

F.Y.B.COM SEMESTER END EXAMINATION APRIL 2018 (REGULAR/REPEAT)

SUB: MATHEMATICAL TECHNIQUES – II (AS PER OLD SYLLABUS)

SEMESTER: II

CLASS: F.Y. B.COM

DURATION: 2HRS

MAX. MARKS: 80

- Instructions:** 1. All questions are compulsory however internal choice is available.  
2. Use of calculator is strictly forbidden.  
3. Figures to the right indicate marks allotted.  
4. There are 4 main questions each carrying 20 marks.  
5. You may answer randomly but every main question attempted should be answered serially.

**Q.1) Attempt the following:**

(4 x 5 = 20)

- a) Find the length of all sides of triangle PQR where P = (2, -3), Q = (5, 7) and R = (-2, 0).  
b) If A = {1, 2, 3, 4}, B = {0, 1, 2, ..., 20} and R is relation from A to B such that R = {(a, b) / a ∈ A, b ∈ B and aRb if a<sup>2</sup> = b}. State the type of correspondence. Is it a function? If yes, into or onto function?  
c) Find  $\frac{dy}{dx}$  for following functions: i)  $y = 2x^3 - 5x + 99$  ii)  $y = (x - 4)(x^3 + 7)$   
d) Find i)  $\int (x^{-4} - 3e^x) dx$  (ii)  $\int (2x - 4)(x^2 + 1) dx$

OR

**Q.1) Attempt the following:**

(4 x 5 = 20)

- p) Using distance formula check whether ABC is right-angled triangle or not; where A = (3, -3), B = (3, 3) and C = (0, 5).  
q) If  $f(x) = 7x - x^4 + 4e^x$ , then find f(0), f'(0) and f''(0).  
r) If  $f(x) = x^2$  and  $g(x) = 4x$ , then find (f o g)(x) and (g o f)(x).  
s) Integrate the following functions w.r.t x (i)  $4x - x^3 + 2$  (ii)  $(1 - 4x + 3x^2)/x$

**Q.2) Attempt the following:**

(4 x 5 = 20)

- a) If A = (-2, 3), B = (3, 1). Then find equation of line parallel to AB and passing through (1, -2).  
b) Find  $\lim_{x \rightarrow 1} \left( \frac{3x^2 + 4x - 7}{x^3 - 2x + 1} \right)$ .  
c) Find maximum value of the function  $f(x) = 200x - x^2 - 15$ .  
d) If  $z = 7x^2 - xy - y^5$ , find  $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y}$ .

OR

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

- p) Check whether the lines  $5x - 5y + 3 = 0$  and  $3y - 6x + 1 = 0$  are perpendicular to each other or not.
- q) Check whether the limit of  $f(x)$  exists at  $x = 4$ , where  $f(x) = \begin{cases} 2 - x^2, & x \leq 4 \\ x^2 - 16, & 4 < x \end{cases}$
- r) If  $f(x) = 5 + 3x - 3x^2$ , find the extreme value/s of  $f(x)$ .
- s) If  $u = 5xy^2 - 3x + 7y^3$ , find  $(y \frac{\partial u}{\partial x})(x \frac{\partial u}{\partial y})$ .

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

- a) Solve the following LPP by graphical method.

$$\text{Maximize } z = 10x + 3y$$

$$\text{subject to } x + 2y \leq 8$$

$$3x + y \leq 9$$

$$x \leq 2$$

$$x \geq 0, y \geq 0.$$

- b) Find  $\frac{d^2y}{dx^2}$  where  $y = \log(x) - 3x + 2x^5 - 1$ .
- c) The supply function is  $p = 3x^2 + 1$ . Find the producer's surplus at  $x = 2$ .
- d) Find the compound interest for the principal amount 1500 in 2 years at 5% compounded annually.

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

- p) Solve the following LPP by graphical method.

$$\text{Minimize } z = 6x + 7y$$

$$\text{subject to } 2x + 3y \geq 12$$

$$2x + y \leq 8$$

$$x \geq 0, y \geq 0.$$

- q) If  $f(x) = x - 3x^3 + e^x$ , then find  $f(-1)$  and  $f'(2)$ .
- r) If the demand function is  $p = 14x - 1$ . Find the consumer's surplus at  $x = 3$ .
- s) Mr X deposits ₹2000 for 1 year. What is the total amount at the end of year if interest is compounded half yearly?

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

- a) If A is (2, 4) and B is (5, -2), find mid-point of AB and slope of AB.
- b) Find average cost and marginal cost at  $x = 3$  if total cost function is  $C = 8 - 2x + 3x^2$ .
- c) Find  $\int_0^2 (x+3)^2 dx$ .

d) If Rs. 450 amounts to Rs. 570 at simple interest in four years, find the rate of interest.

OR

Q.IV) Attempt the following:

(4 x 5 = 20)

p) If the lines  $3x + 2y + 1 = 0$  and  $2kx + 3y - 5 = 0$  are parallel to each other then find the value of k.

q) If the total cost function is  $C = 4x + x^2 - 1$ , then find the marginal cost at  $x = 30$ .

r) Integrate the function  $f(x)$  between 0 and 1 where  $f(x) = \frac{x - 3 + 5x^4}{x^2}$ .

s) Find the simple interest on ₹ 5555 from January 01, 2015 to January 01, 2017 at 5% per annum.

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ALL THE BEST

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