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# KE-507 Seat No._____

## B. Sc. (Sem. V) Examination

**October/November – 2017**

## ES MAT - 31 : Business Mathematics - III

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

**Instructions :** (1) All questions are compulsory.

(2) Figure to the right indicates the marks of the corresponding question.

1 Attempt any Five. **25**

(1) Evaluate : $\frac{d}{dx}(\sin x)^{\sin x}$

(2) $\frac{d}{dx}\left(\tan^{-1}\frac{2x}{1-x^2}\right)$, *if* $x \neq \pm 1$

(3) If $x = a\left(\cos t + \log\tan\frac{t}{2}\right), y = a\sin t$ than prove that

$$y_2 = \frac{\sin t.\sec^4 t}{a}$$

(4) $y = \left(\cos^{-1} x\right)^2$ then prove that $\left(1-x^2\right)y_2 - xy_1 = 2$

(5) If $\sin y = x\sin(a+y)$ then prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

(6) If $x^y = e^{x-y}$ then prove that $\frac{dy}{dx} = \frac{\log x}{(\log x+1)^2}$

(7) $\frac{d}{dx}\left(\sqrt{\sin x^3}\right)=\frac{3}{2}\frac{x^2\cos x^3}{\sqrt{\sin x^3}}$

**2** Attempt any Five. **25**

(1) Evaluate $\int\frac{x^4+x^2+3}{2\left(x^2+1\right)}dx$.

(2) Evaluate $\int\sin^3 x.\cos^{10}x dx$.

(3) Evaluate $\int\frac{x+3}{x^2+6x+4}dx$.

(4) $\int\frac{\sin^2(\log x)}{x}dx=\frac{\log x}{2}-\frac{1}{4}\sin(2\log x)+c$.

(5) $\int\frac{e^x(1+x)}{\cos^2(xe^x)}dx=\tan(xe^x)+c$.

(6) $\int\frac{4x+1}{x^2+3x+2}dx=2\log\left|x^2+3x+2\right|=5\log\left|\frac{x+1}{x+2}\right|+c$.

(7) $\int\cos^4 x dx=\frac{3x}{8}+\frac{\sin 2x}{4}+\frac{1}{32}\sin 4x+c$.