(20113) Roll No. .....

B. B. A.-I Sem.

NP-3040

B. B. A. Examination, Dec. 2012

Mathematical Foundation for Business Administration

(BBA-103)

(Old Course -I)

Time : Three Hours] *[Maximum Marks : 75*

Note : Attempt questions from all the Sections as per instructions.

Section-A

(Very Short Answer Questions)

Attempt all the *five* questions. Each question carries 3 marks. 3×5=15

1. Find the present value of an annuity of ₹ 400 per annum for 6 years at 5%.

2. Evaluate : $\lim_{x \to 0} \sin x . \log x$.

3. Test the following function for continuity :

$$f(x) = \begin{cases} x \sin(1/x) & \text{when } x \neq 0 \\ 0 & \text{when } x = 0 \end{cases}$$

4. Find :

$$\frac{dy}{dx}, \text{ if } y = (\cos x)^{(\cos x)^{(\cos x) \ldots \ldots \ldots \text{to } \infty}}.$$

5. Given :

$$A = \begin{bmatrix} 1 & 2 & -3 \\ 5 & 0 & 2 \\ 1 & -1 & 1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 3 & -1 & 2 \\ 4 & 2 & 5 \\ 2 & 0 & 3 \end{bmatrix}.$$

Find the matrix C such that $A + C = B$.

Section-B

(Short Answer Questions)

Attempt any *two* questions. Each question carries 7½ marks. 7½×2=15

6. Evaluate :

$$\begin{vmatrix} 1 & w & w^2 \\ w & w^2 & 1 \\ w^2 & 1 & w \end{vmatrix},$$

where w is one of the imaginary cube roots of unity.

7. Evaluate the following integrals :

(i) $\int_0^{\pi} \theta \sin^2\theta \cos\theta \, d\theta$.

(ii) $\int_0^{\pi/2} \sin^2 6\phi \cos^2 3\phi \, d\phi$.

8. (a) Evaluate :

$$\Delta^2 (3e^x).$$

(b) Show that :

$$\Delta \log f(x) = \log\left\{1 + \frac{\Delta f(x)}{f(x)}\right\}.$$

Section-C

(Detailed Answer Questions)

Attempt any *three* questions. Each question carries 15 marks. 15×3=45

9. (a) Find the differential coefficient of $(\sin^{-1}x)^{\log x}$.

(b) Evaluate :

$$\lim_{x \to a} \frac{x^m - a^m}{x - a}.$$

10. (a) If $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$, then show that :

$$A^k = \begin{bmatrix} 1+2k & -4k \\ k & 1-2k \end{bmatrix},$$

where k is any positive integer.

(b) Find the polynomial of the lowest possible degree which assumes the values 3, 12, 15, –21, where x has the values 3, 2, 1, –1 respectively.

11. (a) Discuss the continuity and discontinuity of the following function :

$$f(x) = \begin{cases} \dfrac{e^{1/x} - 1}{e^{1/x} + 1} & \text{when } x \neq 0 \\ 1 & \text{when } x = 0 \end{cases}$$

(b) Find the maximum value of $(\log x)/x$ in $0 < x < \infty$.

12. (a) Show that :

$$\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = 4a^2b^2c^2.$$

(b) Evaluate :

$$\begin{vmatrix} b+c & a+b & a \\ c+a & b+c & b \\ a+b & c+a & c \end{vmatrix}.$$

13. (a) Show that :

$$\int_0^{\pi/2} \frac{\sin^2 x}{(\sin x - \cos x)} dx = \frac{1}{\sqrt{2}} \log(\sqrt{2} + 1).$$

(b) Show that :

$$\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx = \pi / 4.$$