CODE: 2200BS03 | R22 | SET - 3

MALLA REDDY ENGINEERING COLLEGE FOR WOMEN
(Autonomous Institution – UGC, Govt. of India)

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NIRF India Ranking, Accepted by MHRD, Govt. of India

B.TECH I YEAR II SEMESTER REGULAR END EXAMINATIONS, JUNE/JULY-2024
ADVANCED CALCULUS AND TRANSFORM TECHNIQUES
(Common to CSE, CSE-DS, AIML, IOT, CS, CSIT, IT)

[Time: 3 Hours] **[Max. Marks: 60]**

PART – A

(10x 1 = 10M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer **All Questions**. Each question carries 1 Mark.

.1.	A	State Rolle's theorem.	1M	BTL2
	B	Prove that $\Gamma(n+1) = n\Gamma n$	1M	BTL2
	C	Evaluate $\int_0^5 \int_0^{x^2} x(x^2+y^2)dxdy$	1M	BTL4
	D	Sketch the region of the integral $\int_{-a}^{a} \int_0^{\sqrt{a^2-x^2}} f(x,y)dxdy$	1M	BTL2
	E	Prove that $\nabla(r^n) = n\, r^{n-2} R$	1M	BTL2
	F	Define divergence F and curl F.	1M	BTL1
	G	State the Dirichlet's conditions for Fourier series.	1M	BTL2
	H	Write the Fourier sine transform pair formula.	1M	BTL2
	I	Define Laplace transforms.	1M	BTL1
	J	Find Z (1)	1M	BTL1

PART – B

(5 x 10 = 50M)

Note: 1. ThisPart consists of 10 QUESTIONS
2. Answer any 1 question from each Section.Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	Prove that if $(0 < a < b < 1), \frac{b-a}{1+b^2} < \tan^{-1} b - \tan^{-1} a < \frac{b-a}{1+a^2}$	5M	BTL4
2.B	Verify Cauchy's mean value theorem for e^x *and* e^{-x} in the interval (a,b)	5M	BTL5

(OR)

3.A	Prove that $\beta(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$	5M	BTL4
3.B	Evaluate $\int_0^{\infty} e^{-ax} x^{m-1} \sin bx\, dx$ in terms of Gamma function.	5M	BTL5

SECTION - II

4.A	Evaluate $\int_0^1 \int_x^{x^2} (x^2+y^2)dxdy$	5M	BTL4
4.B	Evaluate $\int_0^a \int_0^b \int_0^c (x^2+y^2+z^2)dxdydz$	5M	BTL5

(OR)

5.A	Change the order of integration in $I=\int_{0}^{4a}\int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dydx$ and hence evaluate it.	5M	BTL4
5.B	Find the volume of the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$	5M	BTL2

SECTION - III

6.A	Show that $\nabla^2(r^n)=n(n+1)r^{n-2}$	5M	BTL3
6.B	If $u=x^2yz, v=xy-3z^2$, find (i) $\nabla(\nabla u \bullet \nabla v)$ (ii) $\nabla(\nabla u \times \nabla v)$	5M	BTL5

(OR)

7.A	Find the work done in moving a particle in the force field $F=3x^2I+(2xz-y)J+zK$ along (i) the straight line from (0,0,0) to (2,1,3) (ii) the curve defined by $x^2=4y, 3x^3=8z$ from $x=0\ to\ x=2$	5M	BTL2
7.B	Using the line integral, compute the work done by the force $F=(2y+3)I+xzJ+(yz-x)K$ when it moves a particle from the point (0,0,0) to the point (2,1,1) along the curve $x=2t^2, y=t, z=t^3$	5M	BTL5

SECTION – IV

8.A	Find the Fourier series for the function $f(x)=e^x$ defined in $(-\pi,\pi)$	5M	BTL4
8.B	Find the Fourier series for $f(x)=x^2$ $f(x)=x^2$ in $-\pi\le x\le\pi$. And hence deduce that $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+.....$	5M	BTL5

(OR)

9.A	Find the Fourier cosine Transform of the function $f(x)=\begin{cases}\sin x, & 0\le x<a\\ 0 & x>a\end{cases}$	5M	BTL2
9.B	Find the Fourier transform of $f(x)$ if $f(x)=\begin{cases}1-\lvert x\rvert, & \lvert x\rvert<1\\ 0 & \lvert x\rvert>1\end{cases}$ Hence deduce that $\int_0^\infty\left(\frac{\sin t}{t}\right)^4 dt=\frac{\pi}{3}$	5M	BTL2

SECTION – V

10.A	Find $L^{-1}\left[\frac{5s+3}{(s-1)(s^2+2s+5)}\right]$	5M	BTL2
10.B	Apply convolution theorem to evaluate $L^{-1}\left[\frac{s^2}{(s^2+a^2)^2}\right]$	5M	BTL5

(OR)

11.A	Find the inverse Z –transform of $\frac{2(z^2-5z+6.5)}{(z-2)(z-3)^2}\ for 2<\lvert z\rvert<3$	5M	BTL2
11.B	Using Convolution theorem ,find $Z^{-1}\left[\frac{z^2}{(z-1)(z-3)}\right]$	5M	BTL5

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CODE: 2202ES01 | R22 | SET - 2

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B.TECH I YEAR II SEMESTER REGULAR END EXAMINATIONS, JULY-2024
BASIC ELECTRICAL ENGINEERING
(Common to EEE,ECE,CSE-DS, IOT, CS&IT, IT)

[Time: 3 Hours] **[Max. Marks: 60]**

PART – A

(10x 1 = 10M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer **All Questions**. Each question carries 1 Mark.

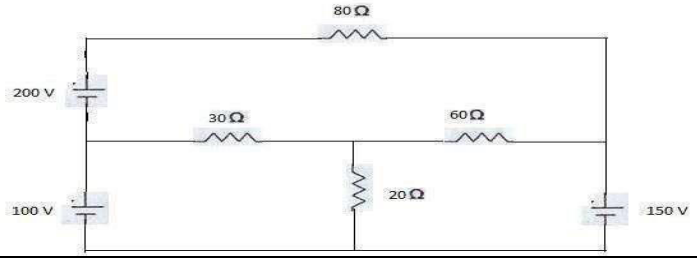
1	A	Define node and mesh.	1M	BTL1
	B	Classify the energy sources.	1M	BTL1
	C	Define power factor.	1M	BTL3
	D	State Norton's Theorem.	1M	BTL1
	E	Why DC series motor should not be started without load?	1M	BTL1
	F	What is Back E.M.F?	1M	BTL2
	G	Express the term slip in the Induction motor.	1M	BTL1
	H	Illustrate why single-phase Induction motor is not self-starting.	1M	BTL2
	I	List out the Safety precautions to be followed against electric shock.	1M	BTL1
	J	Compare circuit breaker and fuse.	1M	BTL2

PART – B

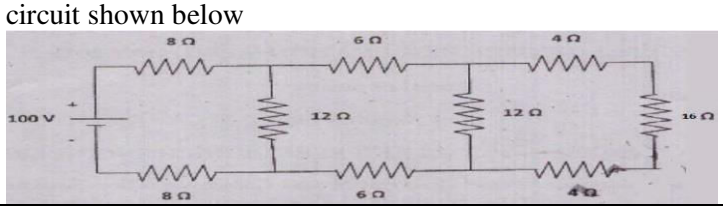
(5 x 10 = 50M)

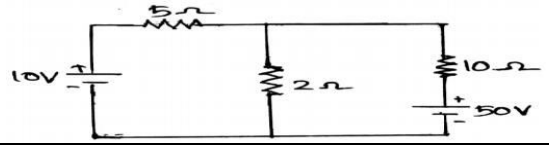
Note: 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

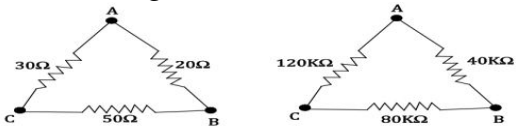
2.A	Estimate the current through the Various branches in the circuit of the following figure. Using mesh analysis. 	5M	BTL5
2.B	A Resistor of 50 Ohm has a potential difference of 100 Volts across the DC supply for 1 Hour. Examine the value of (i) Current (ii) Conductance (iii) Power (iv) Energy.	5M	BTL5

(OR)

3.A	Calculate (i) equivalent resistance across the terminal of the supply (ii) total current supplied by the source (iii) power delivered to the 16Ω resistor in the circuit shown below 	6M	BTL5

3.B	Write the mesh current equation in the circuit shown in the figure and determine the currents. 	4M	BTL5

SECTION - II

4.A	Three similar coils connected in star, take a power of 1.5KW at a power factor of 0.2 lagging from a 3 phase, 400V, 50Hz supply. Calculate the resistance and inductance of each coil.	5M	BTL5
4.B	Analyze the following network Delta into Star network and find the value as shown in Fig. 	5M	BTL5

(OR)

5.A	A balanced star connected load having an impedance (15+j20) Ω per phase is connected to a three phase 440V, 50 Hz supply. Find (i) The line currents and (7 (ii) The power absorbed by the load.	5M	BTL5
5.B	A DC Voltage of 100 Volts is applied to Series RL Circuit with R=25 Ohm. Calculate the value of the current in which the time constant is twice.	5M	BTL5

SECTION - III

6.A	Describe the following terms in single phase transformer(i) Efficiency (ii) All day efficiency (iii) Losses in transformer (iv) Regulation of Transformer	6M	BTL5
6.B	Derive the EMF Equation of Transformer.	4M	BTL5

(OR)

7.A	A single phase 5KVA transformer has 2000 primary turns and 1000 secondary turns if the flux flowing in the core is 0.4 Weber's. If the frequency is 50Hz then calculate the primary and secondary induced voltages.	5M	BTL5
7.B	Why is it more difficult to cool a transformer than any other electrical rotating machine?	5M	BTL5

SECTION – IV

8.A	Why the single-phase Induction motors are not Self-starting? And compare the contrast of Squirrel Cage and Slip ring Induction Motors.	6M	BTL5
8.B	Draw the torque slip characteristics of three phase induction motor.	4M	BTL5

(OR)

9.A	Derive and explain the torque equation of three phase induction motor with necessary expressions.	7M	BTL5
9.B	Justify which type of induction motor develops higher starting torque.	3M	BTL5

SECTION – V

10.A	Enumerate the functions and applications of SFU	6M	BTL5
10.B	Briefly explain the types of wiring with a neat diagram.	4M	BTL5

(OR)

11.A	Describe the different classifications of batteries and also explain the important characteristics of batteries	7M	BTL5
11.B	Differentiate the characteristics of MCB, ELCB, and MCCB	3M	BTL5

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CODE: 2200BS07 | R22 | SET - 3

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B.TECH I YEAR II SEMESTER REGULAR END EXAMINATIONS, JUNE/JULY-2024
ENGINEERING CHEMISTRY
(Common to EEE, ECE, CSE-DS, CSE-IOT, CS&IT, IT)

[Time: 3 Hours] **[Max. Marks: 60]**

PART – A

(10x 1 = 10M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer **All Questions**. Each question carries 1 Mark

1.	A	State the drawbacks of crystal field theory.	1M	BTL1
	B	What is doping? Mention the effect of impurities doping on conductivi	1M	BTL1
	C	What is ozonization? How it is useful in the treatment of water.	1M	BTL2
	D	What is potable water? Give any two specifications of potable water.	1M	BTL1
	E	Write the Nernst equation.	1M	BTL1
	F	What is metal cladding?	1M	BTL2
	G	Write any differences between S_N1 and S_N2 reactions.	1M	BTL1
	H	Define enantiomers and diastereomers.	1M	BTL1
	I	Write the formula of force constant.	1M	BTL2
	J	What are the various types of electronic excitations?	1M	BTL3

PART – B

(5 x 10 = 50M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	Write a note on linear combination of atomic orbital.	5M	BTL2
2.B	Explain the band structure of solids with suitable illustrations	5M	BTL2

(OR)

3.A	Discuss the crystal field splitting of *d*-orbitals in square planar geometry.	5M	BTL3
3.B	Draw and discuss the molecular orbital energy level diagram of O_2.	5M	BTL3

SECTION - II

4.A	Write a note on temporary and permanent hardness of water.	5M	BTL2
4.B	Provide a note on scales and sludges.	5M	BTL3

(OR)

5.A	Discuss the complexometric method of estimating hardness of water.	5M	BTL4
5.B	Explain how the ion-exchange process is useful in the treatment of water.	5M	BTL2

SECTION - III

6.A	Provide an account on potentiometric titrations.	5M	BTL4
6.B	Discuss $CH_3OH–O_2$ fuel cells.	5M	BTL3

(OR)

7.A	Write a note on potentiometric sensors.	5M	BTL2
7.B	Explain the factors that affect the rate of corrosion.	5M	BTL2

SECTION – IV

8.A	Discuss the conformational analysis of n-butane.	5M	BTL3
8.B	Write a brief note on the oxidations of alcohols using $KMnO_4$ and chromic acid.	5M	BTL4

(OR)

9.A	Explain Markownikoff and anti-Markownikoff additions.	5M	BTL2
9.B	Write the synthesis and pharmaceutical applications of paracetamol.	5M	BTL2

SECTION – V

10.A	Derive Beer-Lamberts Law.	5M	BTL4
10.B	Write a note on the chemical shift in ^1H NMR spectroscopy.	5M	BTL2

(OR)

11.A	Provide a note on magnetic resonance image.	5M	BTL4
11.B	Discuss the modes of vibrations under IR spectra.	5M	BTL3

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CODE: 2205ES02 | R22 | SET - 2

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B.TECH I YEAR II SEMESTER REGULAR END EXAMINATIONS, JUNE/JULY-2024
PYTHON PROGRAMMING
(Common to ALL)

[Time: 3 Hours] **[Max. Marks: 60]**

PART – A

(10 x 1 = 10M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer **All questions**. Each question carries 1 Mark.

1	A	Discuss the differences between interactive mode programming and scripting mode programming in Python	1M	BTL2
	B	Define slicing and indexing in Python	1M	BTL1
	C	Analyze the advantages and disadvantages of using lists over tuples in Python	1M	BTL2
	D	Differentiate between mutable and immutable data types in Python	1M	BTL2
	E	Compare and contrast Python's lambda functions with regular functions	1M	BTL2
	F	Write a Python program to demonstrate the use of keyword arguments in functions.	1M	BTL2
	G	Describe the purpose and functionality of the `collections` module in Python, with example.	1M	BTL1
	H	Justify how inheritance in Python promotes code reusability.	1M	BTL2
	I	List any 4 inbuilt functions and their usage in Python programming	1M	BTL2
	J	Identify the utility of `finally` block in exception handling in Python.	1M	BTL2

PART – B

(5 x 10 = 50M)

Note: 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	Illustrate the process of writing a basic Python program and discuss the steps involved.	5M	BTL2
2.B	Develop a Python function that takes a number as input and returns its factorial.	5M	BTL4

(OR)

3.A	Create a Python program to generate and print the Fibonacci sequence up to a specified number	5M	BTL4
3.B	Evaluate the functionalities and features of Jupyter Notebook and Spyder as Python IDEs.	5M	BTL6

SECTION - II

4.A	Differentiate between forward direction slicing with a positive step and backward direction slicing with a negative step using suitable examples	5M	BTL3

4.B	Analyze the use of break, continue, and pass statements within loops and conditional statements in Python using suitable examples	5M	BTL4

(OR)

5.A	Construct a program that uses a while loop to reverse the digits of an integer number.	5M	BTL4
5.B	Implement a function that converts a given decimal number to binary, octal, and hexadecimal formats	5M	BTL4

SECTION - III

6.A	Explain how dictionaries in Python handle key-value pairs and the underlying hash table implementation	5M	BTL2
6.B	Create a dictionary and use built-in functions to perform various operations such as getting keys, values, and items.	5M	BTL6

(OR)

7.A	Implement a set and demonstrate the use of union, intersection, and difference operations.	5M	BTL4
7.B	Create a list of integers and demonstrate how to update, slice, and iterate through the list.	5M	BTL6

SECTION – IV

8.A	Explain the difference between positional arguments and keyword arguments in Python functions	5M	BTL2
8.B	Construct a Python function that uses a lambda function to filter even numbers from a list.	5M	BTL4

(OR)

9.A	Explain the role of custom exceptions in Python and how they enhance error handling.	5M	BTL2
9.B	Write a Python program to demonstrate the usage of the `try`, `except`, and `finally` blocks.	5M	BTL3

SECTION – V

10.A	Interpret the role of constructors in Python and the difference between parameterized and non-parameterized constructors.	5M	BTL3
10.B	Develop a Python class named `Book` with attributes for title, author, and price, and a method to display the book's information.	5M	BTL4

(OR)

11.A	Outline the steps to create a custom module in Python and how to import it into a project.	5M	BTL4
11.B	Write a program that utilizes the `random` module to simulate rolling a pair of dice and output the result.	5M	BTL3

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