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BT-201

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

PAPER ID : 154201

Roll No.

B. Tech.

(SEM. II) THEORY EXAMINATION, 2014-15

ENGINEERING MATHEMATICS - II

Time : **3** Hours] [Total Marks : **100**

Note : Attempt all questions.

SECTION A

1 Attempt all parts of the following : **10×2=20**

(a) Find the sum of odd integers from 1 to 99.

(b) Find the 20^{th} term of the G.P. $\frac{5}{2}, \frac{5}{4}, \frac{5}{8}, \ldots\ldots\ldots$

(c) Consider the experiment in which the coin is tossed repeatedly until a head comes up. Describe the sample space.

(d) A coin is tossed twice. What is the probability that atleast one tail occurs.

(e) Find the integral $\int \frac{1-\sin x}{\cos^2 x} dx$

(f) Find $\int \log x dx$

(g) Find the unit vector in the direction of the sum of the vectors $\bar{a} = 2\hat{i} + 2\hat{j} - 5\hat{k}$ and $\bar{b} = 2\hat{i} + \hat{j} + 3\hat{k}$.

(h) If $\bar{a} = 2\hat{i} + 3\hat{j} - 5\hat{k}$ and $\bar{b} = 3\hat{i} - \hat{j} - \hat{k}$ find $\bar{a} \cdot \bar{b}$.

(i) $x^2 + x + 1 = 0$.

(j) Solve : $\frac{5-2x}{3} \leq \frac{x}{6} - 5$.

SECTION B

2 Attempt any three parts of the following : **3×10=30**

(a) Find the sum of the following series up to n terms : 5+11+19+29+41+.....

(b) A committee of two persons is selected from two men and two women. What is the probability that the committee will have (a) no man (b) one man (c) two man.

(c) Find $\int_0^4 \left(x + e^{2x}\right) dx$ as the limit of a sum.

(d) Find a unit vector perpendicular to each of the vectors $\left(\bar{a} + \bar{b}\right)$ and $\left(\bar{a} - \bar{b}\right)$ where $\bar{a} = \hat{i} + \hat{j} + \hat{k}$, $\bar{b} = \hat{i} + 2\hat{j} + 3\hat{k}$

(e) Solve the following system of inequality graphically $3x + 4y \leq 60$, $x + 3y \leq 30$, $x \geq 0$, $y \geq 0$.

SECTION C

Note : Attempt any two parts from each question of this section. **(2×5)×5=50**

3 (a) Insert five numbers between 8 and 26 such that the resulting sequence is in A.P.

(b) How many terms of the G.P. $3, \frac{3}{2}, \frac{3}{4}, \ldots\ldots$ are needed to give the sum $\frac{3069}{512}$.

(c) Find a G.P. for which the sum of the first two terms is -4 and the fifth term is 4 times the third term.

4 (a) Find the probability that when a hand of 7 cards is drawn from a well shuttled deck of 52 cards is contains (i) all kings (ii) 3 kings (iii) at least 3 kings.

(b) A coin is tossed. If the outcome is head, a die is thrown. If the die shows up an even number, the die is thrown, again. What is the sample space for the experiment.

(c) A die has two faces each with number 1, three faces each with number '2' and one face with number 3. If the die is rolled once, determine (i) $P(2)$, (ii) $P(1 \, or \, 3)$, (iii) $P(not \, 3)$.

5 (a) Find $\int \sin^3 x \cos^2 x dx$

(b) Find $\int \frac{x+3}{x^2-2x-5} dx$

(c) Find $\int e^x \sin x dx$.

6 (a) Show that the points $A(2\hat{i}-\hat{j}+\hat{k})$, $B(\hat{i}-3\hat{j}-5\hat{k})$, $C(3\hat{i}-4\hat{j}-4\hat{k})$ are the vertices of a right angled triangle.

(b) Find $|\bar{a}-\bar{b}|$, if two vectors $\bar{a}$ and $\bar{b}$ are such that $|\bar{a}|=2$, $|\bar{b}|=2$ and $\bar{a},\bar{b}=4$.

(c) Find the unit vector perpendicular to each of the vector $\bar{a}+\bar{b}$ and $\bar{a}-\bar{b}$ where $\bar{a}=3\hat{i}+2\hat{j}+2\hat{k}$, $\bar{b}=\hat{i}+2\hat{j}-2\hat{k}$.

7 (a) Solve : $3(1-x)<2(x+4)$ and show the graph of the solution on the number line.

(b) Find all pairs of consecutive odd natural numbers, both of which are larger than 10 such that their sum is less than 40.

(c) Solve : $21x^2-28x+10=0$