

12.11.19 SECOND MID TERM TEST Time: 1½ Hrs  
 Std:XI (H,I) Business Mathematics Marks: 45  
 I. Choose the correct answer: 10x1=10

1.  $\sec^{-1} \frac{2}{3} + \operatorname{cosec}^{-1} \frac{2}{3} =$  \_\_\_\_\_  
 a)  $\frac{-\pi}{2}$       b)  $\frac{\pi}{2}$       c)  $\pi$       d)  $-\pi$
2. For what value of x,  $f(x) = \frac{x+2}{x-1}$  is not continuous?  
 a) -2      b) 2      c) 1      d) -1
3. If  $y = e^{8x}$  then  $\frac{d^2y}{dx^2}$  at  $x=0$  is \_\_\_\_\_.  
 a) 4      b) 8      c) 64      d) 16
4. The brokerage paid by a person on the sale of 400 shares of face value ₹100 at 1% brokerage \_\_\_\_\_.  
 a) ₹ 600      b) ₹500      c) ₹200      d) ₹400
5. If the dividend received from 10% of ₹25 shares is ₹2000, then the number of shares is \_\_\_\_\_.  
 a) 400      b) 800      c) 600      d) 1200
6. If  $f(x) = 2^x$  and  $g(x) = \frac{1}{2^x}$  then  $(fg)(x)$  is \_\_\_\_\_.  
 a) 1      b) 0      c)  $4^x$       d)  $\frac{1}{4^x}$
7. The value of  $\sin 15^\circ \cos 15^\circ$  is \_\_\_\_\_.  
 a) 1      b)  $\frac{1}{2}$       c)  $\frac{\sqrt{3}}{2}$       d)  $\frac{1}{4}$
8.  $\tan\left(\frac{\pi}{4} - x\right)$  is \_\_\_\_\_.  
 a)  $\left(\frac{1+\tan x}{1-\tan x}\right)$       b)  $\left(\frac{1-\tan x}{1+\tan x}\right)$       c)  $1-\tan x$       d)  $1+\tan x$
9. The present value of perpetual annuity of ₹2000 paid monthly at 10% compound interest is \_\_\_\_\_.  
 a) ₹2,40,000      b) ₹6,00,000      c) ₹ 20,40,000      d) ₹ 2,00,400
10. The part of the annual profit, which a share holder gets for his investment from the company is called \_\_\_\_\_.  
 a) Rate of dividend      b) Percentage of return  
 c) Dividend      d) No. of shares

II. Answer any 4 of the following: 4x2=8

11. Express as sum or difference of sine or cosine  
 i)  $\cos \frac{7A}{3} \sin \frac{5A}{3}$

12. Evaluate  $\lim_{n \rightarrow \infty} \frac{\sum n^2}{n^3}$
13. Which is better investment?  
 7% of ₹100 shares ₹120 (or) 8% of ₹100 shares at ₹135.
14. Differentiate the following with respect to 'x': i)  $x^x$
15. Find  $\sin 105^\circ + \cos 105^\circ$
- III. Answer any 4 of the following: 4x3=12
16. Prove that  $\tan 4A \tan 3A \tan A + \tan 3A + \tan A - \tan 4A = 0$
17. If  $y = \cos mx + b \sin mx$ , then show that  $y^2 + m^2 y = 0$
18. A person deposits ₹4,000 at the end of every month from his salary towards his contributory pension scheme. The same amount is credited by his employer also. If 8% rate of compound interest is paid, then find the maturity amount at the end of 20 years of service.  $[(1.0067)^{240} = 3.3266]$
19. If  $f(x) = \frac{x+1}{x-1}$ , then prove that  $f(f(x)) = x$
20. A man buys 400 of ₹10 shares at a premium of ₹2.50 on each share. If the rate of dividend is 12%, then find  
 (i) his investment      ii) annual dividend received by him  
 (iii) Rate of interest received by him on his money.
- IV. Answer any 3 of the following: 3x5=15
21. a) Prove that  $(1+\tan A)(1+\tan B) = 2$  if  $A+B = 45^\circ$  and deduce to find the value  $\tan 22\frac{1}{2}^\circ$   
 (or)  
 b) Show that  $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$
22. a) Evaluate:  $\lim_{x \rightarrow a} \frac{x^{\frac{5}{8}} - a^{\frac{5}{8}}}{x^{\frac{2}{3}} - a^{\frac{2}{3}}}$  (or)  
 b) Differentiate  $\sqrt{\frac{(x-3)(x^2+4)}{3x^2+4x+5}}$
23. a) A person has taken a loan of ₹7,00,000 at 16% rate of interest from a finance company. If the repayment period is of 15 years then find the installment he has to pay at the beginning of each month.  $[(1.0133)^{180} = 9.772]$   
 (or)  
 b) Find the present value of ₹2,000 per annum for 14 years at the rate of interest of 10% per annum.  $((1.1)^{-4} = 0.2632)$ .

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## COMMON SECOND MID-TERM TEST - 2019

Standard XI

Reg.No.:

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Time: 1.30 hours.

BUSINESS MATHS AND STATISTICS

Marks: 45

## Part - A

## I. Choose the correct answer:

10 x 1 = 10

- If the demand function is said to be inelastic, then
  - $|\eta_d| > 1$
  - $|\eta_d| = 1$
  - $|\eta_d| < 1$
  - $|\eta_d| = 0$
- If demand and the cost function of a firm are  $P = 2 - x$  and  $C = -2x^2 + 2x + 7$  then its profit function is
  - $x^2 + 7$
  - $x^2 - 7$
  - $-x^2 + 7$
  - $-x^2 - 7$
- If  $f(x, y)$  is a homogeneous function of degree  $(n-1)$ , then  $x \frac{\partial f}{\partial x} + y \frac{\partial f}{\partial y}$  is equal to
  - $(n-1)f$
  - $n(n-1)f$
  - $nf$
  - $f$
- The demand function is always
  - increasing function
  - decreasing function
  - non-decreasing function
  - undefined function
- The maximum value of  $f(x) = \cos x$  is
  - $\frac{1}{2}$
  - $-\frac{1}{2}$
  - 1
  - $\frac{\sqrt{3}}{2}$
- The dividend received on 200 shares of face value Rs. 100 at 8% dividend value is
  - 1600
  - 1000
  - 1500
  - 800
- Market price of one share of face value 100 available at a discount of  $9\frac{1}{2}\%$  with brokerage  $\frac{1}{2}\%$  is
  - Rs. 89
  - Rs. 90
  - Rs. 91
  - Rs. 95
- If the dividend received from 20% of Rs. 20 shares is Rs. 2000. Then the number of shares is
  - 250
  - 500
  - 750
  - 1000
- The income on 7% stock at 80 is
  - 9%
  - 8.75%
  - 8%
  - 7%
- The brokerage paid by a person on this sale of 400 shares of face value Rs. 100 at 1% brokerage
  - Rs. 600
  - Rs. 500
  - Rs. 200
  - Rs. 400

## Part - B

- II. Answer any 4 questions: (Ques.No.16 is compulsory)
- For the function  $y = x^3 + 19$ , find the values of  $x$  when its marginal value is equal to 27
  - If  $u = e^{xy}$  then find  $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y}$
  - For the given demand function  $P = 40 - x$ , find the value of the output  $\eta_d = 1$
  - A limited company wants to create a fund to help their employees in critical circumstances. The estimated expenses per month is Rs. 18,000. Find the amount to be deposited by the company if the rate of compound interest is 15%.
  - Find the number of shares which will give an annual income of Rs. 3,600 from 12% stock of face value Rs. 100
  - If the demand law is given by  $p = 10e^{-\frac{x}{2}}$  then find the elasticity of demand.

(2)

XI BusMaths &amp; Statistics

## Part - C

## III. Answer any 4 questions: (Ques.No.22 is compulsory)

4 x 3 = 12

- Show that the function  $f(x) = x^3 - 3x^2 + 4x$ ,  $x \in \mathbb{R}$ , is strictly increasing function on  $\mathbb{R}$ .
- Find the stationary value and the stationary points  $f(x) = x^2 + 2x - 5$
- Find the elasticity of supply for the supply function  $x = 2p^2 + 5$  when  $p = 3$
- Find the amount of an ordinary annuity of Rs. 3,200 per annum for 12 years at the rate of interest of 10% per year.  $[(1.1)^{12} = 3.3184]$
- How much will be required to buy 125 of Rs. 25 shares at a discount of Rs. 7
- Let  $u = x \cos y + y \cos x$ . Verify  $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$

## Part - D

## IV. Answer all the questions:

3 x 5 = 15

- A firm produces  $x$  tonnes of output at a total cost of  $C(x) = \frac{1}{10}x^3 - 4x^2 - 20x + 7$ . Find the (i) average cost (ii) average variable cost (iii) average fixed cost (iv) marginal cost and (v) marginal average cost  
(or)
- A man invest Rs. 96,000 on Rs. 100 shares at Rs. 80. If the company pays him 18% dividend, find
  - the number of shares he buys
  - his total dividend
  - his percentage return on the shares.
- If Marginal Revenue (MR), Average Revenue (AR) and Elasticity of demand  $[\eta_d]$  then prove that  $\eta_c = \frac{AR}{AR - MR}$   
(or)
- What is the amount of perpetual annuity of Rs. 50 at 5% compound interest per year?
- A dealer has to supply his customer with 400 units of a product per every week. The dealer gets the product from the manufacturer at a cost of Rs. 50 per unit. The cost of ordering from the manufacturers is Rs. 75 per order. The cost of holding inventory is 7.5% per year of the product cost. Find (i) EOQ (ii) Total optimum cost  
(or)
- The demand for a commodity A is  $q = 80 - p_1^2 + 5p_2 - p_1p_2$ . Find the partial elasticities  $\frac{E_q}{E_{p_1}}$  and  $\frac{E_q}{E_{p_2}}$  when  $p_1 = 2$ ,  $p_2 = 1$ .

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