

GULF SAHODAYA (SAUDI CHAPTER) EXAMINATION - 2011

STD XI

MATHEMATICS

Max Marks: 100

SET A

Time : 3 Hrs

GENERAL INSTRUCTIONS

- (i) All questions are compulsory
- (ii) The question paper consists of 29 questions divided into three sections A, B and C.
Section A comprises of 10 questions of one mark each, Section B comprises of 12 questions of 4 marks each and Section C comprises of 7 questions of 6 marks each.
- (iii) 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.
- (v) Use of calculators is not permitted.

SECTION – A

1. Write the relation $R = \{ (x, x^2 + 1) : x \text{ is an odd natural number less than } 10 \}$ in roster form.
2. Insert 3 Geometric means between 2 and $1/128$.
3. Find the slope of the line perpendicular to the line joining the points $(2, 5)$ and $(-3, 6)$.
4. Find the centroid of the triangle whose vertices are $(2, 4, 3)$, $(-3, 5, 7)$ and $(4, 6, -1)$.
5. Find the points on Z-axis which are at a distance $\sqrt{21}$ units from the point $(1, 2, 3)$.
6. Evaluate:
$$\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$$
7. Find the derivative of $x/(3x+1)$ with respect to x .
8. Write the negation of the statement "parallel lines do not intersect in their plane".
9. Write the following in the form "if p then q", "There is a traffic jam whenever there are school hour."
10. Check whether the following statement is true or not
If $x, y \in Z$ are such that x and y are odd then xy is odd.

11. Let A and B be two sets. If $A \cap X = B \cap X = \emptyset$ and $A \cup X = B \cup X$ for some set X.

14 Show that $A = B$

12. Find the domain and range of real function f defined by

4 $f(x) = \sqrt{x-2}$

or

Draw the graph of f(x) in its domain where $f(x) = -\sqrt{x}$. Also find its range

13. Prove that
$$\frac{\cos x + \cos 3x - \cos 2x}{\sin x + \sin 3x - \sin 2x} = \cot 2x$$

Or

Prove that $(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4 \cos^2 [(x+y)/2]$

14. Solve $2 \cos^2 x - 5 \sin x + 1 = 0$.

15. Prove by induction that, $\forall n \in \mathbb{N}$

$$1/1.4 + 1/4.7 + 1/7.10 + \dots + 1/(3n-2)(3n+1) = n/(3n+1).$$

Or

Prove by induction that, $\forall n \in \mathbb{N}$

$3^{2n+2} - 8n - 9$ is divisible by 8

16. Convert the following Cartesian form of complex number in polar form

$$Z = (1+i)^2 / (1-i)$$

17. If $a^2 + b^2 = 1$, prove that $(1+b+ia)/(1+b-ia) = b+ia$

Handwritten work for Q16:

$$\frac{(1+i)^2}{1-i} = \frac{1+i+2i-1}{1-i} = \frac{1+3i}{1-i}$$

$$\frac{1+3i}{1-i} \cdot \frac{1+i}{1+i} = \frac{1+3i+i+3i^2}{1-i^2} = \frac{1+3i+i-3}{1-(-1)} = \frac{-2+4i}{2} = -1+2i$$

18. Solve graphically: $x + 2y \leq 8$, $2x + y \geq 2$, $x - y \leq 1$, $x, y \geq 0$.
19. Find the number of arrangement of the letters of the word INDEPENDENT. In how many of these arrangement. (i) do all the vowels always occur together. (ii) do the vowels never occur together.
20. Find the equation of the circle with radius $\sqrt{5}$ units, whose centre lies on y -axis and passes through the point $(2, 3)$.
- Or
- Find the co-ordinates of the foci, the vertices, eccentricity and length of the latus rectum of the conic $4x^2 + y^2 = 400$.
21. A Mathematics paper consists of 10 questions divided into two parts I and II. Each part containing 5 questions. A student is required to attempt 6 questions in all, taking at least 2 questions from each part. In how many ways can the student select the questions?
22. Find the derivative of the function $y = \sin^2 x$ with respect to x by first principle method.

SECTION -- C

23. At break, in a school 123 students go to canteen which sells cakes, Ice cream and buns. 42 students buy ice-cream, 36 buy buns and 10 buy only cakes, 15 students buy ice-cream and buns, 10 buy ice-cream and cakes 4 buy cakes and buns but not ice-cream and 11 buy ice-cream and buns but no cakes. Draw Venn-diagram to illustrate the above information and find (i) How many students buy nothing at all. (ii) How many students buy at least two items. (iii) How many students buy all three items.

24. Prove that $\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$.

$$\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$$

25. The third, fourth and fifth terms in the expansion of $(1+x)^n$ are respectively 84, 280 and 560. Find the values of n & x .

26. (a) How many terms of the G.P. $3, 3/2, 3/4, \dots$ are needed to give the sum $3069/512$?

(b) Find the sum to n terms of the series $3 \times 8 + 6 \times 11 + 9 \times 14 + \dots$ to n terms.

Or

Let S be the sum, P the product and R the sum of reciprocals of n terms in a G.P.

Prove that $P^2 R^n = S^n$.

27. Find the co-ordinates of the foot of the perpendicular from $P(2, 3)$ to the line $y = 3x + 4$.

Also write the equation of the perpendicular through P .

Or

A line is such that its segment between the lines $5x - y + 4 = 0$ and $3x + 4y - 4 = 0$ is bisected at the point $(1, 5)$. Obtain its equation.

28. Find the mean and standard deviation of the following:

C.I	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90
f	3	51	122	141	130	51	2

29. (a) A box contains 5 red marbles, 8 blue marbles and 7 green marbles. 3 marbles are drawn at random from the box. What is the probability that (i) all will be blue?

(ii) none of them is red? (iii) at least one will be green?

- (b) The probability that a student will pass the entrance test in both mathematics and physics is 0.3 and the probability of passing neither is 0.2. If the probability of passing the physics test is 0.6.

What is the probability of passing the mathematics test?