H.T No: ☐☐☐☐☐☐☐☐☐☐ **R22**   Course Code: A400101

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations September-2023
Course Name: ENGLISH FOR SKILL ENHANCEMENT
(Common for CE, ME, CSC, CSM, CSD & AIM)

Date: 12.09.2023 AN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1. Fill in the blanks by adding a suitable affix.   1 M
   a) It is _____ to kill endangered animals. (Prefix + legal)
   b) She was given a_____ of sweets. (Hand+ Suffix)

2. Fill in the blanks with appropriate word in the brackets.   1 M
   a) I always use_____ HB Pencil. (a/an).
   b) I am interested_____ basketball. (about/in)

3. Fill in the blanks with the correct pronoun/verb given in brackets.   1 M
   a) The members of the jury disagreed among_____. (itself/themselves)
   b) The President and the Vice President_____ coming. (is/are)

4. Fill in the blanks with the correct homophone from the options given in the brackets.   1 M
   a) They are in_____ garden. (their/there)
   b) Arjun was_____ of the game. (board/bored)

5. Identify and correct the misplaced modifier in the following sentences.   1 M
   a) The train was nearly late by five hours.
   b) She gave the beggar her food who was sitting on the road.

6. Rewrite the following sentences with correct tense forms.   1 M
   a) I used to wrote stories as a child.
   b) My sister has returned home last week.

7. Spot the cliché/redundancy in the following sentences and rewrite the sentence without cliché /redundancy.   1 M
   a) We must encourage new innovation.
   b) They should learn to cooperate together.

8. Give the full form of the following abbreviations.   1 M
   a) R&D
   b) VAT

9. Fill in the blanks with the correct collocation from the options given in the brackets.   1 M
   a) Pavan expressed his_____apology. (honest/sincere)
   b) The team lead has_____a mistake in the project (done/made)

10. Complete the following sentences by choosing correct option.   1 M
    a) My cell phone was under the sofa which_____all night. (rang/ringing)
    b) Rajan will succeed, if he _____hard (works/worked)

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). What does the author mean by saying that there should be a 'Bharat brand of English'? Has English in India developed unique expressions and usages?   10M

OR

11. B). What is process of 'toasting' of language, according to R.K. Narayan? Also comment on the style and tone of the essay.   10M

(P.T.O..)

12. A). Draw a character sketch of Sudha Murthy, as seen from the facets of her personality she reveals in 'Appro JRD'.   10M

OR

12. B). Write a description of a person who sat opposite to you in a train/bus journey. Convey what the character, thoughts and mood of the person seemed to be.   10M

13. A). There are a number of issues that need to be tackled to improve online learning. Elaborate on any two issues mentioned in 'Digital Learning' by referring to your own experience.   10M

OR

13. B). Write a letter to the Registrar of your University to correct a mistake in the spelling of your name in your mark sheet while also requesting him to issue a new mark sheet to you.   10M

14. A). Kalam believed that students of Art and Literature are important contributors to transforming India into a developed nation. Do you agree with this statement? Elaborate your answer.   10M

OR

14. B). Write an argumentative essay on 'Violence in cinema promotes violence in society'.   10M

15. A). Summarize your learning inputs from the topic 'Lessons from online learning".   10M

OR

15. B). Write a report on your college Annual day celebrations.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations September-2023
Course Name: ELECTRICAL CIRCUIT ANALYSIS-I
(Electrical & Electronics Engineering)

Date: 12.09.2023 AN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
### Each question carries ONE mark.   10x1=10M

1. Define Ohms Law.   1 M
2. Define Kirchhoff's Voltage Law.   1 M
3. Define Average Value.   1 M
4. Write the Impedance equation for Series RLC Circuit.   1 M
5. Draw the Thevinin's equivalent circuit.   1 M
6. State the Superposition Theorem.   1 M
7. Write the relation between line and phase voltages in a balanced Y-Connection. 1 M
8. Which type of connection of 3Φ system is preferred at the point of utilization? Why? 1 M
9. What is the difference between self-inductance and mutual inductance?   1 M
10. How do you form tree and co-tree in the network topology?   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Using mesh analysis, determine the loop currents as shown in Fig.   10M
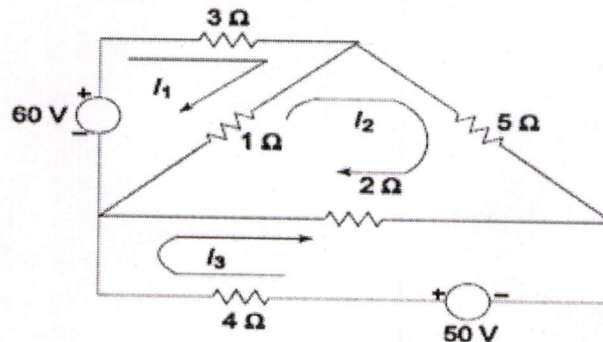

OR

11. B). State and explain Kirchhoff's laws with an example.   10M

12. A). Analyze the steady state performance of RC circuit with AC excitation with phasor   10M
diagram and also derive different types of power in the same circuit.

OR

12. B). Derive the expression for Resonant frequency and Bandwidth of series RLC Circuit.   10M
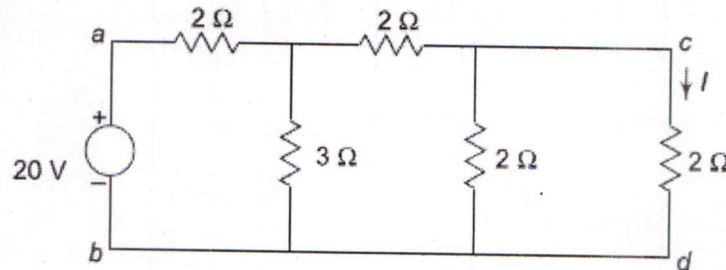
(P.T.O..)

13. A). Determine the voltage across $(2 + j5)\ \Omega$ impedance as shown in Fig. by using the superposition theorem.   10M
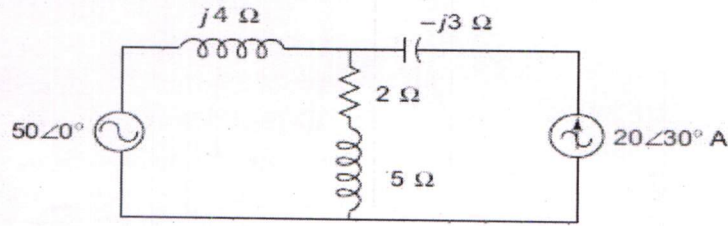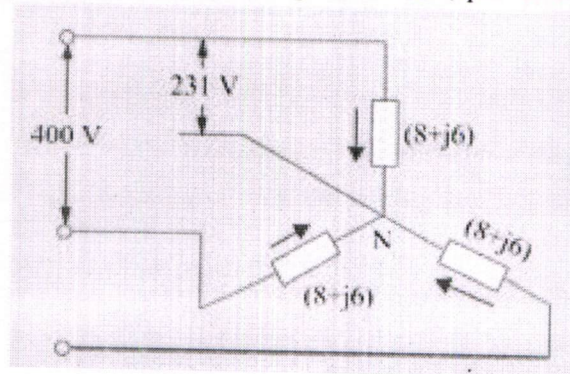

OR

13. B). Determine current I at terminals "cd" using Norton's theorem for the circuit shown in Fig.   10M

14. A). A balanced star-connected load of $(8 + j6)\ \Omega$ per phase is connected to a balanced 3-phase 400-V supply. Find the linecurrent, power factor, power and total volt-amperes   10M


OR

14. B). Explain how to measure the Three phase Power in Unbalanced network using two watt meter method.   10M

15. A). Two coupled coils with L1=0.01H and L2=0.04H and M12=0.0024H are connected in four different ways i.e series aiding, series opposing, parallel aiding and parallel opposing. Find the equivalent inductance in each case.   10M

OR

15. B). Draw the graph of the network shown in figure and select a suitable tree to write incidence and tie-set schedule.   10M
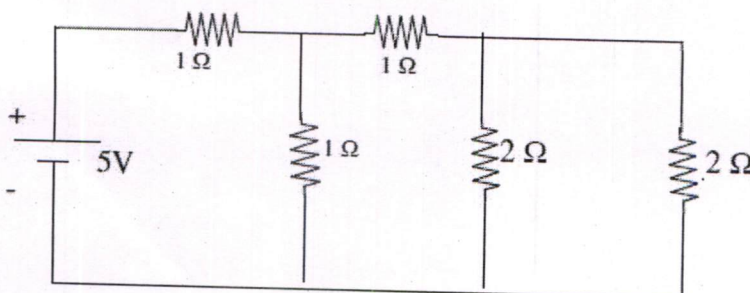
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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations September-2023
Course Name: BASIC ELECTRICAL ENGINEERING
(Common for ECE, CSE & IT)

Date: 12.09.2023 AN	Time: 3 hours	Max.Marks: 60

(Note: Assume suitable data if necessary)
PART-A
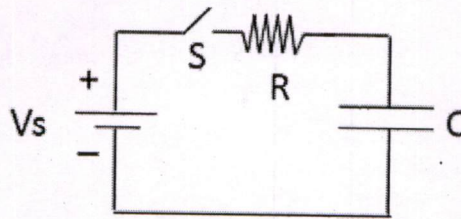**Answer all TEN questions (Compulsory)**
Each question carries ONE mark.   **10x1=10M**

1. State ohm's law and its limitations.   1 M

2. Write the expression for the current i(t) for the circuit shown in figure.   1 M

3. Define R.M.S. value of a sinusoidal quantity.   1 M
4. Define Q-Factor.   1 M
5. Give the EMF equation of a transformer.   1 M
6. Can the voltage regulation of a transformer go to negative? If so under what condition?   1 M
7. Mention the causes for failure of dc shunt generator to excite.   1 M
8. What is the effect of skewing the rotor slots of an induction motor?   1 M
9. List the differences between a fuse and a circuit breaker.   1 M
10. List the various types of batteries available?   1 M

PART-B
Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A). i) Explain independent voltage and current sources in detail.   4M
        ii) Calculate V_o and I_o in the circuit shown in figure.   6M
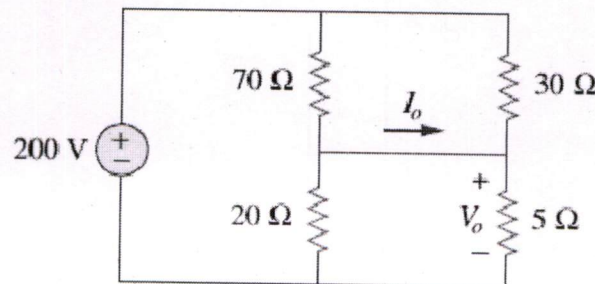
OR

11. B). Derive the expression of series RC transient with a DC voltage applied through it. Obtain the current, voltage and draw the decay transient of the circuit.   10M

12. A). i) Define: a) Power factor   b) Real Power   c) Reactive Power   d) Apparent Power   4M

        ii) A coil having a resistance of 7Ω and an inductance of 31.8mH is connected to 230V, 50Hz supply. Calculate: (a) the circuit current, (b) phase angle (c) power factor (d) power consumed.   6M

OR

12. B). Derive expression for average and RMS values of a sinusoidal wave form.   10M

13. A). i) Differentiate Ideal and Practical Transformers.   5M

        ii) Deduce the equivalent circuit of a Transformer.   5M

OR

13. B). i) List the losses, which occur in a loaded transformer. Deduce the condition for maximum efficiency.   5M

        ii) What is auto-transformer? Compare auto-transformer with two winding transformer.   5M

14. A). i) Distinguish between self-excited and separately exited DC Generators. Draw the circuit diagrams of Self excited DC Generators and write the voltage equations.   6M

        ii) Explain the principle of operation of DC motor in detail.   4M

OR

14. B). i) Explain working principle of three phase induction motor.   5M

        ii) Compare between non–salient and salient pole type synchronous generators.   5M

15. A). Explain the functions of MCB, ELCB, MCCB with neat sketch.   10M

OR

15. B). Define the principle of earthing and list the various types of earthing. Explain the construction and working principle of any one earthing method with neat diagram.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations September-2023
Course Name: ENGINEERING MECHANICS
(Common for CE & ME)

Date: 14.09.2023 AN	Time: 3 hours	Max.Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1. What is free body diagram?   1 M
2. What are the properties of a couple?   1 M
3. What is cone of friction?   1 M
4. Why dynamic friction is having less friction than limiting friction?   1 M
5. What is the difference between centroid and centre of gravity.   1 M
6. State second theorem of Pappus.   1 M
7. What is the moment of inertia for a semi circle of radius r about an axis passing through   1 M
   centroid and parallel to base?
8. What is mass moment of inertia of a cone of mass 'm', base radius 'a' and altitude h about its   1 M
   geometric axis?
9. What is the equation of motion of rigid body in plane motion?   1 M
10. State Impuse and Momentum principle.   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Two cylinders A and B rest in a horizontal channel as shown in Fig.1. The cylinder A has   10M
a weight of 1500 N and radius of 9 cm. The cylinder B has a weight of 500 N and radius
of 5 cm. The channel is 18 cm wide at the bottom with one side vertical. The other side is
inclined at an angle 60^0 with the horizontal. Find the reactions at the supports.

fig. (1)

(P.T.O..)
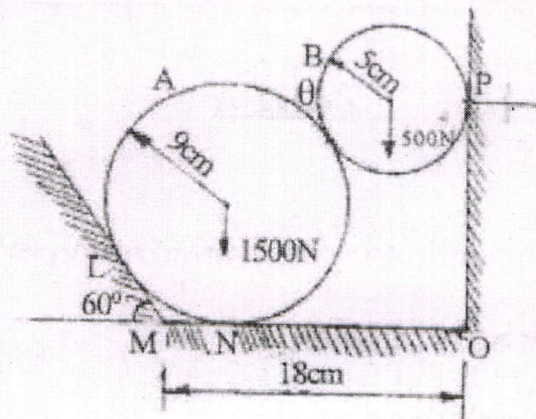
11. B). Determine the forces in the bars AB, AC and AD when loaded at the joint A by a force   10M
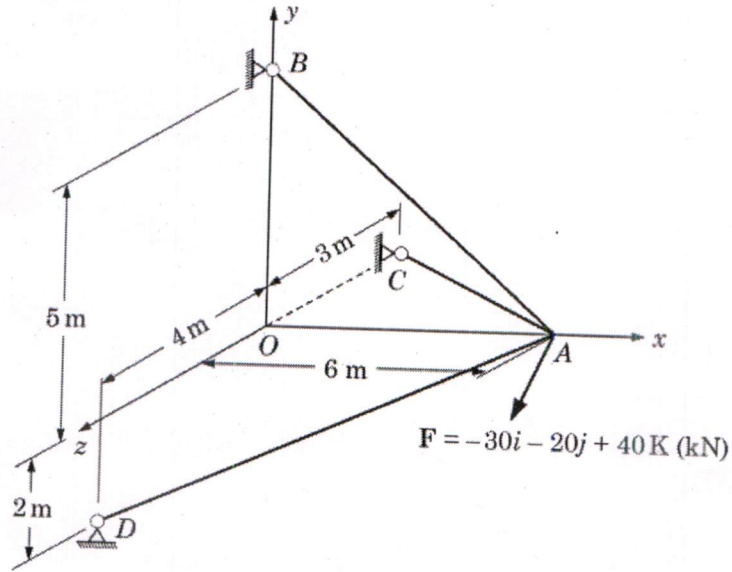F = -30 i – 20 j + 40 k as shown in Fig.2.

Fig.2.

12. A). Two blocks are connected by a horizontal link AB and rest on two planes as shown in   10M
Fig.3. What is the smallest weight of the block A for which the equilibrium can exist?
Assume the coefficient of friction for the block A and the horizontal surface to be 0.4 and
the angle of friction for the block B on the inclined plane is 20^0. Weight of block B is
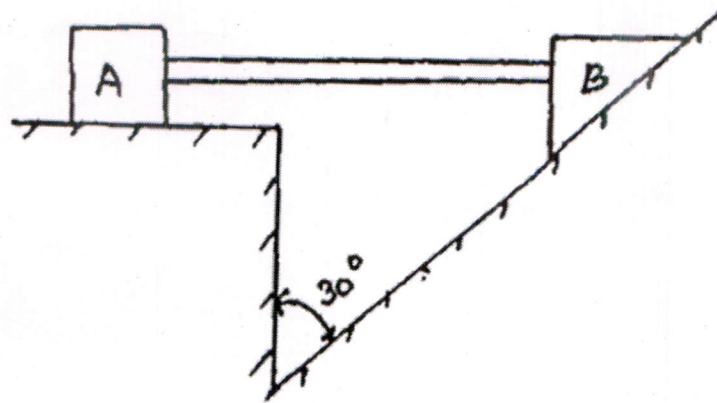500 N.

Fig.3

OR

12. B). A Screw jack has square threads of mean diameter of 10 cm and a pitch of 1.25 cm.   10M
Determine the force that must be applied to the end of a 50 cm lever to raise and lower a
weight of 50 KN. Find the efficiency of the jack. Is it self-locking. Coefficient of friction
is 0.20.

(P.T.O..)

13. A). Determine the Centroid of the lamina shown in Fig.4 with respect to an axis passing through base: 10M
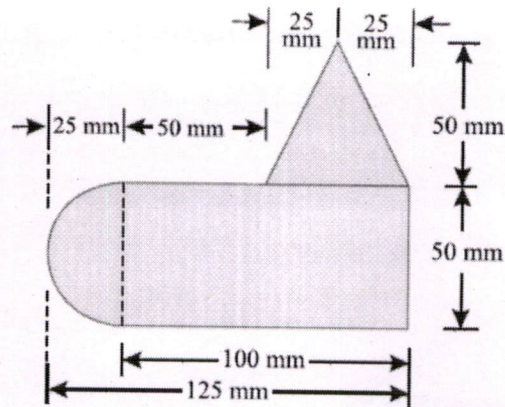

Fig.4

OR

13. B). State and prove Pappus theorem I and II.   10M

14. A). Determine the moment of inertia of the lamina with a circular hole of 30 mm diameter about the axis AB as shown in Fig.5.   10M
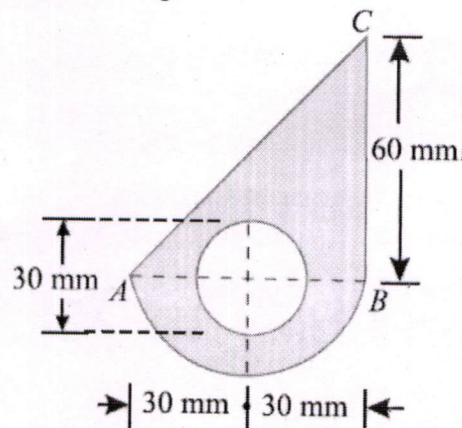
Fig.5

OR

14. B). Find the mass moment of inertia of the solid cone of mass m, height h and base radius R about an axis passing through vertex and parallel to base.   10M

15. A). A gun of mass 3000 kg fires horizontally a shell of mass 50 kg with a velocity of 300 m/s. What is the velocity with which the gun will recoil. Also determine the uniform force required to stop the gun in 0.6m. In how much time will it stop.   10M

OR

15. B). A cylinder of mass m and radius r resting on an inclined plane is released from rest and rolls down the inclined plane without slipping. Determine the acceleration of its centre of mass and the maximum angle Θ of the inclined plane for which the body will roll without slipping. Assume the coefficient of static friction $\mu = 0.192$.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations September-2023
Course Name: C PROGRAMMING & DATA STRUCTURES
(Common for EEE & ECE)

Date: 14.09.2023 AN | Time: 3 hours | Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1.	How do you declare a constant in C?	1 M
2.	Define keyword.	1 M
3.	What is goto statement?	1 M
4.	Define one-dimensional array.	1 M
5.	What is string size in memory?	1 M
6.	Define pointer.	1 M
7.	Define data structure.	1 M
8.	Define PUSH operator.	1 M
9.	Define searching.	1 M
10.	What is best complexity of insertion sort?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Draw the structure of the C program? Explain.   10M

OR

11. B). Explain the following operators in C: 10M
     i)   Relational
     ii)   Logical
     iii)   Conditional
     iv)   Bitwise
     v)   Special

12. A). Explain the nested if-else statement.   10M

OR

12. B). Differentiate One-Dimensional Arrays, Two-Dimensional Arrays with suitable example.   10M

13. A). Explain types of functions with syntaxes.   10M

OR

13. B). Explain various types of string handling functions with suitable examples.   10M

(P.T.O..)

14. A). Discuss the linear list ADT with examples.   10M

OR

14. B). Explain QUEUES and its operations with neat diagrams.   10M

15. A). Explain linear search technique with suitable example.   10M

OR

15. B). Explain insertion sort technique and its operations with suitable example.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations September-2023
Course Name: PROGRAMMING FOR PROBLEM SOLVING
(Common for CSE, IT, CSC, CSM, CSD & AIM)

Date: 14.09.2023 AN	Time: 3 hours	Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1. Define flowchart. — 1 M
2. Write about keywords in C language. — 1 M
3. State the differences between while and do-while loop. — 1 M
4. Write about formatted I/O. — 1 M
5. List any four standard library functions. — 1 M
6. Define recursion. — 1 M
7. State the differences between structure and union. — 1 M
8. Define pointer. — 1 M
9. List any four file open modes in C. — 1 M
10. What is the use of fseek function in files? — 1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). i) Draw the flowchart to find the maximum number among three given numbers. — 5M

ii) Write a program to accept the details of the employee such as empid, empname, empbasic, empHRA, empDA,taxdeduction and display the gross salary and net salary of an employee. — 5M

OR

11. B). Explain the precedence and associativity of operators with suitable examples. — 10M

12. A). i) Write a program to find whether the given number is prime or composite number. — 5M

ii) Write a program to check whether the given number is divisible by 3 and 5. — 5M

OR

12. B). Write a program to perform basic arithmetic operations such as addition, subtraction on two dimensional matrices and display the resultant matrices. — 10M

13. A). i) Write a program that demonstrates call by reference. — 5M

ii) Write a program to find the Fibonacci series upto 'n' terms using recursion. — 5M

OR

13. B). Write a program that demonstrates basic string handling functions. — 10M

(P.T.O..)

14. A).   i) Write a program that demonstrates pointers to structures with suitable example.   5M

           ii) Write about allocating memory for arrays of different data types.   5M

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

14. B).   Write a program to perform addition and subtraction on two given complex numbers and display the resultant complex numbers using structure.   10M

15. A).   i) What are the various command line arguments used in C. Explain with suitable examples.   5M

           ii) Write a program to search for an element using linear search.   5M

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

15. B).   i) Write the algorithm for insertion sort technique.   5M

           ii) Write the algorithm for bubble sort technique.   5M

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

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations September-2023

Course Name: MATRICES & CALCULUS

(Common for all Branches)

Date: 16.09.2023 AN 　　　　　Time: 3 hours 　　　　　Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark. 　　　　　　　　　　10x1=10M

1. The adjoint of $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ 　　　　　　　　　　　　　1 M

2. Define Orthogonal matrix. 　　　　　　　　　　　　　1 M

3. The Eigen values of the matrix A=$\begin{bmatrix} 1 & -1 & 5 \\ 0 & 5 & 6 \\ 0 & -6 & 5 \end{bmatrix}$. 　　1 M

4. The quadratic form associated with Symmetric matrix $\begin{bmatrix} 1 & 0 & -1 \\ 0 & -1 & 2 \\ -1 & 2 & 1 \end{bmatrix}$. 　1 M

5. State Cauchy's theorem. 　　　　　　　　　　　　　1 M

6. Taylor's expansion of $f(x) = \frac{1}{1+x^2}$. 　　　　　　　1 M

7. The stationary points of $x^3 y^2 (1-x-y)$ 　　　　　1 M

8. If $f = x^2 + y^2$ the $\frac{\partial^2 f}{\partial x \partial y}$. 　　　　　　　　　　1 M

9. Evaluate $\int_{-1}^{2} \int_{x^2}^{x+2} dy\, dx$. 　　　　　　　　　　1 M

10. Find $\int_0^1 \int_0^1 \int_0^1 e^{x+y+z}\, dx\, dy\, dz$. 　　　　　　　1 M

PART-B
Answer the following. Each question carries TEN Marks. 　　5x10=50M

11.A). Solve the system of equations $3x + y - z = 3; 2x - 8y + z = -5; x - 2y + 9z = 8$ Using Gauss elimination method. 　　10M

OR

11. B). Prove that the following set of equations is consistent and solve them. 　10M
$3x + 3y + 2z = 1;\ x + 2y = 4;\ 10y + 3z = -2;\ 2x - 3y - z = 5$

12. A). If A=$\begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & 2 \\ 2 & -2 & 1 \end{bmatrix}$ verify Cayley-Hamilton theorem. Find A^4 and A^{-1} using Cayley-Hamilton theorem. 　10M

OR

12. B). Reduce the quadratic form $3x^2 + 3y^2 + 3z^2 + 2xy + 2xz - 2yz$ into sum of squares form by an orthogonal transformation and give the matrix of transformation. 　10M

(P.T.O..)

13. A). i) If $a < b$, prove that $\frac{b-a}{(1+b^2)} < tan^{-1}b - tan^{-1}a < \frac{b-a}{(1+a^2)}$ using Lagrange's Mean value   5M

theorem. Deduce the following: $\frac{\pi}{4} + \frac{3}{25} < tan^{-1}\frac{4}{3} < \frac{\pi}{4} + \frac{1}{6}$

ii) Expand e^{xsinx} in power of x.

    5M

OR

13. B). i) Verify Cauchy's mean value theorem for $f(x) = sinx$ and $g(x) = cosx$ on $\left[0, \frac{\pi}{2}\right]$ 5M

ii) State Geometrical interpretation of Lagrange's mean value theorem.

    5M

14. A). Verify Euler's theorem for the function $u = sin^{-1}\frac{x}{y} + tan^{-1}\frac{y}{x}$

    10M

OR

14. B). If $u = \frac{yz}{x}, v = \frac{zx}{y}, w = \frac{xy}{z}$ show that $J\left(\frac{u,v,w}{x,y,z}\right) = 4$.

    10M

15. A). Change the order of integration in $\int_0^1 \int_{x^2}^{2-x} xy \, dx \, dy$ and hence evaluate the double   10M

integral.

OR

15. B). Evaluate $\iiint xyz \, dx \, dy \, dz$ over the positive octant of the sphere $x^2 + y^2 + z^2 = a^2$.

    10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations September-2023
Course Name: APPLIED PHYSICS
(Common for CE, ME, CSC, CSM, CSD & AIM)

Date: 19.09.2023 AN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   **10x1=10M**

1.	What is the energy of the photons per unit volume in black body radiation according to Plank's law?	1 M
2.	Define effective mass of electron.	1 M
3.	What are intrinsic semiconductors?	1 M
4.	Name the two applications of LED.	1 M
5.	List the characteristics of LASER.	1 M
6.	Classify different types of Optical Fibers	1 M
7.	What are Dielectrics?	1 M
8.	Relate the relation between B, H & M.	1 M
9.	What are superionic conductors?	1 M
10.	What are the approaches for the fabrication of Nanomaterials?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A).	Explain the significance of wave function and Derive Schrodinger's time independent wave equation for a free particle in one dimensional potencial box.	10M

OR

11. B).	Show that the energy spectrum of an electron contains a number of allowed energy bands separated by forbidden bands using Kronig-Penny model.	10M

12. A).	What is PN junction diode? Explain the formation of depletion region in PN junction. Draw the V-I characteristics of PN junction diode.	10M

OR

12. B).	What is a Solar cell? Explain its construction and working. Give four applications.	10M

13. A).	Explain construction and working of a He-Ne Laser with a neat diagram. Give four applications of Laser.	10M

OR

13. B).	i) Explain the working principle of an optical fiber and derive an expression for numerical aperture of an optical fiber.	7M
	ii) Find Numerical aperture and Acceptance angle for an Optical fiber with core and cladding refractive indices of 1.55 and 1.50 respectively.	3M

(P.T.O..)

14. A).   Explain the Local field with a neat diagram. Derive the equation for local field.   10M

OR

14. B).   What is ferromagnetism? Explain the hysteresis curve on the basis of Domain theory.   10M

15. A).   Explain the construction and working of rechargeable ion batteries.   10M

OR

15. B).   i) List the applications of nanomaterials.   4M
       ii) Explain how X-ray diffraction can be used to characterize Nanomaterials.   6M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations September-2023
Course Name: ENGINEERING CHEMISTRY
(Common for EEE, ECE, CSE & IT)

Date: 19.09.2023 AN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions (Compulsory)
Each question carries ONE mark.   10x1=10M

1.	Mention any two applications of electrochemical series.	1 M
2.	Mention the various factors affecting rate of corrosion.	1 M
3.	What are the applications of conducting polymers.	1 M
4.	What are the monomers involved in the preparation of Bakelite?	1 M
5.	Define cracking.	1 M
6.	Define HCV and LCV of a fuel.	1 M
7.	Differentiate between temporary and permanent hardness of water.	1 M
8.	What are zeolites and write its formula?	1 M
9.	Define Flash and Fire point of lubricant materials.	1 M
10.	What are the engineering applications of smart materials?	1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Explain the measurement of pH of a solution using glass electrode.   10M

OR

11. B). Write a short note on the following: 10M
(i) Galvanic Corrosion (ii) Electroless plating.

12. A). Discuss the preparation, properties and applications of Nylon 6,6 and Butyl Rubber.   10M

OR

12. B). Explain Preparation, properties, and applications of Polylactic acid of Biodegradable Polymers.   10M

13. A). What is the significance of Octane number & Cetane number and for which these are used? How these can be improved?   10M

OR

13. B). Explain ultimate analysis of coal? How is it carried out? What is significance?   10M

14. A). What is the principle of EDTA method? Describe the estimation of hardness of water by EDTA method?   10M

OR

14. B). Summarize a short note on the following: 10M
i) Phosphate conditioning, ii) Boiler corrosion and iii) Calgon conditioning.

15. A). Define lubricant. Explain the mechanism of thin film lubrication.   10M

OR

15. B). Explain briefly setting hardening of Portland cement.   10M

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