GULF SAHODAYA (SAUDI CHAPTER) EXAMINATION, 2013
GRADE – 11

SUBJECT: **MATHEMATICS** **SET – B**

Total Pages: 3
Time: 3 Hours
Max. Marks: 100

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 1 mark each, Section B comprises of 12 questions of 4 marks each and Section C comprises of 7 questions of 6 marks each*

(iii) *All questions in Section A are to be answered in one word, one sentence or as per each requirement of the question.*

(iv) *There is no overall choice. However, internal choice has been provided in 4 questions of four marks each and 2 questions of six marks each. You have to attempt only one of the alternatives in all such questions.*

(v) *Use of calculator is not permitted. However, you may ask for logarithmic and statistical tables, if required.*

SECTION - A

1. If the origin be shifted to the point (– 2, 3) by a translation of coordinate axes, find the new coordinates of the point (4, 7).

2. Evaluate $\lim_{x \to 0}\left(\frac{e^{3x}-1}{x}\right)$

3. Evaluate $\lim_{x \to 0}\left(\frac{\cos x}{\pi - x}\right)$

4. Write the contrapositive of the following statement:
"If a number is divisible by 9, then it is divisible by 3"

5. Write the component statements of the following:
"All prime numbers are either even or odd"

6. Identify the quantifier in the following statement and write the negation of the statement.
"There exists a number which is equal to its square."

7. Find the value of $\cos(-1410^0)$

8. Find the multiplicative inverse of 2 – 3i.

9. Which term of an A.P. 7 – 4i, 6 – 2i, 5 – 0i, 4 + 2i (i) is purely real
(ii) purely imaginary.

10. Find the second term of the sequence, defined by $a_1 = 1$, $a_n = a_{n-1} + 3$ for $n \geq 2$.

SECTION - B

11. Prove that $\cos\left(\frac{3\pi}{2}+\theta\right)\cos(2\pi+\theta)\left[\cot\left(\frac{3\pi}{2}-\theta\right)+\cot(2\pi+\theta)\right]=1$

OR

Prove that $\tan 4x = \frac{4\tan x\,(1-\tan^2 x)}{1-6\tan^2 x+\tan^4 x}$

12. Prove the following by using the principle of mathematical induction:

$3^{2n+2} - 8n - 9$ *isdivisibleby* 64 for all n ε N

13. Convert $\frac{-16}{1+i\sqrt{3}}$ in polar form.

OR

Find the square root of 3 – 4i.

14. Find the number of different 8 – letter arrangements that can be made from the letters of the word DAUGHTER so that
(i) All vowels occur together.
(ii) All vowels do not occur together.

OR

In how many ways can the letters of the word ASSASSINATION be arranged so that all the S's are together?

15. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of:
(i) exactly 3 girls (ii) at most 3 girls?

16. Find the coordinats of the foot of the perpendicular from the point (– 1 , 3) to the line 3x – 4y – 16 = 0

17. Find the ratio in which the line segment joining the points (4, 8, 10) and (6, 10, – 8) is divided by the YZ – plane.

18. Find the derivative of x sin x from the first principle.

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

OR

Find the equation of the ellipse, with major axis along the x-axis and passing through the points (4, 3) and (6, 2).

20. If U = {x : x ε N, x ≤ 10}, A = { x : x is a solution of $x^2 - 5x + 6 = 0$}
B = {x : x is a prime number, x ≤ 7}. Verify that $(A \cup B)' = A' \cap B'$

21. Let f = {(1, 1), (2, 3), (0, – 1), (– 1, – 3), . . . } be a function from Z to Z defined by f(x) = a + bx for some integers a and b. determine a, b.

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

SECTION - C

23. The sum of first two terms of an infinite G.P. is 5 and each term is three times the sum of the succeeding terms. Find G.P.

24. Solve the following system of inequalities graphically

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

25. In a certain lottery 10,000 tickets are sold and 10 equal prizes are awarded. What is the probability of not getting a prize if you buy (i) one ticket (ii) 10 tickets?

In a certain lottery thousands of lottery ticket buyers lose their hard-earned money to fill one's pocket. Do you think it is a good practice, explain.

26. A school gave away 38 medals for honesty, 15 for punctuality and 24 for obedience. If these medals went to a total of 58 students and only three students got medals in all the three values, how many received medals in exactly two of the three values? Which value do you prefer to be rewarded the most and why?

27. 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

28. In any triangle ABC, prove that $2\left(b\cos^2\frac{C}{2} + c\cos^2\frac{B}{2}\right) = a + b + c$

OR

In any triangle ABC, prove that $a\cos\left(\frac{B-C}{2}\right) = (b+c)\sin\frac{A}{2}$

29. The coefficients of the $(r-1)^{th}$, r^{th} and $(r+1)^{th}$ terms in the expansion of $(x+1)^n$ are in the ratio 1: 3 : 5. Find n and r.

OR

Expand using Binomial theorem $\left(1 + \frac{x}{2} - \frac{2}{x}\right)^4, x \neq 0$

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(v) *Use of calculator is not permitted. However, you may ask for logarithmic and statistical tables, if required.*

SECTION - A

1. Write the converse of the following statement:
   "If a number n is odd, then n^2 is odd"

2. Write the component statements of the following:
   "All prime numbers are either even or odd"

3. Identify the quantifier in the following statement and write the negation of the statement.
   "There exists a number which is equal to its square."

4. Find the value of $\sin\left(\frac{-11\pi}{3}\right)$

5. Find the multiplicative inverse of $3+2\sqrt{2}i$

6. Which term of an A.P. 7 – 4i, 6 – 2i, 5 – 0i, 4 + 2i (i) is purely real (ii) purely imaginary.

7. Find the second term of the sequence, defined by $a_1 = 1$, $a_n = a_{n-1} + 3$ for $n \geq 2$.

8. If origin be shifted to point (2, – 3) by a translation of coordinate axes, find the new coordinates of the point (2, 7).

9. Evaluate $\lim_{x \to 0}\left(\frac{e^{3x}-1}{x}\right)$

10. Evaluate $\lim_{x \to 0}\left(\frac{\cos x}{\pi - x}\right)$

SECTION - B

11. Find the derivative of cot x from the first principle.

12. 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 the x-axis and passing through the points (4, 3) and (6, 2).

13. If $U = \{x : x \in N, x \leq 10\}$, $A = \{ x : x \text{ is a solution of } x^2 - 5x + 6 = 0\}$

$B = \{x : x \text{ is a prime number}, x \leq 7\}$. Verify that $(A' \cap B)' = A \cup B'$

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

16. Prove that $\cos\left(\frac{3\pi}{2} + \theta\right)\cos(2\pi + \theta)\left[\cot\left(\frac{3\pi}{2} - \theta\right) + \cot(2\pi + \theta)\right] = 1$

OR

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SECTION - C

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