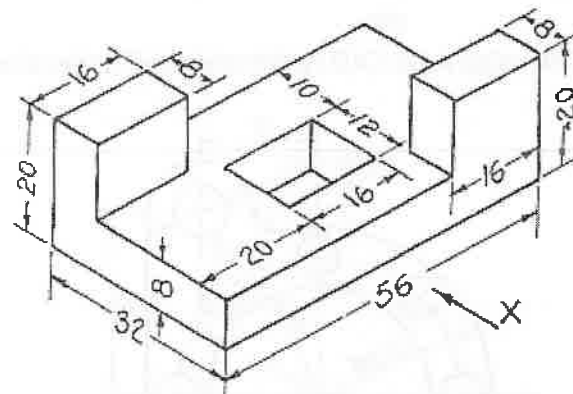
Q.5(B)	A Vertical cylinder of 80mm diameter is completely penetrated by another cylinder of 60mm diameter, their axes bisecting each other at right angles. Draw their projections showing curves of penetration, assuming the axis of penetrating cylinder to be parallel to the V.P.(Assume height of the both cylinders suitable)	12M	5	3

*** END***

Hall Ticket No: Question Paper Code: 20ME101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year I Semester (R20) Regular End Semester Examinations –March 2023
ENGINEERING GRAPHICS
(Common to ME and CST)

Time: 3Hrs   Max Marks: 60

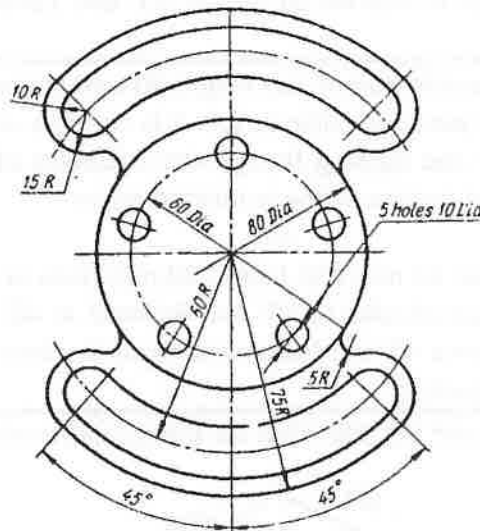Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 1 to 5 answer either Part-A or B only

	Marks	CO	E

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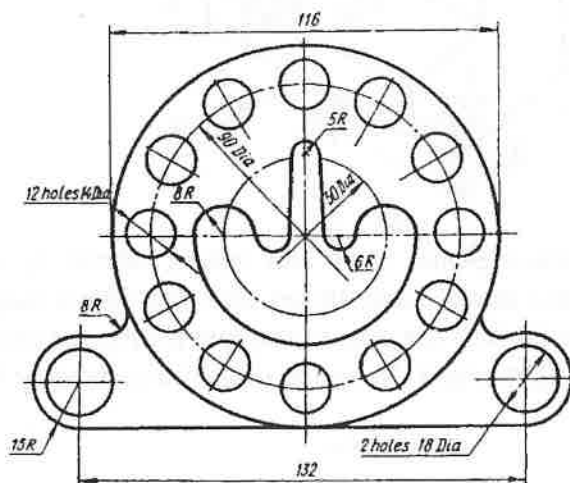

OR

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

Q.2(A)	The Top view of a 85mm long line measures 55mm. While the length of its Front view is 45mm. Its one end A is in H.P and 20mm infront of V.P. Draw the projections of AB and determine its inclinations with H.P and V.P	12M	2	

OR

Q.2(B)	Draw the projections of the following points on the same reference line XY by keeping the distance between the projectors are 50mm. Also, name the quadrant in which the points lies.	12M	2	

1. Point A, 40mm above the H.P. and 30mm in front of the V.P.
2. Point B, 50mm below the H.P. and 40mm behind the V.P.
3. Point C, 35mm above the H.P. and 55mm behind the V.P.

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	

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	

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	

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, sectional top view and tru shape of the section.	12M	4	

Q.5(A)	Draw front view ,topview and left side view for the isometric view given below	12M	5	
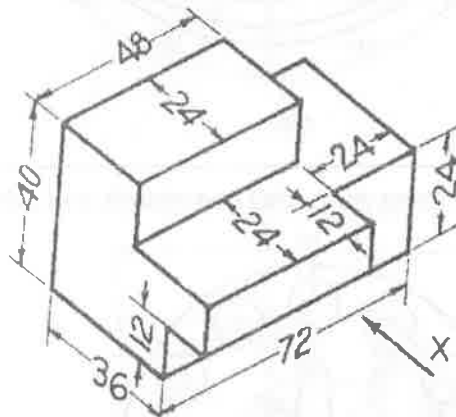
OR

Q.5(B)	A vertical square prism, base 50mm side and height 90mm is completely penetrated by another square prism, base 40mm side and 90mm 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	

*** END***

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

**B.Tech I Year I Semester (R20) Regular and B.Tech I Year I & II Semester (R20) Supplementary
End Semester Examinations, March- 2023**

BASIC ELECTRICAL ENGINEERING
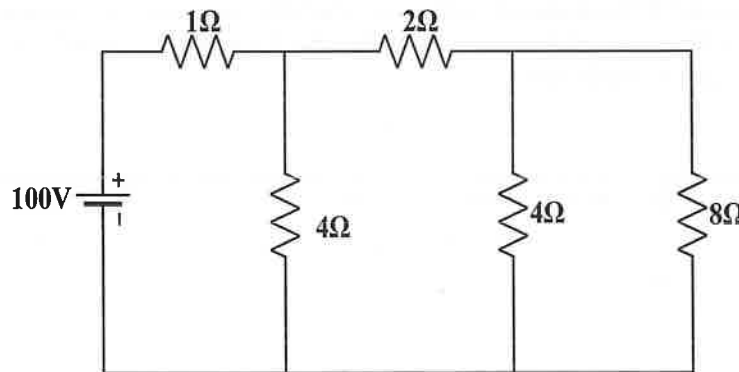(Common to all)

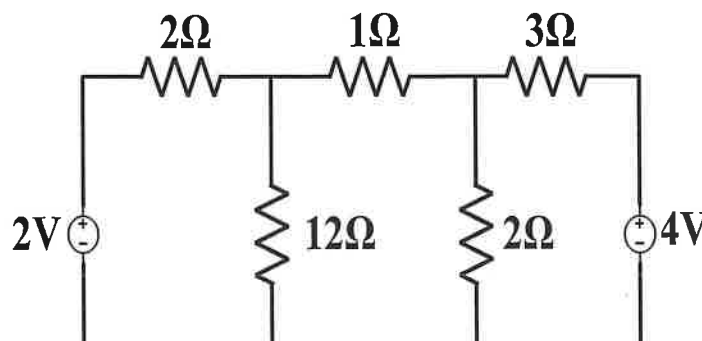Time: 3Hrs   Max Marks: 60

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.	A 200 W electric light bulb is connected to a 230V supply. Determine the resistance of the bulb..	1M	1	2
	ii.	State Kirchhoff's Current Law.	1M	1	1
	iii.	Define Phasor.	1M	2	1
	iv	List the advantages of three phase systems.	1M	2	1
	v.	Write the relation between magnetic flux density and magnetic field intensity.	1M	3	2
	vi	What is an ideal transformer?	1M	3	1
	vii.	What is the function of commutator in a DC generator?	1M	4	1
	viii.	For a given frequency, if the number of poles is increased, how the synchronous speed will vary?	1M	4	2
	ix.	What is the knee voltage of a Silicon P – N junction diode?	1M	5	1
	x.	Mention different types of cables.	1M	5	1
Q.2(A)		Determine the current in 2Ω resistor by node voltage method.	10M	1	3

OR

Q.2(B)	By using superposition theorem, determine the current in 1Ω resistor.		10M	1	2

Q.3(A)	A coil of resistance 10Ω and inductance 0.1H in series with a 150μf capacitor is connected to a 200V, 50Hz supply. Calculate (a) Inductive Reactance (b) Capacitive Reactance (c) current (d) the voltage across the coil (e) voltage across capacitor.	10M	2	3

OR

Q.3(B)	Derive the relation between line voltage and phase voltage, line current and phase current for a 3-phase star connected system.	10M	2	2

Q.4(A)	Draw and explain B-H curve for 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 cm^2. 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	3

Q.5(A)	With the help of neat sketch, explain the constructional details of a DC machine.	10M	4	2

OR

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

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

OR

Q.6(B)	Explain the construction and operation of MCB.	10M	5	2

*** END***

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

B.Tech I Year I & II Semester (R20) Supplementary End Semester Examinations, March - 2023

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.	Define variable. Write the rules to be followed to declare a variable.	1M	1	1
	ii.	List any two data types and their memory sizes.	1M	1	1
	iii.	Is it necessary to give size of the array? Justify your answer.	1M	2	1
	iv	What is the use of register keyword?	1M	2	1
	v.	What is a string? Give syntax and example.	1M	3	1
	vi	Write the syntax to declare a pointer variable	1M	3	1
	vii.	List major file operations in C.	1M	4	2
	viii.	What are the different modes in opening a file?	1M	4	1
	ix.	Abbreviate LIFO and FIFO	1M	5	1
	x.	List the applications of Queue	1M	5	2
Q.2(A)		Explain the different types of looping statements with examples.	10M	1	4
		OR			
Q.2(B)		i. Discuss on iterative statements in C	5M	1	2
		ii. Develop C program to find roots of Quadratic equation	5M		2
Q.3(A)		Develop the code for Linear Search to find the particular key in a given array	10M	2	3
		OR			
Q.3(B)		Illustrate insertion sort for the following data. 67, 19, 81, 77, 56, 29, 99, 37,41,7	10M	2	3
Q.4(A)		Compare Character Array and String. Write a program to find length of a string without using strlen().	10M	3	3
		OR			
Q.4(B)		Explain string library functions with examples.	10M	3	4
Q.5(A)		Develop a C program to count no of lines, words and characters in a file.	10M	4	3
		OR			
Q.5(B)		Explain different categories of file functions.	10M	4	3
Q.6(A)		Explain how a single linked list is built. Build a code to insert a new data item at the end of linked list.	10M	5	3
		OR			
Q.6(B)		List out operations on stack? Write a C program with functions to implement them.	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year II Semester (R20) Supplementary End Semester Examinations, March - 2023
LINEAR ALGEBRA AND TRANSFORM CALCULUS
(Electrical & Electronics Engineering)

Time: 3Hrs
Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	Describe the nature of a quadratic form of a matrix $A = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$	1M	1	2
	ii.	Find the characteristic equation of a matrix $A = \begin{bmatrix} 1 & 0 \\ 7 & -3 \end{bmatrix}$	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 $L(\cos^2 2t)$	1M	3	2
	vi	Find $L^{-1}\left(\dfrac{1}{s^2 + 4}\right)$	1M	3	1
	vii.	What is a change scale property for Fourier transform?	1M	4	1
	viii.	Find the Fourier cosine transform of $f(x) = e^{-x}$	1M	4	2
	ix.	State damping rule of Z-transform.	1M	5	1
	x.	Find $Z^{-1}\left(\dfrac{z}{(z+7)}\right)$	1M	5	2
Q.2(A)		Reduce the following matrix in to its normal form and find its rank: $\begin{pmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{pmatrix}$	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.	10M	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)	Find the Laplace transforms of the following:	10M	3	2

(a). $t^3 e^{-3t}$ (b). $t^2 e^{-3t} \sin 2t$

OR

Q.4(B)	Solve by using Laplace transforms:	10M	3	3

$y'' + y' - 6y = 2e^{3t}$ $y(0) = 0$; $y'(0) = 0$

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

$$f(x) = \begin{cases} 1 - x^2 & for \ |x| \le 1 \\ 0 & for \ |x| > 1 \end{cases}$$. Hence evaluate $\displaystyle\int_0^\infty \dfrac{x \cos x - \sin x}{x^2} \cos \dfrac{x}{2} dx$

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)	Using Z-transform solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$ with $u_0 = 0$, $u_1 = 1$	10M	5	4

*** END ***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year II Semester (R20) Supplementary End Semester Examinations, March - 2023
LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS
(Common to Civil Engineering and Mechanical Engineering)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	Define Orthogonal Matrix.	1M	1	1
	ii.	Find the Eigenvalues of the matrix $A = \begin{pmatrix} 1 & -1 \\ 0 & 3 \end{pmatrix}$.	1M	1	1
	iii.	Find the order and degree of the differential equation $\frac{d^2 y}{dx^2} + y^2 = \left(\frac{dy}{dx}\right)^{3/2}$	1M	2	1
	iv	Find the solution of differential equation $\frac{dy}{dx} = \frac{y}{x}$.	1M	2	1
	v.	Find the solution of $y'' + 4y' + 4y = 0$.	1M	3	1
	vi	What is Wronskian of $y_1 = e^x$ and $y_2 = \sin x$.	1M	3	1
	vii.	Find the Laplace transform of the $f(t) = te^{-t}$	1M	4	1
	viii.	Find inverse Laplace transform of $L^{-1}\left(\frac{1}{(s-2)^2}\right)$.	1M	4	1
	ix.	Form partial differential equation by eliminating arbitrary constants $z = ax + by$.	1M	5	1
	x.	Write the form one dimensional wave equation	1M	5	1
Q.2(A)		Investigate the values of α and β for which the system of equations $$x + \alpha y + z = 3$$ $$x + 2y + 2z = \beta$$ $$x + 5y + 3z = 9$$ are consistent. When will these equations have a unique solution?	10M	1	2
		OR			
Q.2(B)		Find the eigenvalues and eigenvectors of the matrix $A = \begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$	10M	1	3
Q.3(A)		Solve the differential equations (i) $ye^y dx = \left(y^3 + 2xye^y\right)dy$. (ii) $x\log x \frac{dy}{dx} + y = \log x^2$.	10M	2	3
		OR			
Q.3(B)		Solve the differential equation $\sec^2 y \frac{dy}{dx} + x \tan y = x^3$.	10M	2	3
Q.4(A)		Solve differential equation $x^2 y'' + 4xy' + 2y = 0$.	10M	3	3

OR

Q.4(B)	Solve by using method of variation of parameters $y'' + 4y = \tan 2x$.	10M	3	3
Q.5(A)	Find the Laplace transforms of the following:	10M	4	2

(i) $x^5 + \cos 2x$ (ii) $4 Sinx Cosx + 2e^{-x}$

OR

Q.5(B)	$y'' + y' - 6y = 2e^{3t}$ $y(0) = 0; y'(0) = 0$	10M	4	3
Q.6(A)	Form the partial differential equation by eliminating the arbitrary	10M	5	2

constants (i) $(x-a)^2 + (y-b)^2 + z^2 = 1$ (ii) $z = f(x+at) + g(x-at)$.

OR

Q.6(B)	Find the eigenvalues and Eigen function of $y'' + \lambda y = 0$ with the	10M	5	3

following conditions: (i) $y(0) = 0, y(2\pi) = 0$ (ii) $y(-L) = 0, y(L) = 0$.

*** END***

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

B.Tech I Year II Semester (R20) SUPPLEMENTARY End Semester Examinations, March - 2023

LINEAR ALGEBRA, COMPLEX VARIABLE & ORDINARY DIFFERENTIAL EQUATIONS
(Electronics & Communication Engineering)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	Define skew symmetric matrix with an example.	1M	1	1
	ii.	Find the eigenvalues of the matrix $A = \begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix}$.	1M	1	1
	iii.	Show that the function $U(x,y) = \sin hx \sin y$ is harmonic.	1M	2	2
	iv	Determine the singular points of the function $f(z) = \frac{z}{z^2+1}$	1M	2	1
	v.	State the Cauchy Residue Theorem.	1M	3	1
	vi	Evaluate $\int \frac{z}{9-z^2} \, dz$, where C is the circle $|z| = 2$	1M	3	2
	vii.	Solve the differential equation $(x+1)p = y + 2p^2$	1M	4	2
	viii.	Find degree of the differential equation $\frac{d^2y}{dx^2} = \sqrt{\left(1+\frac{dy}{dx}\right)}$	1M	4	1
	ix.	Find Wronskian of the functions $y_1 = \cos 2x$ and $y_2 = \sin 2x$.	1M	5	2
	x.	Find complementary function of the differential equation $(D^2 + 5D + 6)y = e^x$	1M	5	1

Q.2(A)		10M	1	3

Find the eigenvalues and eigenvectors of the matrix $A = \begin{pmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{pmatrix}$

OR

Q.2(B)		10M	1	3

Verify Cayley-Hamilton theorem and find its inverse for the matrix

$$A = \begin{pmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{pmatrix}$$

Q.3(A)	Verify Cauchy Riemann equations at $z = (0,0)$ for the function defined by	5M	2	3

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

and show that $f'(z)$[first order derivative] does not exist at $z = (0,0)$

OR

Q.3(B)	Show that the roots of the equation $\cos z = 2$ are $z = 2n\pi + i\ \cosh^{-1} 2$, $(n = 0, \pm 1, \pm 2, \pm 3 ......)$.	10M	2	3

Q.4(A)	Evaluate $\oint_c f(z)dz$ where $f(z) = \pi \exp(\pi\bar{z})$ and C is the boundary of the square with vertices at the points $0, 1,\ 1 + i$ and i, the orientation of C being in the counterclockwise direction.	10M	3	3

OR

Q.4(B)	Give two Laurent series expansions in powers of z for the function $f(z) = \dfrac{1}{z^2(1-z)}$ and specify the regions in which those expansions are valid.	10M	3	3

Q.5(A)	Solve the following differential equation: (i) $\dfrac{dy}{dx} - 2xy = 6xe^{x^2}$ (ii) $(1 - x^2)\dfrac{dy}{dx} - xy = 1$	10M	4	3

OR

Q.5(B)	Solve $y - 2px = \tan^{-1}(xp^2)$, (where $\dfrac{dy}{dx} = p$)	10M	4	3
Q.6(A)	Solve $x^2 y'' - 3xy' + 4y = 1 + x^2$	10M	5	3

OR

Q.6(B)	Using the method of variations of parameters, solve $y'' - 2y' + 2y = e^x \sin x$	10M	5	3

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech I Year II Semester (R20) SUPPLEMENTARY End Semester Examinations, March - 2023
LINEAR ALGEBRA
(Common to CSE, CSE-AI, CSE-DS, CSE-CS, CSE-IOT and CST)

Time: 3Hrs   Max Marks: 60

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

Q.No		Question	Marks	CO	BL
Q.1	i.	Find the 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.	Find T^{-1}, if exists for the Linear transformation $T(x,y) = (7x, x-y)$	1M	3	2
	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 $T(x,y) = (y, 3x-y)$ 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 $\begin{bmatrix} T^* \end{bmatrix}_\alpha$ 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)		Solve the following system of equations by Gauss Jordan method: $x_1 + x_2 + x_3 - x_4 = -2$; $2x_1 - x_2 + x_3 + x_4 = 0$; $3x_1 + 2x_2 - x_3 - x_4 = 1$; $x_1 + x_2 + 3x_3 - 3x_4 = -8$	10M	1	3
		OR			
Q.2(B)		Find the eigenvalues and eigenvectors of the matrix, $A = \begin{bmatrix} 1 & 1 & 2 \\ -1 & 2 & 1 \\ 0 & 1 & 3 \end{bmatrix}$	10M	1	3
Q.3(A)		Does the vector $(3,-1,0,-1)$ belong to the subspace of $\mathbb{R}^4$ spanned by the vectors $(2,-1,3,2),(-1,1,1,-3)$ and $(1,1,9,-5)$?	10M	2	3

Q.3(B) Find bases for the row space $R(A)$ and Null space $N(A)$ and column space $C(A)$ of the matrix $A = \begin{bmatrix} 1 & 2 & 0 & 2 & 5 \\ -2 & -5 & 1 & -1 & -8 \\ 0 & -3 & 3 & 4 & 1 \\ 3 & 6 & 0 & -7 & 2 \end{bmatrix}$.   10M   2   3

Q.4(A) Let $w_1 = (1,0)$, $w_2 = (2,-1), w_3 = (4,3)$ be three vectors in R^2. Let   10M   3   3
$\beta = \{v_1, v_2, v_3\}$ be another basis for 3-space R^3, where $v_1 = (1,1,1), v_2 = (1,1,0), v_3 = (1,0,0)$, and let $T: R^3 \rightarrow R^2$ be the linear transformation defined by, $T(v_1) = w_1$, $T(v_2) = w_2$, $T(v_3) = w_3$. Find the formula for $T(x_1, x_2, x_3)$, and then use it to compute $T(2,-3,5)$.

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

Q.4(B) Let $T: R^2 \rightarrow R^3$ be the linear transformation defined by   10M   3   3
$T(x,y) = (x+2y, 0, 2x+3y)$ with respect to the standard bases $\alpha = \{e_1, e_2\}$, $\beta = \{e_1, e_2, e_3\}$ and the bases $\beta' = \{e_3, e_2, e_1\}$. Find $[T]_{\alpha}^{\beta}$ and $[T]_{\alpha}^{\beta'}$.

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   4   4
  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 $T(x, y, z) = (2y + x, x - 4y, 3x)$

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

Q.5(B) Let $T: R^3 \rightarrow R^3$ be the linear transformation defined by $T(x_1, x_2, x_3) =$ 10M   4   4
$(x_1 + 2x_2 + x_3, -x_2, x_1 + 4x_3)$. Let α be the standard basis and let $\beta = \{v_1, v_2, v_3\}$ be another basis consisting of $v_1 = (1,0,0), v_2 = (1,1,0)$ and $v_3 = (1,1,1)$ for R^3. Find the associated matrix of T with respect to α and the associated matrix of T with respect to β. Are they similar?

Q.6(A)   10M   5   3

Find the QR factorization of the matrix $A = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$

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

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

$$A = \begin{bmatrix} 1 & -2 & 1 \\ 2 & -3 & -1 \\ -1 & 1 & 2 \\ 3 & -5 & 0 \end{bmatrix}, b = \begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \end{bmatrix}$$

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