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AAN-499

Seat No. _____

B. Sc. (Sem. V) Examination

October / November – 2016

Mathematics : ES MAT 31

(Business Mathematics - III)

Time : **3** Hours] [Total Marks : **50**

Instruction : Figures to the right indicate marks of the corresponding question.

1 Attempt any five : **25**

(a) If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + ...\infty}}}$; then prove that $\frac{dy}{dx} = \frac{\cos x}{2y-1}$.

(b) If $x\sqrt{1+y} + y\sqrt{1+x} = 0$; then prove that $\frac{dy}{dx} = -(1+x)^{-2}$.

(c) Differentiate $\frac{\left(x^2-1\right)^{4/5}(3x+5)^{2/7}e^{3x}}{(x-9)^{1/2}(2x-7)^4}$ with respect to x.

(d) If $u=\dfrac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}$ and $v=\cos^{-1}\left(x^2\right)$;

then prove that $\dfrac{du}{dv}=-\dfrac{1}{2}$.

(e) Show that $\dfrac{d}{dx}\left(\dfrac{\sqrt{x}+\sqrt{7}}{1-\sqrt{7x}}\right)=\dfrac{1}{2\sqrt{x}(1+x)}$.

(f) If $y=\cos^{-1}(3x)+\cot^{-1}\left(\sqrt{x}\right)+\log\left(\cos ec^{-1}x\right)$;

then find out $\dfrac{dy}{dx}$.

(g) Find : $\dfrac{d}{dx}\left(\dfrac{1}{\sqrt{x^2+a^2}+\sqrt{x^2+b^2}}\right)$.

(h) If $y=2\sqrt{x^3}\left(\sqrt{x}-1\right)\left(\sqrt{x}+2\right)$; then find out $\dfrac{dy}{dx}$.

2 Attempt any five : **25**

(1) $\displaystyle\int\frac{e^x(1+x)}{\sin^2\left(xe^x\right)}dx$

(2) $\displaystyle\int\frac{1}{4x^2-5x-3}dx$

(3) $\displaystyle\int\frac{1}{\sqrt{3-4x-9x^2}}dx$

(4) $\int \frac{2x+1}{4x^2-5x-3}\,dx$

(5) $\int \frac{1-x}{\sqrt{3-4x-9x^2}}\,dx$

(6) $\int \frac{1}{4\operatorname{cosec}^2 x+5}\,dx$

(7) $\int \frac{x^2-1}{x^4-x^2+1}\,dx$

(8) $\int x^2 \cos x\,dx$