Printed Pages : 4

BT-101

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

PAPER ID : 154101

Roll No.

B. Tech.

(SEM. I) (ODD SEM.) THEORY EXAMINATION, 2014-15

ENGINEERING MATHEMATICS - I

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

SECTION - A

1 Attempt **all** parts of this question. **2×10=20**

Each part carries **two** marks :

(a) Find the derivative of y = cosx. sinx with respect to x.

(b) Evalute $\lim_{x\to 4} \frac{4x+3}{x-2}$.

(c) State Mean Value theorem.

(d) Discuss the continuty of $f(x)=\frac{1}{x}$ such that $x \neq 0$.

(e) What is the rule for the calculating the integral of the product of two functions?

(f) Evaluate $\int \left(4e^{3x}+1\right) dx$.

(g) Define Order and Degree of a differential equation.

(h) Find the genral solution of $\frac{dy}{dx} = -4xy^z$.

(i) A box contains 1 red and 3 identical white balls. Two balls are drawn at random in succession without replacement. Write the sample space for this experiment.

(j) A die is thrown two times, find the sample space.

SECTION - B

2 Attempt any **three** parts of this question : **3×10=30**

(a) Find the derivative of $f(x)= x^2$ using first fundamental principle.

(b) Find the values of a and b such that the function defined by $f(x) = \begin{cases} 5, & if\ x \le 2 \\ ax+b, & if\ 2 < x < 10 \\ 21, & if\ x \ge 10 \end{cases}$ is a continuous function.

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

(d) Find the general solution of $\frac{dy}{dx} + (\sec x) y = \tan x$.

(e) A die is thrown, find the probability of events :

i. A prime number will appear.

ii. A number greater than or equal to 3 will appear.

iii. A number more than 6 will appear.

iv. A number less than 6 will appear.

v. A number less than or equal to one appear.

SECTION - C

Attempt any **two** parts from each question. **5×2×5=50**
All questions are compulsory.

3 (a) Evaluate $\lim_{x\to 0} \frac{\sin ax}{\sin bx}, a, b \neq 0$.

(b) Find the derivative of (x-1)(x-2) with respect to x

(c) If the function f(x) satisfies $\lim_{x\to 1} \frac{f(x)-2}{x^2-1} = \pi$, evaluate

$\lim_{x\to 1} f(x)$.

4 (a) Find the point of discontinuty of

$$f(x) = \begin{cases} \frac{|x|}{x}, & if \quad x \neq 0 \\ 0, & if \quad x = 0 \end{cases}$$

(b) Find derivative of $y = \sec\left(\tan\left(\sqrt{x}\right)\right)$ using chain rule.

(c) If $y = 5\cos x - 3\sin x$, prove that $\frac{d^2y}{dx^2} + y = 0$.

5 (a) Evaluate $\int \frac{1}{x^2 - 16} dx$ by partial function.

(b) Evaluate integral of tanx.

(c) Find $\int_0^{\pi/2} \cos^2 x \, dx$.

6 (a) Solve the differential equation $x^5 \frac{dy}{dx} = -y^5$.

(b) Find the general solution of the differential equation

$$x\frac{dy}{dx} + 2y = x^2 \left(x \neq 0\right).$$

(c) Find the differential equation representing the family of curves y= mx, where m is constant.

7 (a) A die is thrown up repeatedly until a six comes up. What is the sample space for this experiment ?

(b) A coin is tossed two times. What is the probability of getting :

i. Two heads

ii. One tail.

(c) A fair coin with 1 marked on one face and 6 on the other and a fair die are both tossed.
Find the probability that the sum of numbers that turn up is (i) 3 (ii) 12