

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. $3 \times 5 = 15$

- Find the present value of an annuity of ₹ 400 per annum for 6 years at 5%.
- Evaluate : $\lim_{x \rightarrow 0} \sin x \cdot \log x$.

- Test the following function for continuity :

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

- Find :

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

- 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 $7\frac{1}{2}$ marks. $7\frac{1}{2} \times 2 = 15$

- 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.

(3)

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:

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

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.

(4)

(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:

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

(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:

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