DAE/IIA-2016/08 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. Find the value of $f\left(\frac{1}{x}\right)$, if $f(x) = \frac{1}{x^2+4}$.
2. Show that the function $f(x) = x^4 - 7x^2 + 7$ is an even function of x.
3. Evaluate: $\lim_{x \to -2} \frac{x^2}{x+1}$
4. Evaluate the limit: $\lim_{x \to 0} \frac{\sin^2 x}{x^3}$.
5. Find $\frac{dy}{dx}$ if $y = x^3 + x^2 + 2x + 3$
6. Find $\frac{dy}{dx}$ if $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
7. If $y = (3x^2 + 2x + 9)^7$, find $\frac{dy}{dx}$
8. Find the derivative of $(ax^2 + b)(cx^2 + d)$ w.r.t. 'x'.
9. Differentiate $\frac{x^2}{1+x^2}$ w.r.t. 'x'.
10. Find the derivative $\sin x^n$ w.r.t. 'x'.
11. Differentiate $\cot^3(3x+1)$.
12. Differentiate $\frac{\sin x}{1-\cos x}$ w.r.t. 'x'.
13. Find the derivative of $x^2 \tan x$.
14. Differentiate: $\tan^{-1}\left(\frac{1}{x^2}\right)$.
15. Differentiate: $\sin^{-1} x$ w.r.t. $\cos^{-1} x$.
16. Evaluate: $\lim_{x \to 2} \frac{3x+4}{x+3}$.
17. Differentiate $x\ell n x - x$ w.r.t. 'x'.
18. Find the derivative of $e^{-2\log x}$ w.r.t. 'x'.
19. Define increasing function.
20. Find mean of the data.

x	1	3	5	7	9
f	2	7	11	5	4

21. If displacement is $s = \sin 2t$, find, its acceleration.
22. Define length of a class interval.
23. Find the median of 4, 3, 5, 2, 11.
24. Find standard deviation of the values: $2, 4, 6, 8, 10$.
25. If a die is rolled once, what is the probability of getting an even number?
26. Differentiate $\sin(\ell n \tan x)$.
27. Find the value of $\frac{d}{dx}\left(\sin^{-1} x + \cos^{-1} x\right)$.

SECTION – II

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

Q.2: (a) Show that $\frac{e^x + 1}{e^x - 1}$ is an odd function of x.

(b) Evaluate $\lim_{\theta \to 0} \frac{1 - \cos\theta}{\theta^2}$

Q.3: (a) Differentiate $\sqrt{\frac{1+x}{1-x}}$ w.r.t. 'x'.

(b) Differentiate $\frac{x^2}{1+x^2}$ w.r.t. x^4

Q.4: (a) If $y = a\sin\theta + b\cos\theta$ show that $y^2 + \left(\frac{dy}{d\theta}\right)^2 = a^2 + b^2$

(b) Find $\frac{dy}{dx}$ for the $\ell n\left(\frac{e^x + 1}{e^x - 1}\right)$

Q.5: Discuss for relative maxima and minima of the function $y = x^3 - 3x^2 + 2$

Q.6: Calculate mode of following data:

Weekly Wages	No. of workers
0 – 4	5
4 – 8	15
8 – 12	22
12 – 16	28
16 – 20	45
20 – 24	25
24 – 28	13
28 – 32	6

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