BK BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS

SENIOR Secondary Co-Ed DAY CUM BOYS' RESIDENTIAL SCHOOL

PERIODIC TEST-1 2024

APPLIED MATHEMATICS (241)

Class: XII Commerce — Duration: 1 Hour

Date: 03/08/24 — MARKING SCHEME — Max. Marks: 25

Q No.	Answer	Scheme
1	C	$2x^{2x}(1+\log x)$
2	A	$\frac{1}{t}$
3	B	$\frac{1}{\pi}$
4	A	$\left(\frac{1}{3}, \infty\right)$
5	A	
6	Y = $(x)^{\log x}$, log y = logx logx = $(\log x)^2$ $\frac{1}{y}\frac{dy}{dx} = 2\log x.\frac{1}{x}$ $\frac{dy}{dx}$ = y(2logx)/x $\frac{dy}{dx} = (x)^{\log x} 2\log x / x$	
7	logx +logy = $x^2 + y^2$ $1/x + 1/y\frac{dy}{dx} = 2x + 2\frac{dy}{dx}$ $2\frac{dy}{dx} - \frac{1}{y}\frac{dy}{dx} = \frac{1}{x} - 2x$ $\frac{dy}{dx}(2-\frac{1}{y}) = \frac{1}{x} - 2x$ $\frac{dy}{dx} = \frac{y(2x^2-1)}{x(1-2y^2)}$	
8	Let r be the radius and A cm^2 be the disturbed area at time t second. $A = \pi r^2$ $\frac{dr}{dt} = 3.5$ cm/sec, $\frac{dA}{dt} = \frac{d}{dt}\pi r^2 = 2\pi r\frac{dr}{dt} = 2\pi x 7.5 x 3.5 = 165 cm^2$	
9	Average cost = C(x) /x = $0.005x^2 - 0.02x + 30 + \frac{5000}{x}$ Marginal cost = $\frac{dC}{dx} = 0.015x^2 - 0.04x + 30$.	
10	$Y = (2x+3)^{x-5}$, log y = (x-5) log (2x+3) $\frac{1}{y}\frac{dy}{dx} = (x-5)\frac{2}{2x+3} + \log(2x+3).1$ $\frac{dy}{dx} = (2x+3)^{x-5}\left[\frac{2(x-5)}{2x+3} + \log(2x+3)\right]$	
11	$e^y\frac{d}{dx}(x+1) + (x+1)\frac{d}{dx}e^y = 0$ $e^y + (x+1)e^y\frac{dy}{dx} = 0$	

	$\frac{dy}{dx} = -e^{y}$
12	AC= C/x = $\frac{x}{90} + 2 + \frac{1000}{x}$ $\frac{d}{dx}A = \frac{1}{90} - \frac{1000}{x^2}$ =0 x= 3000 Now, $\frac{d^2 A}{dx^2}$ =$\frac{2000}{x^3} > 0$ when x=300 Therefore average cost is minimum when x=300 Minimum average cost = 26/3
13	P(x) = R(x) – C(x) = $\frac{597}{2}x - \frac{3}{4}x^2 - 50$ $\frac{dP}{dx} = \frac{597}{2} - \frac{6}{5}x$ =0 x= 199 $\frac{d^2 P}{dx^2} = -\frac{6}{4} < 0\ when\ x = 199$ Therefore maximum profit at x= 199 Maximum profit = 29650.75