Name: …… Admission No: ……

ABES Institute of Technology, Ghaziabad

Subject Code: BAS103

Subject Name: Engineering Mathematics-I

Year - 1st, Branch-All

1st ASSIGNMENT (ODD SEMESTER 2024-25)

[Time: 1 Hours] **[Total Marks: 10]**

COURSE OUTCOMES

CO	Statements
2	***Remember*** the concept of differentiation to ***find*** successive differentiation, Leibnitz Theorem, and ***create*** curve tracing, and ***find*** partial and total derivatives.

(SET-A)

SECTION-A

Q.1	Attempt one Questions. (1×1=1)	CO
a.	***Find*** $D^n \log(2x^2 + x^3)$.	2
b.	***Evaluate*** y_n if $y = e^{2x}\, cos^2 2x$.	2

SECTION-B

Q.2	Attempt two Questions. (2x3=6)	CO
a.	If $y = \sin\log(x^2 + 2x + 1)$, ***calculate*** the value of the relation $(1+x)^2 y_{n+2} + (2n+1)(1+x)y_{n+1} + (n^2+4)y_n$.	2
b.	If $y = a\cos(\log x) + b\sin(logx)$ then ***show*** that $x^2\, y_{n+2} + (2n+1)x\, y_{n+1} + (n^2+1)y_n = 0$.	2
c.	If $y = \left[x + \sqrt{1+x^2}\right]^m$ $then$ ***find*** $y_n(0)$ by Leibnitz Theorem.	2

SECTION-C

Q.3	Attempt one Questions. (1x3=3)	CO
a.	If $y = \tan^{-1}\left(\frac{x}{a}\right)$ then ***show*** that $y_n = (-1)^{n-1}\,(n-1)!\;\; a^{-n}\, sin^n\theta\, \sin n\theta$ where $\theta = \tan^{-1}\left(\frac{a}{x}\right)$.	2
b.	***Obtain*** nth order derivative y_n, for the function $y = sin^3 x\, cos^2 x$.	2

(SET-B)

SECTION-A

Q.1	Attempt one Questions. (1×1=1)	CO
a.	***Find*** $D^n \log(x^2 + 3x + 2)$.	2
b.	***Evaluate*** y_n if $y = e^x\, sin^2 2x$.	2

SECTION-B

Q.2	Attempt two Questions. (2x3=6)	CO
a.	If $\cos^{-1}\frac{y}{b} = \log\left(\frac{x}{m}\right)^m$, then ***apply*** Leibnitz Theorem to ***obtain*** the relation $x^2 y_{n+2} + (2n+1)x\, y_{n+1} + (n^2+m^2)y_n = 0$.	2
b.	If $y = (x^2-1)^n$ then ***prove*** that $(x^2-1)y_{n+2} + 2x\, y_{n+1} - n(n+1)y_n = 0$.	2
c.	If $y = \left[\log\left(x + \sqrt{1+x^2}\right)\right]^2$ $then$ ***find*** y_n at x=0 by Leibnitz Theorem.	2

SECTION-C

Q.3	Attempt one Questions. (1x3=3)	CO
a.	If $y = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$ then ***show*** that $y_n = 2\,(-1)^{n-1}\,(n-1)!\;\; sin^n\theta\, \sin n\theta$ where $\theta = \tan^{-1}\left(\frac{1}{x}\right)$.	2
b.	***Obtain*** nth order derivative y_n, for the function $y = sin^2 x\, cos^3 x$.	2