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CB111(R20)

B. TECH. DEGREE EXAMINATION, MAY-2022

Semester I [First Year] (Regular)

DISCRETE MATHEMATICS

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- (a) What is power set? CO1
- (b) Define equivalence relation. CO1
- (c) How many functions are there from a set with m elements to one with n elements? CO1
- (d) Find the number of permutations of the word CALCULUS. CO1
- (e) Define cyclic group. CO2
- (f) What is a field? CO2
- (g) List any two postulates of Boolean algebra. CO2
- (h) Find the negation of proposition p and q , if p : It is cold, q : It is raining CO3
- (i) Define satisfiability. CO3
- (j) What is completeness? CO3
- (k) Construct the truth table for $p \uparrow q$. CO3
- (l) How many vertices are needed to construct a graph with 16 edges in which each vertex is of degree 2? CO4
- (m) What is a complement of a graph? CO4
- (n) Define planar graph. CO4

UNIT - I

2. (a) Applying pigeonhole principle show that of any 14 integers are selected from the set $S = \{1, 2, 3, \dots, 25\}$ there are at least two whose sum is 26. (7M) CO1

- (b) Use mathematical induction to show that 5 divides $n^5 - n$ whenever ' n ' is a non-negative integer. (7M) CO1

(OR)

3. Solve the recurrence relation $a_r - 2a_{r-1} + a_{r-2} = 2^r, r \geq 2$ by the generating function method with the boundary conditions $a_0 = 2$ and $a_1 = 1$. CO1

UNIT – II

4. (a) Show that the set $\{1, 2, 3, 4, 5\}$ is not a group under addition and multiplication modulo 6. (7M) CO2
(b) State and prove Lagrange's theorem. (7M) CO2

(OR)

5. (a) Express the Boolean function $F = xy' + xz + xy$ in conjunctive normal form. (7M) CO2
(b) Draw Karnaugh map and simplify the Boolean expression $F(A, B, C, D) = \sum(7, 13, 14, 15)$. (7M) CO2

UNIT – III

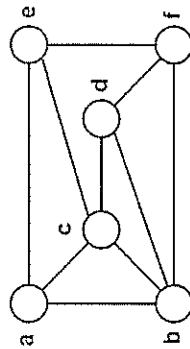
6. Show that $(p \wedge q) \vee r \leftrightarrow ((\sim p \vee \sim q) \wedge \sim r)$ is a contradiction. CO3

(OR)

7. (a) Obtain the principle disjunctive normal form for $\sim P \vee Q$. (7M) CO3
(b) Obtain the principle conjunctive normal form for $(\sim P \rightarrow R) \wedge (Q \leftrightarrow P)$. (7M) CO3

UNIT – IV

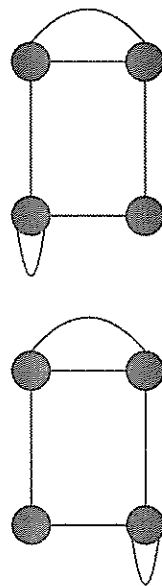
8. (a) Show that in any graph, the number of vertices of odd degree is even. (7M) CO4
(b) Find the chromatic number of the graph



(7M) CO4

(OR)

9. (a) Determine whether the following graphs are isomorphic or not.



G1

G2

(7M) CO4

- (b) Explain Hamilton path and Hamilton circuit with suitable example, also draw a graph with Hamilton circuit but no Euler circuit. (7M) CO4

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(OR)

9. (a) Evaluate $\int_0^{\log 2} \int_0^x \int_0^{x+y} e^{x+y+z} dx dy dz$

(7M) CO4

(b) Applying the change of order of integration technique, evaluate $\int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy dx$

(7M) CO4

CB112(R20)

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CB112(R20)

B.TECH. DEGREE EXAMINATION, MAY-2022

Semester I [First Year] (Regular)

**INTRODUCTORY TOPICS IN STATISTICS,
PROBABILITY AND CALCULUS**

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- (a) Define Statistics. CO1
- (b) What do you mean by Secondary data? CO1
- (c) Define Coefficient of Variation. CO1
- (d) Define marginal frequency distribution. CO1
- (e) Define Random experiment. CO2
- (f) Find the probability that the leap year will have 53 Sundays. CO2
- (g) Define combinatorial probability. CO2
- (h) Write mean and variance of Binomial distribution. CO3
- (i) Define Moment generating function of Poisson distribution. CO3
- (j) Write any two properties of Normal distribution. CO3
- (k) Define Chi-square distribution. CO3
- (l) Define mathematical expectation. CO3
- (m) Evaluate $\int_0^1 \int_1^2 xy dy dx$. CO4
- (n) Changing the order of integration rewrite the integral $\int_0^\infty \int_1^\infty f(x,y) dy dx$. CO4

UNIT - I

2. (a) Discuss Various methods of collecting the data. (7M) CO1

- (b) Find the Quartile Deviation for the following data.

Class Interval	130-134	135-139	140-144	145-149	150-154	155-159	160-164
Frequency	3	12	21	28	19	12	5

(7M) CO1

(OR)

3. (a) What do you mean by classification of data. Explain different types of classification. (7M) CO1
- (b) Find the Geometric mean for the following data. (7M) CO1

Class Interval	≤ 200	≤ 300	≤ 400	≤ 500	≤ 600	≤ 700	≤ 800
Frequency	3	22	39	54	72	88	100

UNIT – II

4. (a) Discuss various definitions of probability and their limitations. (7M) CO2
- (b) A can hit a target 3 times in 5 attempts. B can do it twice in 5 shots and C can do it 3 times in 4 shots. They fire a volley (at a time). What is the probability two shots hit the target? (7M) CO2

(OR)

5. (a) The probability that a doctor will diagnose a disease x correctly is 60%. The probability that a patient will die by his treatment after correct diagnosis is 40% and the probability of death by wrong diagnosis is 70% a patient of the doctor who had the disease X, died. What is the probability that his disease was diagnosed correctly? (7M) CO2
- (b) In a bolt factory, machines A, B, C manufacture 20%, 30% and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is

drawn at random and found to be defective. Find the probability that it is manufactured from machine A. (7M) CO2

UNIT – III

6. (a) A continuous random variable x has the probability density function $f(x) = kx^2 e^{-x}$ when $x \geq 0$, find the value of k and obtain the mean and variance of x . (7M) CO3
- (b) Fit a Poisson distribution for the following data and find the expected frequencies.

x	0	1	2	3	4	5
$f(x)$	42	33	14	6	4	1

(7M) CO3

(OR)

7. (a) In a test on 2000 electric bulbs, it was found that the life of a particular type is normally distributed with an average life of 2040 hours and a standard deviation of 60 hours. Estimate the number of bulbs likely to burn for
 (i) More than 1950 hours.
 (ii) Less than 2150 hours.
 (iii) More than 1920 but less than 2160 hours.

(7M) CO3

- (b) Explain in detail about moment generating function. (7M) CO3

UNIT – IV

8. (a) Find the volume of the tetrahedron bounded by the planes $x=0, y=0, z=0$ and $x+y+z=a$ ($a > 0$). (7M) CO4
- (b) By the technique of change the order of

integration, evaluate $\int_0^{\infty} \int_0^{\infty} \frac{e^{-y}}{y} dy dx$

(7M) CO4

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CB113(R20)

B. TECH. DEGREE EXAMINATION, MAY-2022

Semester I [First Year] (Regular)

FUNDAMENTALS OF PHYSICS

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- | | |
|---|-----|
| (a) What is Damped harmonic oscillation? | CO1 |
| (b) What are free oscillations? | CO1 |
| (c) Define Resonance. | CO1 |
| (d) What is constructive interference? | CO2 |
| (e) Recall Zone plate. | CO2 |
| (f) What is double refraction? | CO2 |
| (g) Outline Planck's quantum theory of radiation. | CO3 |
| (h) State Heisenberg's uncertainty Principle | CO3 |
| (i) Define Atomic packing factor. | CO3 |
| (j) Define Insulator. | CO3 |
| (k) Recall Population Inversion. | CO4 |
| (l) List any two applications of optical fiber. | CO4 |
| (m) State Zeroth law of thermodynamics. | CO4 |
| (n) What is entropy? | CO4 |

UNIT - I

- | | | |
|---|------|-----|
| 2. (a) Derive an expression for amplitude of forced oscillator and give the condition for amplitude resonance | (8M) | CO1 |
| (b) List the Characteristics of Simple Harmonic motion. | (6M) | CO1 |

(OR)

3. (a) Explain continuity equation for current densities. (6M) CO1
- (b) State and Explain Maxwell's equations for Electromagnetic field, deduce the wave equation for a plane wave in vacuum. (8M) CO1

UNIT – II

4. (a) Discuss the Fraunhofer diffraction at a single slit. Explain the condition for principal maximum and minimum. (8M) CO2
- (b) Distinguish between Fresnel's and Fraunhofer diffraction. (6M) CO2

(OR)

5. (a) Name the differences between polarized and unpolarized light (4M) CO2
- (b) Describe the production of polarized beam of light from two SHM's acting at right angles. (10M) CO2

UNIT – III

6. (a) Derive an expression for a particle in one dimension potential box (8M) CO3
- (b) Summarize Heisenberg picture. (6M) CO3

(OR)

7. (a) Explain Conductors, semiconductors and Insulators. (7M) CO3
- (b) Classify the types of Crystal systems. (7M) CO3

UNIT – IV

8. (a) Describe the Einstein's theory of matter radiation using Coefficients. (9M) CO4
- (b) List the applications of Lasers in engineering. (5M) CO4

(OR)

9. (a) Describe the change in entropy in reversible and irreversible processes. (9M) CO4
- (b) Name the applications of First law of thermodynamics. (5M) CO4

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CB/CD/CM/CO114(R20)

B. TECH. DEGREE EXAMINATION, MAY-2022

Semester I [First Year] (Regular)

FUNDAMENTALS OF COMPUTER SCIENCE

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- | | |
|--|-----|
| (a) Draw the basic structure of a C program. | CO1 |
| (b) What is variable? List the restrictions on the variable names. | CO1 |
| (c) Define increment and decrement operators. | CO1 |
| (d) Write a short note on switch case statement. | CO1 |
| (e) Give an example for Continue statement. | CO2 |
| (f) Distinguish between while and do-while statements. | CO2 |
| (g) Define a function. List the categories of user defined functions | CO2 |
| (h) What is pointer to pointer? | CO3 |
| (i) How to initialize a Structure variables? | CO3 |
| (j) Define Union. How to represent a union? | CO3 |
| (k) Why do you make files exist? | CO4 |
| (l) Discriminate putchar() and getchar(). | CO4 |
| (m) Write about random file handling functions. | CO4 |
| (n) Define macros for logical operators. | CO4 |

UNIT - I

2. (a) Define flowchart. List the symbols used in flow charts. (7M) CO1

- (b) Write a program to evaluate the following arithmetic expressions.

(i) $a + b$ (ii) $a - b$ (iii) $a * b$ (iv) a / b (v) $a \% b$ (7M) CO1

UNIT – IV

8. (a) What is the purpose of `scanf()`, `printf()`, `getchar()` and `putchar()` statements? (7M) CO4
 (b) Write a C program to display the contents of the file in reverse order. (7M) CO4

(OR)

9. (a) What is path and pathname in Unix? Explain them in detail. (7M) CO4
 (b) Write a C program to copy the contents from one file to another file. (7M) CO4

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(OR)

3. (a) What is an Algorithm? Write an algorithm to find the largest of three numbers. (7M) CO1
 (b) Explain two types of conversion with examples. (7M) CO1

UNIT – II

4. (a) Explain the syntax of IF-ELSE statement. Write a C program to check whether a given number is even or odd using IF-ELSE statement. (7M) CO2
 (b) What is function parameter? Explain different types of parameters in C functions. (7M) CO2

(OR)

5. (a) What are unconditional control statements? Explain any two with syntax and example (7M) CO2
 (b) Write a C program to find the factorial of a number using recursion. (7M) CO2

UNIT – III

6. (a) Write a C program to find the largest element in an array. (7M) CO3
 (b) What is a structure? Explain the syntax of structure declaration with example. (7M) CO3

(OR)

7. (a) Write a C program to read and display a 3 x 3 matrix elements. (7M) CO3
 (b) Write a C program to store and print NAME, UID, SUBJECT and MARKS of students using structure. (7M) CO3

9. (a) Write a short note on:

- (i) Types of wiring
- (ii) Protective / safety devices

(7M) CO4

(b) Classify the magnetic materials and explain the magnetic properties by drawing B-H curve of them.

(7M) CO4

CB115(R20)

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CB115(R20)

B. TECH. DEGREE EXAMINATION, MAY-2022

Semester I [First Year] (Regular)

PRINCIPLES OF ELECTRICAL ENGINEERING

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

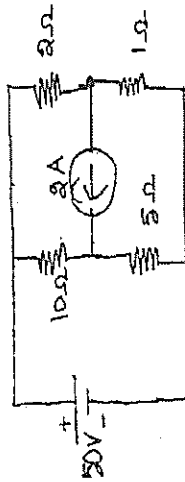
1. Answer the following:

- (a) Define energy in electrical systems. CO1
- (b) State Ohm's law. CO1
- (c) Calculate current flowing through a 5 meters long conductor with resistance of 2 Ohms per meter which is connected across a 10 V battery. CO1
- (d) Distinguish between a mesh and a loop of a circuit? CO1
- (e) Name any one device that operates at Unity Power Factor. CO2
- (f) Define Frequency. CO2
- (g) What is the current and voltage relation of pure inductor connected across AC supply. CO2
- (h) Define power factor. CO2
- (i) What is the total capacitance when two 5 μ F capacitors are connected in parallel combination? CO3
- (j) Define the reluctance of a magnetic circuit. CO3
- (k) What is meant by step up and step down transformers? CO3
- (l) What the slope of B-H curve indicates? CO4
- (m) Define a thermo-couple. CO4
- (n) Is fuse necessary for any electrical circuits, clarify why? CO4

UNIT - I

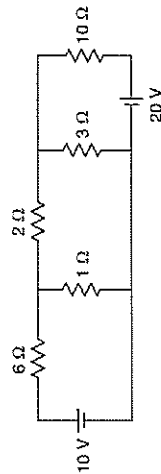
2. (a) Explain the passive and active elements along with their current-voltage relation. (7M) CO1

- (b) Determine the current in the $5\ \Omega$ resistor using nodal analysis. (7M) CO1



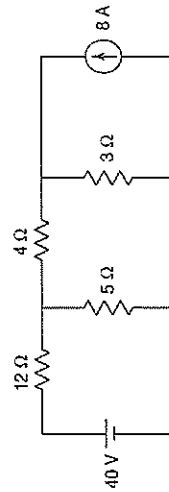
(OR)

3. (a) State and explain Kirchhoff's laws with suitable examples. (7M) CO1
(b) Find the current through $2\ \Omega$ resistor of the circuit given below by using Mesh analysis: (7M) CO1



UNIT – II

4. (a) State the Thevenin's theorem and explain the procedure of finding Thevenin's equivalent circuit with an example. (7M) CO2
(b) Find the current through the $4\ \Omega$ resistor of the given circuit using superposition theorem: (7M) CO2



(OR)

5. (a) Explain the response of single phase series R-C circuit with the help of phasor diagram in detail. (7M) CO2

- (b) A coil has an inductance of $0.05\ \text{H}$ and a resistance of $10\ \Omega$. It is connected to a sinusoidal $200\ \text{V}$, $50\ \text{Hz}$ supply. Calculate the impedance, current, power consumed and power factor. (7M) CO2

UNIT – III

6. (a) Explain in detail about:
(i) capacitors in series and parallel combination (7M) CO3
(ii) charging and discharging of capacitors (7M) CO3
(b) A $120\ \text{kVA}$ transformer having primary voltage of $2000\ \text{V}$ at $50\ \text{Hz}$ has 180 primary and 45 secondary turns. Neglecting losses, calculate:
(i) the full load primary and secondary currents (7M) CO3
(ii) the no-load secondary induced EMF (7M) CO3
(iii) the maximum flux in the core (7M) CO3

(OR)

7. (a) A transformer is rated at $100\ \text{kVA}$. At full load its copper and iron losses are $1200\ \text{W}$ and $960\ \text{W}$ respectively. Calculate the efficiency when it is supplying half load at
(i) 0.8 power factor (ii) 0.9 power factor. (7M) CO3
(b) Explain principle of operation of transformer. (7M) CO3

UNIT – IV

8. (a) Explain in detail about elementary methods for measurement of DC current. (7M) CO4
(b) What is necessity of earthing and explain any one type of earthing in detail with neat sketches. (7M) CO4

(OR)