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F.Y.B.Com, Semester II, Semester End Examination – April 2018

COMMERCIAL ARITHMETIC

Duration: 2hours **Max. Marks: 80**

Instructions: 1) All question are compulsory (choice is internal)
2) Start each new question on a fresh page
3) Figures to the right indicate full marks
4) Use of non-programmable and non-scientific calculators are allowed

Q.1 Attempt the following: **(5 x 4=20)**

a) Find the distance between the points the pair of points$(7,-2)$ *and* $(-1,4)$.

b) Find $\frac{dy}{dx}$ if $y=(2x^2-3)(5x+1)$

c) Find $f(g(x))$ *and* $g(f(x))$ if $f(x)=3x-1$ and $g(x)=x^2+1$

d) Evaluate i) $\int x^2+x-e^x+3^x+\frac{2}{x}dx$

ii) $\int \frac{x-3}{x}dx$

e) The ages of madan and mukta are in the ratio of 9:4. Seven years hence, the ratio of their ages will be 5:3. Find their ages.

OR

Q.I Attempt the following: **(5 x 4=20)**

p) Show that the points (4,2), (7,5) *and* (9,7) are collinear.

q) Find $\frac{dy}{dx}$ if $y=\frac{4x^3-3x^2+1}{x}$

r) Find x if $f(x+1)=f(x+2)$ for $f(x)=x^2+3x-4$

s) Evaluate $\int_1^3\left(\frac{x^2+4x+3}{x+1}\right)dx$

t) The sum of two numbers is 40 and difference is 4. What is the ratio between the numbers?

Q.2 Attempt the following: **(5 x 4=20)**

a) Find the distance of $A(7,3)$ from a point on the X- axis whose abscissa is 11.

b) Find $\frac{dy}{dx}$ if $y=\log(3x^2+4x+e^x+5^x)$

c) If MR= 30 and elasticity of demand with respect to price is 3, find the price.

d) The marginal cost function of a firm is given by $MC=12x^3+18x^2+25$ where x is the output, find the average cost if the fixed cost is 500

e) A total profit of RS.3600 is to be distributed amongst A, B and C such thatA:B:: 5:4and B:C::8:9. What is C's share?

OR

Q.II Attempt the following: **(5 x 4=20)**

p) If B is the midpoint of segment AC find x where $A(6,-1)$, $B(1,3)$ *and* $C(x,7)$

q) Find $\frac{dy}{dx}$ if $i) y = 7x^5 - 4x^2 + 6$

$ii) y = 2x^3 + 5^x$

r) If the total cost function is given by $C = 4x^2 + 7x + 3$ find average cost and marginal cost when x= 4

s) The demand and supply functions of a commodity $p = 16 - 3x$ and $p = x^2 - 12$ respectively. Find the consumer's surplus at the equilibrium price.

t) If 5 people can complete a given work in 14 days, in how many days will 10 people complete the same work?

Q.3 Attempt the following: **(5 x 4=20)**

a) Discuss the continuity of the following function at $x = 4$

$$f(x) = \begin{cases} x^2 + x + 2 & ; 2 \le x \le 4 \\ 3x + 4 & ; 4 < x \le 6 \end{cases}$$

b) Rita spends 9% of her income on recreation. If her monthly income is $Rs.\,10{,}000$, find her expenditure on recreation per annum.

c) Find the co-ordinates of point P which divides line segment AB in the ratio 2: 3 internally where $A(4,-5)$ *and* $B(4,5)$.

d) Show that the function $f(x) = x^3 - 3x^2 + 4x + 7$ is always increasing.

e) Find the partial derivatives of the functions $f(x,y) = xe^y + ye^x + 9$ at the point (0,0).

OR

Q.III Attempt the following: **(5 x 4=20)**

p) Evaluate the following if they exist

i)$\lim_{x\to 2} \frac{x^3+x^2-12}{x^3-x^2-x-2}$ ii) $\lim_{x\to 2} \left[\frac{1}{x-2} - \frac{2}{x^2-2x}\right]$

q) The cost of sugar was Rs.112. It was increased to Rs.140. What is the percentage increase in the cost of sugar?

r) Using Slope show that $(8,3), (2,-1), (0,1)$*and* $(6,5)$are the vertices of a parallelogram.

s) Examine the following function for maximum and minimum $P = x^4 - 4x$

t) The demand function for a commodity is given by $D(p_1, p_2) = 5 + 2p_1 p_2 - p_1^3$ for two commodities p_1 and p_2 ,find the marginal demand at p_1=2 and p_2=6.

Q.4 Attempt the following: **(5 x 4=20)**

a) If $y = 6x^4 - 7x^2 + 12x - 4$ find $\frac{dy}{dx}, \frac{d^2y}{dx^2}, \frac{d^3y}{dx^3}$.

b) The sale price of 40 mobile phones is equal to the total printed price of 32 such phones. Find the rate of trade discount.

c) Find the equation of a line passing through$(-1,-2)$ and perpendicular to $3x + 8y = 12$

d) Evaluate i)$\int \frac{x^2-4x^3+6x+2}{x^2}\,dx.$

ii)$\int (x+3)(x-2))\,dx.$

e) Find the equation of a line passing through the points $A(3,2)$ *and* $B(6,5)$.

OR

Q.IV Attempt the following: **(5 x 4=20)**

p) Find $\frac{dy}{dx}$ if $y = \frac{x^3 \times 5^x}{x^2+2}$.

q) A purchaser paid $Rs.780000$on a car which cost $Rs.800000$. Find the rate percentage of discount.

r) Find the equation of line passing through (1,3) and parallel to a line having slope 6.

s) Evaluate i)$\int \frac{1}{4x+5} + e^{(8-3x)}\, dx.$

ii)$\int (x+3)^2\, dx$

t) A company manufactures two types of lamps A and B using two machines M_1 and M_2. Lamp A requires 2 *hours* at machine M_1 and 3 *hours* at machine M_2. Lamp B requires 4 *hours* at machine M_1 and 1 *hour* at machine M_2. The profit contributions from each lamp of type A is $Rs.30$ and that from each lamp of type B is $Rs.20$. The number of hours available per week on machine M_1 and M_2 are 40 and 50 hours respectively. Formulate the LPP to maximize the profit.