END SEMESTER/ RETEST EXAMINATION 2020

Semester: 1st

Subject Code: Sc-102

Subject: Mathematics I

Full Marks : 70 (Part A-25+Part B-45)

Duration: 3 hours

The figures in the margin indicate full marks for the questions.

Instructions:

1. ***All* question of PART- A are compulsory.**
2. **Answer any *five* questions from PART-B**

PART-A
Marks-25

1. Answer the following questions: 1x10=10
   a) The value of i^{50}.....
   b) The value of 4_{P_3} .....
   c) Find the 10th term in the series 2,4,8,16.....
   d) The coefficient of x^3 in $(1-x)^5$ .....
   e) The value of $\log_2 \log_2 \log_3^{81}$ is ... ...
   f) The 5th term of the G.P 3,6,12,.....is
   g) If A is a symmetric matrix, then A^T=
   h) Value of Cot$(tan^{-1}a + cot^{-1}a)$=
   i) The surface area of a sphere is .....
   j) The equation of the line joining the points (-1,3) and (4,-2) is.....

2. Write true and false: 1x10=10
   a) The point A(-2,1),B(0,5) and C(4,-2) are collinear.
   b) The partial fraction of $\frac{7x-5}{(x+3)(x-4)}$ is $\frac{4}{x+3}+\frac{3}{x-4}$.
   c) Simpson's rule is $\frac{S}{3}[A + 2D + 4E]$
   d) A given system of linear equations is said to be consistent if at least one solution.
   e) If A and B are square matrix of order 2 and A=3B then the value of $|A| = 6|B|$
   f) The order of a matrix [2 5 7] is 1×3
   g) The volume of a cone is $\pi r^2 h$

h) The condition of perpendicularity of the lines in terms of their slopes is $m_1m_2 = -1$

i) If a=3, r =2 then the nth term of the G.P is 3.2^{n+1}

j) If Z_1&Z_2 are any two complex numbers then $|Z_1Z_2|=|Z_1||Z_2|$

3. Choose the correct answer: 1x5=5

(a)The value of $(w^7 + w^5 + w^3)$ is

i) 1 ii) -1 iii) 0 iv) None of these

(b) Modulus of $\frac{2-i}{3-4i}$ is

i) $\frac{1}{5}$ ii) $\frac{1}{\sqrt{5}}$ iii) $\sqrt{3}$ iv) 5

(c) $\frac{cos8^0-sin8^0}{cos8^0+sin8^0}=$

i) $\tan37^0$ ii)$\tan47^0$ iii)$\tan8^0$ iv)$\cot37^0$

(d) The argument of $\sqrt{3}+i$ is

i) 1 ii)$\frac{\pi}{6}$ iii) 0 iv) $\frac{\pi}{2}$

(e) If the height of a cone is 12 cm and radius is 5 cm the the slant height is

i) 14 ii) 10.5 iii) 13 iv)12

PART-B

Marks-45

4. (a) If w is an imaginary cube root of unity ,prove that $(1-w)(1-w^2)(1-w^4)(1-w^5)=9$ 3

(b) Find the Square root of $7-30\sqrt{-2}$ 3

(c)Resolve into partial fraction

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

5. (a) If $2n_{C_3} : n_{C_2} = 12:1$ Find the value of n. 3 ×3=9

(b) Out of 9 girls and 13 boys how many different committees can be formed each consisting of 5 boys and 3 girls.

(c) Using Cramer's rule solve

$$x + y + z = 3$$
$$2x - y + 3z = 4$$
$$x + 2y - z = 2$$

6. Answer any three question : 3×3

(a)Prove that $log_2log_3log_2512 = 1$

(b) Show that $\tan(\frac{\Pi}{4}+\frac{\theta}{2}) = \sec\theta + tan\theta$

(c) Prove that $sin^248^0 + cos^242^0 = 1$

(d) Prove that $3tan^{-1}x = tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$

(e) Prove that $\frac{sin2A}{1+cos2A} = tanA$

7. (a) In any triangle ABC , the side a=3, b=4 and c=5. Find cos A, cosB and cosC 4
(b)Find the distance between the pairs of points (5,4) and (2.-3) 2
(c Find by Simpson's 1/3rd rule the area of a curvilinear fingure whose ordinates measure 18, 22,26,24,20,26,30,34,28,24 and 14 cm and whose base is 146 cm. 3

8. (a) Find the whole surface area of a right prism whose height is 75cm and whose base is a regular octagon of side 12cm. 3
(b) Find the angles between the lines $y-\sqrt{3}\,x-5=0$ *and* $\sqrt{3}\,y-x+6=0$ 3
(c)If $A^T=\begin{bmatrix}-2 & 3\\ 1 & 2\end{bmatrix}$ and B=$\begin{bmatrix}-1 & 0\\ 1 & 2\end{bmatrix}$ then find $(A+2B)^T$ 3

9. Prove that 3x3=9
(a) Prove that $\begin{vmatrix}x & x^2 & x^3\\ y & y^2 & y^3\\ z & z^2 & z^3\end{vmatrix}=xyz(x-y)(y-z)(z-x)$
(b) $\frac{\sin(B-C)}{cosB.cosC}+\frac{\sin(C-A)}{cosC.cosA}+\frac{\sin(A-B)}{cosA.cosB}=0$
(c) Insert two arithmetic mean between 3 and 23.

10. (a) *Find* $(a+b)^4-(a-b)^4$, Hence Evaluate $(\sqrt{3}+\sqrt{2})^4-(\sqrt{3}-\sqrt{2})^4$ 6
(b) Apply De'Moiver theorem to find the value of $(1+i)^2$. 3

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