DAE/IIA-2018/05 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 $f(x) = 3x^2 - 7x + 4$, then find $f\left(\frac{1}{x}\right)$.
2. If $f(x) = 2x\sqrt{1-x^2}$, then find $f(\sin\theta)$.
3. If $f(x) = \frac{2x}{1+x^2}$, then find $f(\tan A)$.
4. If $f(x) = \frac{1}{1-x}$, then find $f[f(5)]$.
5. Differentiate with respect to x by ab-initio x^2.
6. Differentiate with respect to x by ab-initio x^3.
7. Differentiate $\frac{1}{x^2}$ w.r.t. 'x' by 1st principle.
8. If $y = \sqrt{x} - \frac{1}{\sqrt{x}}$, then show that: $2x\frac{dy}{dx} + y = 2\sqrt{x}$.
9. If $y = x^2 + \frac{1}{x^2}$, then find $\frac{dy}{dx}$.
10. Differentiate $\left(x + x^{-1}\right)^2$ w.r.t. 'x'.
11. Find the value of $\frac{d}{dx}\left(\frac{1-\cos x}{\sin x}\right)$
12. Differentiate $\cos^2 x$ w.r.t. $\sin^2 x$.
13. Find the derivative of $x\cot x$ w.r.t. 'x'.
14. Find $\frac{dy}{dx}$ if $x = a\sec\theta, y = b\tan\theta$.
15. Find the derivative of $\sin^{-1}\left(\frac{x}{a}\right)$.
16. Find the value of $\frac{d}{dx}\left(\sin^{-1}x + \cos^{-1}x\right)$.
17. Find the value of $\frac{d}{dx}\left(\sec^{-1}\left(\sqrt{x}\right)\right)$.
18. If $y = x^4 - 3x^2 + 4x - 1$, find $\frac{d^2y}{dx^2}$.
19. If $y = \ell n x$, find y_2.
20. If $y = \cos 3x + \sin 3x$, show that: $y_2 + 9y = 0$.
21. If $y = Ae^{mx} + Be^{-mx}$, show that: $y_2 - m^2 y = 0$.
22. Define statistics.
23. What is primary data?
24. What is primary data?
25. If a die is rolled once, what is the probability of getting an even number?
26. A card is drawn at random from a deck of 52 cards. Find the probability of getting a diamond.
27. A fair coin is tossed twice what is the probability that we get at least on head.

SECTION – II

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

Q.2. (a) Prove that: $f\left[f\left(x\right)\right] = x$, for the function $f\left(x\right) = \dfrac{x+1}{x-1}$.

(b) Evaluate $\lim\limits_{x \to a} \dfrac{x^n - a^n}{x^m - a^m}$.

Q.3. (a) Find $\dfrac{dy}{dx}$ of $x^5 + y^5 = 5a^2x^2y^2$.

(b) Find the derivative of $\dfrac{\sqrt{x^2+1} - \sqrt{x^2-1}}{\sqrt{x^2+1} + \sqrt{x^2-1}}$.

Q.4. (a) If $xy = \cos\left(x+y\right)$, show that $\dfrac{dy}{dx} + \dfrac{y + \sin\left(x+y\right)}{x + \sin\left(x+y\right)} = 0$

(b) If $y = \tan\left(p\tan^{-1}x\right)$, show that : $\left(1+x^2\right)\dfrac{dy}{dx} = p\left(1+y^2\right)$.

Q.5. (a) Use differentials to find the approximate value of $\sqrt[3]{124}$.

(b) Find the maximum and minimum (extreme) values of the function $\left(x-4\right)^2\left(x-2\right)$.

Q.6. (a) Calculate the median from the following table.

Class	Frequency
65 – 84	7
85 – 104	6
105 – 124	8
125 – 144	2
145 – 164	2
165 – 184	2
185 – 204	3

(b) Calculate S.D. from the following data.

Group	Frequency
20 – 24	1
25 – 29	4
30 – 34	8
35 – 39	11
40 – 44	15
45 – 49	9
50 – 54	2

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