DAE/IIA-2017/05 SECOND YEAR

(Common with Bio Medical, Computer, Food Computer Information, Electrical, Electronics, Food Processing & Preservation, Instrument, Critical Health Care and Telecommunication Technologies.)

MATH-233 APPLIED MATHEMATICS – II

PAPER 'A' (Subjective)

Time: 2:30 Hours **SECTION – I** **Marks: 60**

Q.1: Write short answer to any Eighteen (18) of the questions: - $18 \times 2 = 36$

1. If $f(x) = \log x$, prove that : $f(x^a) = af(x)$
2. If $f(x) = \dfrac{1}{1-x}$, then find $f[f(5)]$
3. Find: $\lim\limits_{x \to 0} \dfrac{\sqrt{1+x}-1}{x}$
4. Evaluate: $\lim\limits_{x \to 0} \dfrac{\sin x^\circ}{x}$.
5. Differentiate $x^{2/3}$ by ab-initio method.
6. If $y = \sqrt{\dfrac{a+x}{a-x}}$, find $\dfrac{dy}{dx}$.
7. Find $\dfrac{dy}{dx}$, If $\dfrac{1}{\sqrt{x}} + \dfrac{1}{\sqrt{y}} = \dfrac{1}{\sqrt{a}}$
8. Find $\dfrac{dy}{dx}$, If $ax^2 + by^2 + 2hxy = 0$
9. Differentiate $\dfrac{x^3}{1+x^3}$ w.r.t. x^3.
10. Differentiate $\sqrt{\sin\sqrt{x}}$ w.r.t. 'x'.
11. Find $\dfrac{dy}{dx}$ if $y = \dfrac{1+\tan x}{1-\tan x}$
12. Find $\dfrac{dy}{dx}$ if $x = a\sec\theta, y = b\tan\theta$.
13. Find the derivative of $\dfrac{\tan x}{x^2}$
14. Find the value of $\dfrac{d}{dx}\left(\cos^{-1}\left(1-2x^2\right)\right)$.
15. Find $\dfrac{d}{dx}\left(a^{x^2}\right)$.
16. Find $\dfrac{d}{dx}\left(e^{2x}\cos 2x\right)$.
17. Differentiate $\ell n \dfrac{x}{\sqrt{1+x^2}}$ w.r.t. 'x'.
18. Find the derivative of $x^y = y^x$
19. Using differential find an approximate value of $\sqrt[3]{124}$.
20. If $y = \cos 3x + \sin 3x$, show that : $y_2 + 9y = 0$
21. If $s = \log t$, find the velocity and acceleration at $t = 3\sec$.
22. The arithmetic mean of 7 values is 6 find the sum of values.
23. What are mutually exclusive events?
24. Find standard deviation of the values: $2, 4, 6, 8, 10$.
25. If two coins are tossed find the probability that only one head.
26. If two dice are rolled, what is probability of getting same number.
27. A card is drawn at random from a well shuffled pack of 52 cards. What is the probability of jack?

SECTION – II

Note: Attempt any three (03) questions. $3 \times 8 = 24$

Q.2. (a) If $f(x) = \log \frac{1-x}{1+x}$, Prove that : $f(x) + f(y) = f\left(\frac{x+y}{1+xy}\right)$

(b) Evaluate $\lim_{h \to 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$

Q.3. (a) Differentiate $(ax^2 + b)(cx^2 + d)$ w.r.t. 'x'.

(b) Find $\frac{dy}{dx}$ if $x = \frac{3at}{1+t^3}$, $y = \frac{3at^2}{1+t^3}$

Q.4. (a) Find the derivative of $(ax + b)\sqrt{1 + \sin 2x}$

(b) Differentiate $\sec^{-1}\left(\frac{x^2+1}{x^2-1}\right)$ w.r.t. 'x'.

Q.5. Prove that x^x has a minimum value at $x = \frac{1}{e}$.

Q.6. Calculate mean median, mode from the following frequency table:

Height in cm	No. of Boys
59	1
58	3
57	7
56	8
55	25
54	30
53	55
52	50
51	40
50	38
49	30
48	9
47	4

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