

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 154201

Roll No.

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B.Tech.

(SEM.II) THEORY EXAMINATION 2013-14

ENGINEERING MATHEMATICS-II

Time : 3 Hours

Total Marks : 100

Note :— Attempt all Sections.

SECTION-A

1. Attempt all parts of this question. Each part carries 2 marks :
(10×2=20)

- (a) Find the A.M. between 12 and -8.
- (b) Find the sum of the G.P. $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \dots$ up to 9 terms.
- (c) Describe the sample space for the experiment – “A coin is tossed three times”.
- (d) Define Exhaustive events with an example.
- (e) Evaluate $\int \left(\frac{x}{a} + \frac{a}{x} \right) dx$
- (f) Evaluate $\int e^{(1-4x)} dx$
- (g) Find the value of x and y so that the vectors $2\hat{i} + 3\hat{j}$ and $x\hat{i} + y\hat{j}$ are equal.

- (h) If $\vec{a} = \hat{i} - 7\hat{j} + 7\hat{k}$ and $\vec{b} = 3\hat{i} - 2\hat{j} + 2\hat{k}$ find $\vec{a} \times \vec{b}$.
 (i) Solve $x^2 + 3 = 0$.
 (j) Write the solution set of $7x + 3 < 5x + 9$ when x is a natural number.

SECTION-B

2. Attempt any **three** parts from this question : (10×3=30)

- (a) How many terms of the A.P. $-6, -\frac{11}{2}, -5, \dots$ are needed to give the sum -25 ?
 (b) One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability the card will be (i) a diamond (ii) a black card (iii) not an ace.

(c) Prove that $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\tan x}}{\sqrt{\tan x} + \sqrt{\cot x}} dx = \frac{\pi}{4}$

- (d) If $\vec{a} = 5\hat{i} - \hat{j} - 3\hat{k}$ and $\vec{b} = \hat{i} + 3\hat{j} - 5\hat{k}$, show that $(\vec{a} - \vec{b})$ is orthogonal to $(\vec{a} + \vec{b})$.
 (e) Solve the following system of inequalities graphically :
 $2x + y \geq 2, x - y \leq 1, x + 2y \leq 8, x \geq 0$ and $y \geq 0$.

SECTION-C

Note :- All questions are compulsory. Each question carries 10 marks. Attempt any **two** parts from each question.

3. (a) Insert four numbers between 4 and 29 such that the resulting sequence is an A.P. (5)

- (b) Find the value of n so that $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$ may be the geometric mean between a and b , where $a \neq b$. (5)

- (c) Find the sum to n terms of the series whose n th term is $n(n+3)$. (5)

4. (a) Three coins are tossed. Describe two events which are mutually exclusive. (5)

- (b) Three coins are tossed once. What is the probability of getting "at least one head" ? (5)

- (c) If A and B are two events such that $P(A) = 0.5, P(B) = 0.3$ and $P(A \cap B) = 0.1$ then find $P(A \cup B)$. (5)

5. (a) Evaluate $\int \sin 3x \cos 4x dx$ (5)

- (b) Evaluate $\int \frac{dx}{e^{x-1}}$ (5)

- (c) Evaluate $\int x \sin x dx$ (5)

6. (a) Write the direction ratios of the vector $\vec{a} = \hat{i} + \hat{j} - 2\hat{k}$ and hence calculate its direction cosines. (5)

- (b) Find the unit vector in the direction of the vector $\vec{a} = 6\hat{i} - 2\hat{j} + 3\hat{k}$ and hence find a vector in the direction of \vec{a} whose magnitude is 7 units. (5)

- (c) Find the projection of the vector $\vec{a} = \hat{i} + 3\hat{j} + 7\hat{k}$ on the vector $\vec{b} = 7\hat{i} - \hat{j} + 8\hat{k}$. (5)

7. (a) Solve the equation $2x^2 - \sqrt{3}x + 1 = 0$ (5)
- (b) Solve the following inequality and show the graph of the solution on number line $5x - 11 \leq 7x - 5 < 9$ (5)
- (c) Solve the inequality $3x + 5y < 15$ graphically. (5)