

II B.Tech I Semester Regular Examinations, December-2024

Sub Code: R23EE2101 **NUMERICAL METHODS AND COMPLEX VARIABLES**

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M			
1	a	Briefly explain bisection method to find solution of algebraic and transcendental equations.			2	1	2M
	b	Write the Newton's forward interpolation formula.			1	1	2M
	c	State Trapezoidal rule.			1	2	2M
	d	Explain Euler method to solve the initial value problems.			2	2	2M
	e	Show that $u = 2x - x^3 + 3xy^2$ is harmonic.			3	3	2M
	f	Evaluate $\int_C e^z dz$, where C is $ z = 1$.			3	3	2M
	g	Find the radius and region of convergence of $\sum_{n=1}^{\infty} \frac{z^n}{2^n + 1}$.			3	4	2M
	h	Define Isolated singularity.			1	4	2M
	i	Identify the set on which the transformation $w = \sin z$ is conformal.			3	5	2M
	j	At what points is the mapping $\omega = z^2 + \frac{1}{z^2}$ is not conformal?			3	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No	Questions	KL	CO	M					
2	Unit-I								
	a	i) The equation $x^6 - x^4 - x^3 - 1 = 0$ has one real root between 1.4 and 1.5. Find the root to four decimals by false position method.			3	1	5M		
		ii) Using Lagrange's formula find the value of y at x = 10 from the following			3	1	5M		
	x:	5	6	9				11	
	y:	12	13	14	16				
	OR								
b	i) Find the root of $x^2 - 5x + 2 = 0$ correct to 5 decimal places which lies between 4 and 5 by using Newton-Raphson method.			3	1	5M			
	ii) Given			3	1	5M			
	x:	1	2				3	4	5
f(x):	1	8	27	64	125	216	343	512	
Find f(7.5) by Newton's backward formula									
3	Unit-II								
	a	i) The velocity v of a particle at distance 's' from a point on its linear path is given in the following data:			3	2	5M		
S(m)		0	2.5	5				7.5	10
V (m/sec)	16	19	21	22	20	17	13	11	9

	Estimate the time taken by the particle to traverse the distance of 20 meters, using Simpson's 1/3 rd rule.			
	ii) Use Picard's method with 3 iterations to solve for $y(0.1)$ and $y(0.2)$, from the equation $\frac{dy}{dx} = x^2 + y^2$; $y(0) = 0$.	3	2	5M
OR				
b	Given that $\frac{dy}{dx} = 1 + y^2$; $y(0.6) = 0.6841$, $y(0.4) = 0.4228$, $y(0.2) = 0.2027$, $y(0) = 0$, find $y(-0.2)$ using Milne's predictor-corrector method.	3	2	10M
Unit-III				
a	i) Show that $u(x, y) = x^2 - y^2 + x$ is harmonic. Find the corresponding analytic function $f(z) = u + iv$.	3	3	5M
	ii) Evaluate $\int_C \left[\frac{3}{z-i} - \frac{6}{(z-i)^2} \right] dz$, where C is $ z = 2$ by Cauchy's integral formula	3	3	5M
OR				
b	i) If $f(z) = u + iv$ is analytic in the domain D, then prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) \operatorname{Re} f(z) ^2 = 2 f'(z) ^2$.	3	3	5M
	ii) Evaluate $\int_C z dz $, where C is the left half of the unit circle $ z = 1$ from $z = -i$ to $z = i$.	3	3	5M
Unit-IV				
a	i) Expand $\log(1+z)$ as a Taylor series about $z = 0$, when $ z < 1$.	3	4	5M
	ii) Determine the poles and their orders for the function $\frac{z+2}{(z+1)^2(z-2)}$. Find the residues at the poles.	3	4	5M
OR				
b	i) Find Laurent's series expansion in powers of z that represent $f(z) = \frac{1}{z^2(1-z)}$ for the domain $ z < 1$.	3	4	5M
	ii) Evaluate $\oint_C \frac{5z+7}{z^2+2z-3} dz$, where C is $ z-2 = 2$.	3	4	5M
Unit-V				
a	i) Determine the region in the w -plane into which the triangle bounded by the lines $x = 0$, $y = 0$ and $x + y = 1$ in the z -plane is mapped under the transformation $w = 4z$.	3	5	5M
	ii) Find the image of infinite strip $0 < y < 1/2$ under the transformation $w = \frac{1}{z}$.	3	5	5M
OR				
b	i) Prove that the image of the straight line $y = mx$ is an equiangular spiral under the transformation $w = e^z$.	3	5	5M
	ii) Find the bilinear transformation which maps the points $(-1, 0, 1)$ into the point $(0, i, 3i)$.	3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech I Semester Regular Examinations, December-2024

Sub Code: R23CC2102

UNIVERSAL HUMAN VALUES

Time: 3 hours.

(COMMON TO ALL BRANCHES)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Describe the value education.	2	1	2M
	b	Differentiate between happiness and prosperity.	2	1	2M
	c	Define the concept of harmony in the human being.	1	2	2M
	d	Interpret the harmony in the self.	2	2	2M
	e	Describe the harmony in the family.	2	3	2M
	f	Differentiate between 'trust' and 'respect'.	2	3	2M
	g	List the four orders of nature.	2	4	2M
	h	Interpret the interconnectedness in nature	2	4	2M
	i	Define the term definitiveness of ethical human conduct.	1	5	2M
	j	Describe the natural acceptance.	2	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M	
2	Unit-I					
	a	i) Explain the role of education in achieving holistic development.	2	1	5M	
		ii) Outline the method to fulfill basic human aspirations.	2	1	5M	
	OR					
	b	i) List the basic components of holistic development.	2	1	5M	
		ii) Explain the current scenario concerning happiness and prosperity in society.	2	1	5M	
3	Unit-II					
	a	i) Explain the co-existence of the self and the body.	2	2	5M	
		ii) How do the needs of the self differ from the needs of the body?	2	2	5M	
	OR					
	b	i) Briefly explain the role of health in ensuring harmony in the human being.	2	2	5M	
		ii) Discuss the key components of a programme for self-regulation?	2	2	5M	
4	Unit-III					
	a	i) Explain the significance of 'trust' as a foundational value in relationships.	2	3	5M	
		ii) Explain why harmony in the family is considered the basic unit of human interaction.	2	3	5M	

OR					
b	i) Explain the importance of harmony in society for the well-being of individuals.	2	3	5M	
	ii) Mention two examples of other feelings that contribute to harmonious relationships.	2	3	5M	
Unit-IV					
5	a	i) Explain the concept of self-regulation in the four orders of nature.	2	4	5M
		ii) Explain the relationship between interconnectedness and coexistence.	2	4	5M
OR					
b	i) Explain the significance of coexistence in realizing existence	2	4	5M	
	ii) How does nature achieve self-regulation without external intervention?	2	4	5M	
Unit-V					
6	a	i) Explain the significance of humanistic education in shaping individual behavior.	2	5	5M
		ii) Discuss the main features of value-based management models.	2	5	5M
OR					
b	i) Outline any one strategy for transitioning toward a value-based profession.	1	5	5M	
	ii) How does a humanistic constitution contribute to a universal human order?	2	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks



NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

R23**II B.Tech I Semester Regular Examinations, December-2024**

Sub Code: R23EE2103

ELECTROMAGNETIC FIELD THEORY

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A: Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M
1	a What are the properties of potential function?	K1	1	2M
	b State Gauss law and list its limitations.	K1	1	2M
	c Differentiate conduction and convection current densities.	K1	2	2M
	d State the Ohm's law in point form	K1	2	2M
	e State and explain the Biot-Savart's law.	K1	3	2M
	f States the Lorentz force equation.	K1	3	2M
	g How you determine the self-inductance of a toroid?	K1	4	2M
	h A solenoid has an inductance of 20 mH. If the length of the solenoid is increased by two times and the radius is decreased to half of its original value, find the new inductance.	K2	4	2M
	i What is the modification of Maxwell's equations for time varying fields?	K1	5	2M
	j Write Maxwell's equations in integral forms.	K1	5	2M

PART-B: Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No	Questions	KL	CO	M	
2	Unit-I				
	a	i) Derive Poisson's and Laplace's equations from fundamentals.	K3	1	5M
		ii) A point charge of 50 μ c is located in free space. Find potential if point P is located at (0.1, 0.2, -0.2) and (a) $V = 0$ at infinite (b) $V = 0$ at (2, 0, 0) and (c) $V = 30$ v at (-0.4, 2, -2)	K3	1	5M
	OR				
	b	i) Derive the expression for electric field intensity due to sheet of charge.	K3	1	5M
		ii) An infinite length of uniform line charge has $\rho_L = 10$ pC/m and it lies along the Z-axis. Determine electric field E at (4,3,3).	K3	1	5M
3	Unit-II				
	a	i) Derive the boundary conditions for conductor to dielectric interface for static electromagnetic fields.	K3	2	5M
		ii) Derive the expression for capacitance of parallel-plate capacitor.	K3	2	5M
	OR				
	b	i) Define electric field in terms of point charge and also in terms of potential, mention salient features of electric field intensity.	K3	2	5M
ii) Derive the boundary conditions between dielectric to dielectric medium		K3	2	5M	

4	Unit-III				
	a	i) Derive the expression for magnetic field intensity due to infinitely long straight filament carrying a direct current I.	K3	3	5M
		ii) Find the field intensity at a point on the axis, 6 m from the centre of a circular coil of area 110 cm ² and carrying a current of 60 A.	K3	3	5M
	OR				
b	i) Derive the Lorentz force equation in static magnetic fields.	K3	3	5M	
	ii) Two long parallel conductors carrying currents 110A and 160A respectively. If the conductors are separated by 25mm. Find the force/meter length of each conductor, if the current flow is in opposite direction.	K3	3	5M	
5	Unit-IV				
	a	i) Derive an expression for mutual inductance between a straight long wire and a square loop wire in the same plane.	K3	4	5M
		ii) An iron ring 15 cm diameter and 25 cm ² cross section is wound with 150 turns of wire. For a flux density of 1.5 tesla and $\mu_r = 700$. Find the exciting current, the inductance and stored energy.	K3	4	5M
	OR				
b	i) Obtain an expressions for the self-inductance of a solenoid and a toroid	K3	4	10M	
6	Unit-V				
	a	i) State and explain the faradays laws of electromagnetic induction.	K2	5	5M
		ii) A parallel plate capacitor with plate area of 6 cm ² and separation of 4 mm has a voltage $60 \sin 10^3 t$ V applied to its plates. Calculate the displacement current assuming $\epsilon = 2\epsilon_0$.	K3	5	5M
	OR				
	b	i) Write the Maxwell's equations both in point and integral forms for time varying fields.	K3	5	5M
ii) State and prove Poynting's theorem.		K3	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech I Semester Regular Examinations, December-2024

R23

Sub Code: R23EE2105

DC MACHINES & TRANSFORMERS

Time: 3 hours

(EEE)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define the term armature reaction in dc machines	2	1	2M
	b	Give the relation between torque and speed in dc machines.	2	1	2M
	c	Why a DC series motor cannot be started on no load?	2	2	2M
	d	State the different method of speed control of DC motor?	2	2	2M
	e	Define voltage regulation of Transformer	2	3	2M
	f	Why are breathers used in transformers?	3	3	2M
	g	A 1100/400 V, 50 Hz single phase transformer has 100 turns on the secondary winding. Calculate the number of turns on its primary	2	4	2M
	h	When will a Bucholz relay operate in a transformer?	3	4	2M
	i	Justify need for cooling of transformers	2	5	2M
	j	Draw circuit diagram for polarity test on single-phase transformer.	2	5	2M

PART-B:

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) How demagnetizing and cross magnetizing ampere turns per pole are calculated in a DC Machine?	3	1	5M
		ii) The brushes of a certain lap connected 400kw, 6-pole generator are given a lead of 18° electrical. From the data given, calculate (i) the demagnetizing ampere-turns (ii) the cross-magnetizing ampere-turns (iii) series turns required to balance the demagnetizing component. The full load current is 750A and total number of conductors are 900 and the leakage coefficient is 1.4.	4	1	5M
	OR				
	b	i) Explain the basic principle of operation of a DC Generator with a simple loop generator?	2	1	5M
ii) An 8-pole lap connected armature has 960 conductors, a flux of 40 m Wb per pole and a speed of 400 r.p.m. Calculate the emf generated on open circuit. If the armature were wave connected, at what speed it must be driven to generate 400 V.		4	1	5M	
3	Unit-II				
	a	i) Explain in detail about the types of D.C motors. Also mention their applications?	2	2	5M
ii) A 25HP, 250V DC Series motor has armature resistance 0.1Ω and field resistance 0.05Ω and brush Contact drop 3V. When the line current is 80A, the speed is 600rpm. Find the speed when the line Current is 100A.		4	2	5M	

	OR			
	i) Explain the armature voltage and field flux control methods for the Speed control of a DC Motor	2	2	5M
b	iii) Find the torque exerted by a 4-pole series motor whose armature has 1200 conductors Connected up in wave winding. The motor current is 10A and the flux per pole is 0.02Wb.	4	2	5M
	Unit-III			
	i) What are the various losses taking place in transformer? How these losses can be minimized.	2	3	5M
a	ii) The iron loss in a transformer core at normal flux density was measured at frequency of 30 Hz and 50 Hz, the results being 30 W and 54 W respectively. Calculate the i) hysteresis loss and ii) eddy current loss at 50 Hz.	4	3	5M
4	OR			
	i) In detail, explain the classification of transformer	4	3	5M
b	ii) A 1-phase transformer has 500 primary and 1200 secondary turns. The net cross-sectional area of the core is 75 cm ² . If the primary winding be connected to 400 V, 50 Hz supply, calculate the peak value of flux density in the core and voltage induced in the secondary winding.	4	3	5M
	Unit-IV			
	i) Following are the test figures for the 4 kVA, 200 / 400 V, 50 Hz, single-phase transformer. O.C. test: 200 V, 0.8 A, 70 W. S.C. test: 17.5 V, 9 A, 50 W. Calculate the parameters of equivalent circuit of a transformer.	4	4	5M
a	ii) List out the advantages and disadvantages of a bank of 3, 1-phase transformers to single 3- phase transformers		4	5M
5	OR			
	i) Compare the results and procedure of O.C., S.C. tests and back to back tests conducted on transformer	4	4	5M
b	ii) Show that one transformer may have slightly less temperature rise than the other in Sumpner's test	4	4	5M
	Unit-V			
	i) Discuss the constructional details of the three-phase transformers with necessary diagrams.	3	5	5M
a	ii) State the conditions to be filled for parallel operation of two transformers.	3	5	5M
6	OR			
	i) Draw the connection diagram and Phasor diagram for the following three-phase connections: (i) Y-Δ, (ii) Δ-Y and (iii) Δ-Δ.	3	5	5M
b	iii) Give the applications of various types of three phase transformers	3	5	5M

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