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**B. Com. 3rd Semester (Hons.)
w.e.f. Academic Session 2015-16
Onwards (Current Scheme)
Examination – November, 2017**

BUSINESS MATHEMATICS

Paper : BCHN-301

Time : Three Hours

Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Section. Question No. 9 is compulsory.

SECTION - I

1. (a) If $A = \begin{bmatrix} 3 & 2 & 0 \\ 1 & 4 & 0 \\ 0 & 0 & 5 \end{bmatrix}$, show that :

$$A^2 - 7A + 10I = 0$$

(b) Prove that :

$$\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$$

2. (a) Solve :

$$2x + 3y + z = 9, 4x + y = 7, x - 3y - 7z = 6$$

(b) Find the inverse of the matrix

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 12 & -1 & 2 \end{bmatrix}$$
 by using elementary row

operations.

SECTION - II

3. (a) A sum of money invested at compound interest amounts to Rs. 2,200 in one year and to Rs. 2,662 in three years. Find the principal and the rate percent.

(ii) The population of a city was 40960 three years ago. If its present population is 49130, find the annual rate of growth of the population.

4. (a) A man decides to save Rs. 15,000 by making payments at the end of each month for two years in a security, paying interest at the rate of 4% p.a. converted monthly. What is the

- (b) Find the present value of Rs. 2,000 received after 10 years, if discount rate is 8%.

SECTION - III

5. (a) Differentiate the following functions w. r. t. x :
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(i) $\frac{\sqrt{a} - \sqrt{x}}{\sqrt{a} + \sqrt{x}}$

(ii) $\log \left(\frac{\sqrt{a+x} + \sqrt{a-x}}{\sqrt{a+x} - \sqrt{a-x}} \right)$

- (b) Differentiate the following functions w. r. t. x :

(i) $x^{\log x}$

(ii) $x^{\log x} + (x-3)^{1/2}, x > 3$

6. (a) Evaluate the following :

(i) $\int \frac{\sqrt{3 + \log x}}{x} dx$

(ii) $\int \frac{\log x}{x^2} dx$

$$(iii) \int \frac{7x^2 + 3x + 1}{x^2 + x} dx$$

(b) Evaluate :

$$(i) \int x^3 e^x dx$$

$$(ii) \int (2x + 3) \sqrt{1 - 9x} dx$$

$$(iii) \int (2x - 5) \sqrt{x^2 - 4x + 3} dx$$

SECTION - IV

7. An oil company requires 13000, 20000 and 15000 barrels of high grade, medium grade and low grade oil respectively. Refinery A produces 100, 300 and 200 barrels per day of high grade, medium grade and low grade oil respectively, while refinery B produces 200, 400 and 100 barrels per day of high grade, medium grade and low grade oil respectively. If refinery A cost Rs. 400 per day and refinery B cost Rs. 300 per day to operate, how many days should each be run to minimize costs while satisfying requirements.

8. (a) Using simplex method, solve the following L.P.P. :

$$\text{Maximize : } Z = 5x + 2y - 4z$$

$$x + 2y + 4z \leq 6,$$

$$3x + 2y \leq 5,$$

$$2x + y + 3z \leq 2,$$

$$x, y, z \geq 0,$$

- (b) In a class of 1000 students, 625 students pass in Mathematics and 525 pass in English. How many students pass in Mathematics only and how many students pass in English only?

(Compulsory Questions)

9. (a) Define finite set and infinite set.

(b) Write a short note on basic feasible solution.

(c) Evaluate :

$$\int (3x - 4)^{-1/2} dx$$

(d) Differentiate :

$$\frac{x^2 + 1}{x^3 + 1}$$

~~(e)~~ Write a ~~short~~ note on time value of money.

~~(f)~~ At ~~what~~ rate of simple interest will S. 1. Rs. ~~4250~~ be three fifth of it in 4 years ?

~~(g)~~ ~~(i)~~ $\begin{vmatrix} x-2 & -3 \\ 3x & 2x \end{vmatrix} = 3$, find the value of x.

~~(h)~~ Find the product AB, if defined when $A = \begin{bmatrix} 2 & 3 \\ 3 & 1 \end{bmatrix}$

and $B = \begin{bmatrix} 1 & 4 \\ -2 & -1 \end{bmatrix}$

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