

# GULF SAHODAYA(SAUDI CHAPTER) EXAMINATION 2016

## MATHEMATICS

### SET A

M.Marks: 100

Time: 3 hrs.

Class : XI

Total No. of pages- 3

#### General Instructions

- (i) All questions are compulsory.
  - (ii) Section A ,Question numbers 1 to 6 carry 1 mark each. Section B, question numbers 7 to 19 carry 4 marks each. Section C, question numbers 20 to 26 carry 6 marks each.
  - (iii) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
  - (iv) There is no overall choice. However, internal choice has been provided in four questions of 4 marks each and two questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.
  - (v) Use of calculators is not permitted.
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#### SECTION – A

1. Write the component statements of the following :  
“All prime numbers are either even or odd”
2. Write the negation of the statement “ All birds have wings ”
3. Write the contrapositive of the following statement:  
“If you are taking part in violent processions then you are not true Indian”
4. Describe the set  $\{-1, 1\}$  in the set builder form.
5. Evaluate  $\lim_{x \rightarrow 0} \frac{\log(1 + x^2)}{\sin^2 x}$
6. Find the value of  $\sin 75^\circ$ .

#### SECTION – B

7. Prove that  $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{16}$
8. If  $A \subset B$ , then prove that (i)  $A \cup B = B$  and (ii)  $A \cap B = A$
9. Find the domain and range of the following functions defined on the set of real numbers; (i)  $f(x) = \sqrt{x - 1}$  (ii)  $g(x) = e^x$

10. Find the modulus and argument of  $\frac{1+i}{1-i} - \frac{1-i}{1+i}$

OR

Find the square root of  $4i - 3$ .

11. Using the principle of mathematical induction, prove that  $3^{2n+2} - 8n - 9$  is divisible by 8,  $\forall n \in \mathbb{N}$

OR

Using principle of mathematical induction, prove that

$$1 \cdot 3 + 2 \cdot 3^2 + 3 \cdot 3^3 + \dots + n \cdot 3^n = \frac{(2n-1)3^{n+1} + 3}{4}, \forall n \in \mathbb{N}$$

12. How many numbers greater than 2000000 can be formed by using the digits 2, 3, 1, 3, 5, 3, 5?

13. How many words with or without meaning, each of three vowels and 2 consonants can be formed from the letters of the word INVOLUTE?

14. Find the sum to  $n$  terms of the series:  $5 + 11 + 19 + 29 + 41 + \dots$

OR

If  $a\left(\frac{1}{b} + \frac{1}{c}\right)$ ,  $b\left(\frac{1}{c} + \frac{1}{a}\right)$ ,  $c\left(\frac{1}{a} + \frac{1}{b}\right)$  are in A.P, prove that  $a, b, c$  are in A.P.

15. Find the sum of the sequence  $0.7, 0.77, 0.777, \dots$  to  $n$  terms.

16. In any triangle ABC, prove that;

$$a \sin(B - C) + b \sin(C - A) + c \sin(A - B) = 0.$$

OR

A tree stands vertically on a hill side which makes an angle of  $15^\circ$  with the horizontal. From a point on the ground 35m down the hill from the base of the tree, the angle of elevation of the top of the tree is  $60^\circ$ . Find the height of the tree.

17. Find the distance of the line  $4x - y = 0$  from the point  $(4, 1)$  measured parallel to the line  $x + y = 10$ .

18. Find the coordinates of the point which divides the line segment joining the points  $(1, -2, 3)$  and  $(3, 4, -5)$  in the ratio 2 : 3 (i) internally and (ii) externally.

SECTION – C

20. If  $A$  and  $B$  are two events such that  $P(A) = 0.54$ ,  $P(B) = 0.69$  and  $P(A \cap B) = 0.35$ , Find (i)  $P(A \cup B)$  (ii)  $P(A^1 \cap B^1)$  (iii)  $P(A \cap B^1)$  and (iv)  $P(B \cap A^1)$

21. If  $a_1, a_2, a_3, a_4$  are the coefficients of any four consecutive terms in the

expansion of  $(1 + x)^n$ , prove that  $\frac{a_1}{a_1 + a_2} + \frac{a_3}{a_3 + a_4} = \frac{2a_2}{a_2 + a_3}$

OR

Find  $n$ , if the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of  $(\sqrt[4]{2} + \frac{1}{\sqrt[4]{3}})^n$  is  $\sqrt{6} : 1$ .

22. Find the equation of the circle passing through the points  $(4, 1)$  and  $(6, 5)$  and whose centre is on the line  $4x + y = 16$ .

OR

Find the equation of the ellipse, with major axis along x-axis and passing through the points  $(4, 3)$  and  $(-1, 4)$ .

23. Solve the following system of inequalities graphically;

$$x + 2y \leq 10, \quad x + y \geq 1, \quad x - y \leq 0, \quad x \geq 0, \quad y \geq 0.$$

24. Prove that  $\sin x + \sin 3x + \sin 5x + \sin 7x = 4 \cos x \cdot \cos 2x \cdot \sin 4x$ .

25. Find mean, variance and standard deviation for the following distribution:

Classes	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90-100
Frequency	3	7	12	15	8	3	2

26. A soft drink company produces three brands of soft drinks  $A$ ,  $B$  and  $C$ . A market research group conducted a survey of 100 students and reported that 40 students buy brand  $B$ , 35 buy brand  $C$  and 10 buy only brand  $A$ , 15 students buy brands  $B$  and  $C$ , 10 students buy brands  $A$  and  $B$ , 5 students buy brands  $A$  and  $C$  but not brand  $B$ , 10 students buy brands  $B$  and  $C$  but not brand  $A$ . How many students (i) buy at least two brands of soft drinks? (ii) buy all three brands? (iii) buy no soft drinks at all? (iv) As a student what measures you take to spread awareness against soft drinks?

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**SECTION – A**

1. Write the negation of the statement “All complex numbers are real numbers”
2. Write the contrapositive of the following statement:  
“If you are taking part in violent processions then you are not true Indian”
3. Write the component statements of the following :  
“There is something wrong with the bulb or with the wiring”
4. Evaluate  $\lim_{x \rightarrow 1} \frac{\log x}{x - 1}$
5. Find the value of  $\cos 75^\circ$ .
6. Describe the set  $\{-1, 1\}$  in the set builder form.

**SECTION – B**

7. If  $A \subset B$ , then prove that (i)  $A \cup B = B$  and (ii)  $A \cap B = A$
8. Find the domain and range of the following functions defined on the set of real numbers; (i)  $f(x) = \sqrt{x - 1}$  (ii)  $g(x) = e^x$
9. Find the modulus and argument of  $\frac{1+i}{1-i} - \frac{1-i}{1+i}$

OR

10. Using the principle of mathematical induction,  
prove that  $3^{2n+2} - 8n - 9$  is divisible by 8,  $\forall n \in \mathbb{N}$

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15. Find the sum to  $n$  terms of the series :  $5 + 11 + 19 + 29 + 41 + \dots$

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If  $a \left( \frac{1}{b} + \frac{1}{c} \right), b \left( \frac{1}{c} + \frac{1}{a} \right), c \left( \frac{1}{a} + \frac{1}{b} \right)$  are in A.P, prove that  $a, b, c$  are in A.P.

16. Find the sum of the sequence  $0.6, 0.66, 0.666, \dots$  to  $n$  terms.

17. Find the derivative of  $f(x) = \cos x$  with respect to  $x$  from the first principle.

18. Find the distance of the line  $4x - y = 0$  from the point  $(4, 1)$  measured parallel to the line  $x + y = 10$ .

SECTION – C

20. Solve the following system of inequalities graphically;  
 $x + 2y \leq 10$ ,  $x + y \geq 1$ ,  $x - y \leq 0$ ,  $x \geq 0$ ,  $y \geq 0$ .

21. Prove that  $\sin x + \sin 3x + \sin 5x + \sin 7x = 4 \cos x \cdot \cos 2x \cdot \sin 4x$ .

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