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## APPLIED M ATHEM ATICS - II <br> 2 ${ }^{\text {nd }}$ Exam/Common/2354/ 2251/5422/ May'17

Duration: 3 Hours
SECTION - A
Q1. (A) Choose the correct answer:
M. Marks:75
$5 \times 1=0$
(i) If $D \neq 0$, then system has
(a) Infinite Solution
(b) Unique Solution
(c) Not a Solution
(d) None of the above
(ii) $\lim _{x \rightarrow 0} \frac{\sin x-x}{x}=$
(a) 1
(b) -1
(c) 0
(d) $\infty$
(iii) $\int_{0}^{1} \frac{1}{1+x^{2}} d x=$
(a) $\frac{\pi}{2}$
(b) $\frac{\pi}{4}$
(c) 1
(d) 0
(iv) The order of differential equation $\left(\frac{d^{4} y}{d x^{4}}\right)^{2}+3\left(\frac{d^{2} y}{d x^{2}}\right)^{4}+y=0$ is
(a) 4
(b) 2
(c) 8
(d) 1
(v) If $f(-x)=f(x)$ then the function is
(a) odd
(b) even
(c) both
(d) none
(B) State true or false.
i. $\int \log x d x=\frac{1}{x}$
ii. If $A=\left[\begin{array}{cc}\cos \alpha & -\sin \alpha \\ \sin \alpha & \cos \alpha\end{array}\right]$ then $|A|=1$
iii. The differential coefficient of a constant is one.
iv. Tossing of a coin is an event and the turning up of head and tail is a trial.
v. Median is a measure of central tendency.

## (C) Fill in the blanks.

## $5 \times 1=5$

i. Derivative of $x^{6}$ w.r.t $x^{3}$ is
ii. A matrix is said to be singular if its $\qquad$
iii. The square of $\qquad$ is called variance.
iv. Arithmetic mean of 10 terms is 7 . If each term is decreased by 3 , then the new mean is $\qquad$
v. Area bounded by the curve, $\mathrm{y}=4 x-x^{2}$ and $x$-axis and the ordinates $x=1$ and $x=3$ is $\qquad$

## SECTION - B

Q2. Attempt any six questions.
$6 \times 5=30$
(i) If $x^{y}=e^{x-y}$ Prove that $\frac{d y}{d x}=\frac{\log x}{(1+\log x)^{2}}$
(ii) Evaluate $\int x \cos ^{2} x d x$
(iii) Using Cramer's rule find the value of $x$ and $y$ for

$$
\begin{aligned}
& 6 x-4 y=-24 \\
& 5 x-11 y=-43
\end{aligned}
$$

(iv) If $y=\left(\tan ^{-1} x\right)^{2}$ Prove that $\left(1+x^{2}\right)^{2} y_{2}+2 x\left(1+x^{2}\right) y_{1}=2$
(v) Find the equation of tangent to the curve $y=9 x^{2}-12 x+9$ which is parallel to $x$ - axis

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(vi) Find the approximate area under the smooth curve whose ordinates are given below by the method of trapezoidal rule

| $x$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $y$ | 2 | 2.6 | 3 | 3.2 | 2.8 | 2 | 1.5 | 1 |

(vii) Evaluate $\int \frac{\cos x d x}{2 \cos x+\sin x}$
(viii) The students work independently on a problem. The probability that the first will solve it is $\frac{2}{3}$ and probability that the second one will solve is $\frac{2}{9}$. Find the probability that the problem will be solved.
(ix) Solve $\left(x y^{2}+x\right) d x / d y=y x^{2}-y$

## SECTION - C

Q3. Attempt any three questions.
(i) Solve the following equations by matrix method

$$
\begin{aligned}
& x+y-z=-2 \\
& 2 x-y-z=-7 \\
& 4 x+y+2 z=4
\end{aligned}
$$

(ii) Find the maximum and minimum values of the function

$$
2 x^{3}-15 x^{2}+36 x+10
$$

(iii) Calculate the standard deviation from the following data

| $x$ | 25 | 35 | 45 | 55 | 65 | 75 | 85 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| f | 3 | 61 | 132 | 153 | 140 | 51 | 2 |

(iv) Show that

$$
\int_{0}^{\pi / 4} \log (1+\tan \theta) d \theta=\frac{\pi}{8} \log 2
$$

(v) Solve

$$
x^{2} \frac{d y}{d x}=x^{2}-2 y^{2}+x y
$$

