

**2<sup>nd</sup> SEMESTER 2017-2018**  
**SUB: MATHEMATICS & STATISTICS**

STD: XI (Com.)

MAX MARKS: 40

DATE: 9/4/18

TIME:

Note:

1. All questions are compulsory.
  2. Figures to the right indicate full marks.
  3. Answers to the two sections should be written in different answer book.
  4. Answer to every question must be written on a new page.
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**SECTION I**

**1. Attempt any SIX of the following: 12**

1. If  $\sin x + \sin^2 x = 1$ , then show that  $\cos^2 x + \cos^4 x = 1$
2. Write the conjugate of the complex number
  - a)  $-5 - 7i$
  - b)  $-5$
3. Find the modulus and amplitude of the complex number  $7-5i$
4. Express the angle
  - a)  $75^\circ$  in radian measure.
  - b)  $-\frac{9\pi}{2}$  in degree measure
5. Find the value of x if
$$\begin{vmatrix} 2 & x \\ -4 & 3 \end{vmatrix} = 0$$
6. Evaluate  $\lim_{x \rightarrow 3} \frac{6+x - 4-x}{x - 3}$
7. Differentiate the function  $y = x \sin x$  w.r.t x
8. Differentiate  $7x + x^2 - 9x + 7$  w.r.t x

**2(A). Attempt any TWO of the following : 6**

1. Find  $f'(x)$ 
$$y = \frac{1 - \cos 2x}{1 + \cos 2x}$$
2. Evaluate :  $\lim_{x \rightarrow 0} \frac{15^x - 3^x - 5^x + 1}{x^2}$
3. Prove the following
$$\frac{\cos^2 \theta + \sin^2 \theta}{\cos^2 \theta - \sin^2 \theta} - \frac{\cos^2 \theta - \sin^2 \theta}{\cos^2 \theta + \sin^2 \theta} = \tan 2\theta$$

**2(B). Attempt any TWO of the following :**

**8**

1. Prove that

$$\tan\left(\frac{\theta + \phi}{2}\right) = \frac{1 + \sin\phi}{1 - \sin\theta}$$

2. Solve x , y and z if

$$\sin x + \cos y + \tan z = 3$$

$$2 \sin x + \cos y + \tan z = 4$$

$$3 \sin x + 4 \cos y - 2 \tan z = 5$$

$$\text{where } 0 < x, y, z < 90^\circ$$

3. Find k if the lines represented by equations  $3x + y = 2$ ;  $kx + 2y = 3$  and  $2x - y = -3$  are concurrent. Hence find the point of concurrency.

**3(A). Attempt any TWO of the following :**

**6**

1. The total cost of producing x items is given by  $C = x^2 + 4x + 4$  Find the average cost and the marginal cost. What is the marginal cost when  $x = 7$ ?

2. Differentiate the function  $y = \frac{1 + \log x}{x}$  w.r.t x

3. Find the possible values of k if

$$\lim_{x \rightarrow k} \frac{x^8 - k^8}{x - k} = 8$$

$$\text{and hence evaluate } \lim_{x \rightarrow 3} \frac{x^3 - 27}{x - 3}$$

**3(B). Attempt any TWO of the following :**

**8**

1. The sum of three numbers is 6. Thrice the third number when added to the first number gives 7. On adding the sum of second and third number to three times the first number we get 12. Find the three numbers using determinants.

2. The perimeter of a sector of a circle of area  $64\pi$  sqcm is 56cms. Find the area of sector.

3. Differentiate the function  $\frac{x \sin x}{1 + \tan x}$  w.r.t x