UNIVERSITY OF NORTH BENGAL

B.Com. Honours 4th Semester Examination, 2020

CC9-COMMERCE

BUSINESS MATHEMATICS

Full Marks: 60

ASSIGNMENT

The figures in the margin indicate full marks.
All symbols are of usual significance.

Answer any *three* questions from the following 20×3 = 60

1. (a) A firm makes chairs and tables. Profit is Rs. 20 per chair and Rs. 30 per table. Both the products are processed on three machines M1, M2 and M3. The time required for each product in hours and total time available in hours per week on each machine are as follows: 15+5

Machine	Chair	Table	Available Time
M1	3	3	36
M2	5	2	50
M3	2	6	60

How should the manufacturer schedule his production for minimizing his profit? (Use Simplex Method)

(b) What do you mean by unbounded solution in the graphical method of LPP?

2. (a) Find the inverse of the matrix $\begin{bmatrix} 2 & 3 \\ 5 & -4 \end{bmatrix}$ and hence solve the system of equation $2x+3y=12$ and $5x-4y=7$. 7+7+6

(b) If $x^m y^n = (x+y)^{m+n}$, prove that $\frac{dy}{dx} = \frac{y}{x}$.

(c) Show that $f(x) = x^5 - 5x^4 + 5x^3 - 1$ is maximum at $x=1$ and minimum at $x=3$.

3. (a) Verify Euler's theorem for $f(x, y) = x^3 + 2y^3 - x^2y$. 7+7+6

(b) If $u = \dfrac{x^3 + y^3}{x + y}$, prove that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = 2u$.

(c) Integrate:

(i) $x(\log x)^2$

(ii) $\log(x^2 + 2x + 1)$

4. (a) Purchasing of NSC makes the investment double itself in 6 years. Find the rate of interest accrued; if compounded half-yearly. 7+7+6

(b) A sum of Rs. 50 is invested to 4 years compound interest at 5%, interest being paid quarterly. Find the effective rate of interest per annum.

(c) Find the area of the region bounded by the curves $y^2 = 6x$ and $x^2 = 6y$.

5. (a) A radio manufacturer finds that he can sell x radios per week of Rs. 'P' each, where $P = 2(100 - x/4)$, his cost of production of x radios per week is Rs. $(120x + x^2/2)$. Show that his profit is maximum when production is 40 radios per week. Find also his maximum profit per week. 10+10

(b) Show that

$$\begin{vmatrix} \frac{a^2+b^2}{c} & c & c \\ a & \frac{b^2+c^2}{a} & a \\ b & b & \frac{a^2+c^2}{b} \end{vmatrix} = 4abc$$

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