GULF SAHODAYA(SAUDI CHAPTER) EXAMINATION 2018

MATHEMATICS

SET A

Grade :XIM.Marks: 100

Time: 3 hrs. *Total No. of pages- 3*

General Instructions :

(i) All questions are compulsory .

(ii) The question paper consists of 29 questions divided into four sections A, B, C and D. Section A comprises of 4 questions of 1 mark each, Section B comprises of 8 questions of 2 marks each, Section C comprises of 11 questions of 4 marks each and Section D comprises of 6 questions of 6 marks each

(iii) All questions in section A are to be answered as per the exact requirement of the question.

(iv) There is no overall choice. However, internal choice has been provided in 3 questions of four marks each and 3 questionsof 6 marks each. You have to attempt only one of the alternatives in all such questions.

SECTION – A

1. Find the coefficient of x^6y^3 in the expansion of $(x + 2y)^9$.

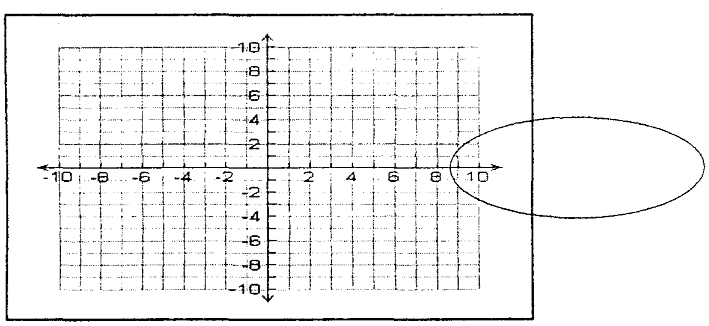
2. Find $k$for which the line $(k - 3)x - (4 - k^2)y + 6 - 7k + k^2 = 0$ passes through the origin.

3. Name the octants in which the points (4, – 2, 3) and (– 4 , 2, – 5) lie.

4. Write the negation of the following statement ;
"There does not exist a quadrilateral which has all its sides equal"

SECTION – B

5. In the following graph, is it a function in x ? Justify your answer.



6. Prove that $\sin\left(\frac{\pi}{3}+\frac{5\pi}{8}\right)\sin\left(\frac{\pi}{6}+\frac{5\pi}{8}\right) + \cos\left(\frac{\pi}{3}+\frac{5\pi}{8}\right)\cos\left(\frac{\pi}{6}+\frac{5\pi}{8}\right) = \frac{\sqrt{3}}{2}$.

7. Convert the complex number $-4 + i\,4\sqrt{3}$ into polar form.

8. Find the sum to n terms of the sequence ;1, –1, 1, –1, 1, –1, 1, –1, ...

9. Check whether A(2, 1, 3), B(4, 2, 5) and C(6, 3, 7) are the vertices of an isosceles triangle.

10.Evaluate: $\lim_{x \to 0} \frac{\sqrt{1+x}-1}{x}$.

11.Write the component statements of the following compound statement and check whether they are true or false.
" *A square is a quadrilateral and its four sides equal.* "

12.A coin is tossed two times, and a person win ₹1 for each head and lose ₹2 for each tail that turns up. How many different amounts of money he can have and what is the probability of having each of these amounts?

SECTION – C

13.Let A and B be sets. If $A \cap X = B \cap X$ and $A \cup X = B \cup X$ for some set X, then show that A = B.

14.If $A = \{x : x^2 - 4x + 3 = 0, x \in R\}$, $B = \{x : x^2 - x - 6 = 0, x \in R\}$, and $C = \{x : x^3 - 4x = 0, x \in R\}$, Find (i) $A \times B$ (ii) $A \times C$

OR

If $y = f(x) = \frac{ax - b}{cx - a}$, then prove that $f(y) = x$, $x, y \neq \frac{a}{c}$.

15. Solve : $2\cos^2 x + 3\sin x = 0$.

OR

Prove that, $\tan 3x . \tan 2x . \tan x = \tan 3x - \tan 2x - \tan x$.

16.Prove the following by the principle of mathematical induction for all $n \in N$:

$$1.2.3 + 2.3.4 + 3.4.5 + \ldots + n(n+1)(n+2) = \frac{n(n+1)(n+2)(n+3)}{4}.$$

17.Find the square roots of $-7 - 24i$.

18.At an election, a voter may vote for any number of candidates not greater than the number to be elected. There are 10 candidates and 4 are to be elected. If a voter votes for at least one candidate, then in how many number of ways he can vote? Do you think that elections should be abolished as it is a waste of money ?

19.Between 1 and 31, m numbers have been inserted in such a way that the resulting sequence is an A.P and ratio of 7^{th} and $(m-1)^{th}$ numbers is 5 : 9. Find the value of m.

20.Find the sum of first n terms of the following series : $3 + 7 + 13 + 21 + 31 + \ldots\ldots$

21.Find the derivative of $\sin x$ from first principle.

22. A line perpendicular to the line segment joining the points (1, 0) and (2, 3) divides it in the ratio 1 :n. Find the equation of the line.

OR

If p and q are the lengths of perpendiculars from the origin to the lines $\cos\theta - y\sin\theta = k\cos 2\theta$ and $x\sec\theta + y\,cosec\,\theta = k$ respectively, prove that $p^2 + 4q^2 = k^2$.

23. In a relay race there are five teams A, B, C, D and E.

(a) What is the probability that A, B and C finish first, second and third, respectively ?

(b) What is the probability that A, B and C are the first three to finish(in any order) ?

SECTION – D

24. Solve the following system of inequalities graphically:

$x + y \leq 100,\ \ y \geq 4x,\ \ x \geq 10$ and $y \geq 0$.

25. If $\tan x = \frac{3}{4}$, $\pi < x < \frac{3\pi}{2}$, find the value of $\sin\left(\frac{x}{2}\right)$, $\cos\left(\frac{x}{2}\right)$ and $\tan\left(\frac{x}{2}\right)$

OR

Prove that $\sin 5\theta = 5\sin\theta - 20\sin^3\theta + 16\sin^5\theta$

26. Show that the middle term in the expansion of $(1+x)^{2n}$ is $\frac{1.3.5....(2n-1)}{n!} 2^n . x^n$, $n \in N$.

OR

Find a, b and n in the expansion of $(a+b)^n$ if the first three terms of the expansion are 729, 7290 and 30375, respectively.

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

OR

Find the equation of hyperbola where foci are $(0, \pm 12)$ and the length of the latus rectum is 36.

28. In a survey of 25 students, it was found that 15 had taken Mathematics, 12 had taken Physics and 11 had taken Chemistry, 5 had taken Mathematics and Chemistry, 9 had taken Mathematics and Physics, 4 had taken Physics and Chemistry and 3 had taken all three subjects. Find the number of students that had taken

(i) only Mathematics (ii) only Physics (iii) only Chemistry (iv) none of three subjects.

29. Find mean and variance for the following frequency distribution :

Class	0 – 30	30 – 60	60 – 90	90 – 120	120 – 150	150 – 180	180 – 210
Frequency	2	3	5	10	3	5	2

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