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

Paper ID : 154111 Roll No. | | | | | | | | | | |

**B.Tech.**

**(SEM. I) THEORY EXAMINATION, 2015-16**

**ENGINEERING MATHEMATICS - I**

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

**SECTION-A**

**Note :** Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)

1. (a) Evaluate $\lim_{x\to 0} \frac{\sin 6x}{5x}$.

(b) Find the derivative of $\frac{1}{\tan x} + \frac{1}{\cot x}$.

(c) State lagrange's mean value theorem.

(d) Find the critical points of $f(x)=9x^2+12x+2$.

(e) Evaluate: $\int (1-x)\sqrt{x}\, dx$.

(f) Evaluate: $\int_0^{\frac{\pi}{2}} \cos^2 x\, dx$.

(g) Find the order and degree of the given differential equation $y''+2y'+\sin y=0$.

(h) Form the differential equation representing the family of curves y=mx, where m is the arbitrary constant.

(i) If 2/11 is the probability of an event, what is the probability of the event 'not A".

(j) If P(A)=7/13, P(B) and $P(P\cap B)=4/13$, find P(A/B).

## SECTION-B

**Note:** Attempt any **five** questions from this sections.

(10×5=50)

2. For the function f(x), given by $f(x)=\begin{cases} b-ax, & if\ x>1 \\ 4, & if\ x=1 \\ a+bx & if\ x<1 \end{cases}$

if $\lim_{x\to 1} f(x)=f(1)$, find the value of a and b.

3. If y=a sint, x=a (cost+logtan$\frac{t}{2}$) find $\frac{dy}{dx}$.

4. If y=3 cos(log x)+4 sine(log x), show that $x^2y_2+xy_1+y=0$.

5. Integrate : $e^x(\sin x+\cos x)$

6. Solve $x\frac{dy}{dx}+2y=x^2\log x$



7. solve $\sec^2 x\tan y\,dx+\sec^2 y\tan x\,dy=0$

8. Bag I contains 3 red and 4 black balls while another bag II contains 5 red and 6 black balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from bag II.

9. Evaluate $\lim_{x\to 2}\frac{x^5-32}{x^3-8}$

## SECTION-C

**Note:** Attempt any **two** questions from this section.

(15×2=30)

10. (a) Differentiate the functions $(\sin x)^x+\sin^{-1}\sqrt{x}$ with respect to x.

(b) Find the point at which the tangent to the curve $y=\sqrt{4x-3}-1$ has its slope 2/3.

11. (a) Integrate the function $\frac{(\log x)^2}{x}$.

(b) Solve $(x^3+x^2+x+1)\frac{dy}{dx}=2x^2+x; y=1$ when $x=0$.

(c) Find the integration, the area of the region bounded by curves, $y^2=4ax$ *and* $x^2=4ay$ .

12. (a) In class XI of a school 40% of the student study Mathematics and 30% study Biology. If a student is selected at random from the class, find the probability that he will be studying Mathematics or Biology.

(b) In a school, there are 1000 students, out of which 430 are girls. It is know that out of 430,10% of the girls study in class XII. What is the probability that a student chosen randomly studies in class XII given that the chosen student is a girl?

(c) Let X denote the no of hours you study during a randomly selected college day, the probability that X can take the value x, has the following form, where k some unknown constant:

$$P(X=x)=\begin{cases} 0.1, & \text{if } x=0 \\ kx & \text{if } x=1 \text{ or } x=2 \\ k(5-x), & \text{if } x=3 \text{ or } 4 \\ 0, & \text{otherwise} \end{cases}$$

Find the value of k and what is the probability that you study at least two hours? Exactly two hours? At most two hours?

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