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KT-5288/89 Seat No._____

B. Sc. (Sem. V) Examination

November / December - 2014

Mathematics

(1) SE : EC-103 - Business Mathematics - I

(Elective Course)

(2) ES-21 : Business Mathematics - III

Time : 2 Hours] [Total Marks : **50**

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(1) SE : EC-103 - Business Mathematics - I

(Elective Course)

Instructions : (1) There are **two** questions.
(2) Figures to the right indicate marks of the corresponding question.

1 Solve : L.P. problems : (any **three**) **30**

(a) Maximize $Z = 4x + 6y$

subject to the constraints $x, y \geq 0$;

$20x + 30y \leq 1050$; $x + y \leq 40$

(b) Maximize $Z = 0.75x + y$

subject to the constraints $x, y \geq 0$;

$x - y \geq 0$; $-0.5x + y \leq 1$

(c) Minimize $Z = 2000x + 1600y$

subject to the constraints $x, y \geq 0$;

$6x + 2y \geq 12$, $2x + 2y \geq 8$; $4x + 12y \geq 24$; $x \leq 7$, $y \leq 7$

(d) Minimize $Z = x - 10y$

subject to the constraints $x - 0.5y \geq 0$;

$x - 5y \geq -5$; $x, y \geq 0$.

2 Attempt any **two** : **20**

(1) Find the equations of regression lines if $\bar{x} = 30.4$, $\bar{y} = 26.5$; $\sigma_x = 6.4$, $\sigma_y = 8$, $r = 0.56$

(2) The two regression lines are $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$ and $\sigma_x^2 = 12$. Then find out x, y; σ_y^2 and r.

(3) Find coefficient of rank correlation :

x:	28	27	26	35	39	42	39	37	32	22
y:	40	42	38	49	40	50	38	44	45	36

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(2) ES-21 : Business Mathematics - III

1 (a) Attempt any **two** : **10**

(1) Evaluate $\frac{d}{dx}\left(\sin^3 x \cos^3 x\right)$

(2) Prove that

$$\frac{d}{dx}\cos^{-2}\left(\frac{1-x^2}{1+x^2}\right) = \frac{2}{1+x^2}, \quad \text{if } x > 0$$

$$= \frac{-2}{1+x^2}, \quad \text{if } x < 0$$

(3) If $x = a(\cos\theta + \theta\sin\theta)$, $y = a(\sin\theta - \theta\sin\theta)$ then find y_2.

(b) Attempt any **two** : **10**

(1) If $y=(\sin x)^x+\sin x^x$ then find $\frac{dy}{dx}$.

(2) If $y=\log(\log x)$ then prove that

$$\frac{d^2y}{dx^2}=\frac{-(1+\log x)}{(x\log x)^2}$$

(3) If $x\sqrt{1-y^2}+y\sqrt{1-x^2}=a$, where $|x|<1$, $|y|<1$ then find $\frac{dy}{dx}$.

(c) Attempt any **one** : **5**

(1) If $x=\sin t$, $y=\sin pt$ then prove that

$$(1-x^2)y_2-xy_1+p^2y=0$$

(2) If $y=\tan^{-1}\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}$, $|x|<1$ then find $\frac{dy}{dx}$.

2 (a) Evaluate the following integrals : (any **two**) **10**

(1) $\int \frac{\tan x}{\sec x + \tan x} dx$

(2) $\int \cos 2x \cos 4x \cos 6x \, dx$

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

(b) Evaluate the following integrals : (any **two**) **10**

(1) $\int \frac{1}{1+\sin x+\cos x} dx$

(2) $\int \sin^7 x \cos^3 x \, dx$

(3) $\int \frac{x^2}{\sqrt{x^6+2x^3+3}} dx$

(c) Evaluate : **5**

$\int \frac{4x+1}{x^2+3x+2} dx$

OR

$\int \frac{1}{x^4+1} dx$
