ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

EXAMINATION MATERIAL ZUEB - 2022

MATHEMATICS XI

SECTION "C" EXTENDED RESPONSE QUESTION (ERQ'S)

Q1) If α, β are the roots of $p\,t^2 + qt + q = 0, p \neq 0, q \neq 0$ *prove that*: $\sqrt{\frac{q}{p}} + \sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} = 0$

Q2) If α, β are the roots of $px^2 + qx + r = 0, p \neq 0$, form the equation whose roots are:

i. α^3, β^3

ii. $\alpha + \frac{1}{\alpha}, \beta + \frac{1}{\beta}$

iii. $-\frac{1}{\alpha^3}, -\frac{1}{\beta^3}$

Q3) Solve, wherever possible, the following systems of equations by Cramer's rule and matrix method.

i. $x + 2y + z = 8 \quad 2x - y + z = 3 \quad x + y - z = 0$

ii. $x + y = 5 \quad y + z = 7 \quad z + x = 6$

iii. $2y - z = 1 \quad 4x + 2y - z = 1 \quad 8x - y + 3z = 2$

Q4) If the pth term of an H.P. is q, the qth term is p; prove that the (p+q) th term is $\frac{pq}{(p+q)}$

Q5) Find the value of n so that:

$$\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$$

May become the H.M between a and b.

Q6) If a rubber ball that is dropped on the floor from a height of 27 meters always rebounds one third of the distance of the precious fall, find the distance it will have travelled before hitting the ground for the ninth time.

Q7) If one grain of wheat is placed on the first square of a chess board, two grains for the second square, four grains for the third square, and so on, doubling the number of grains each time till all the 64 squares of the board are covered. Calculate the total number of grains required.

Q8) At the end of each year the value of a scooter owned by Nasir depreciates 20% of the value it had at the beginning of the year. If it was worth Rs. 20,000 new; what is its value now, at the end of 5 years?

Q9) A machine is depreciated at the rate of 10% on reducing balance. The original cost was Rs. 10, 000. After how many years, it will be valued at Rs. 6561?

Q10) A boy has 231 marbles. He arranges them in rows so that each row contains on marbles less than the preceding. The last row consists of one marble only, which forms the vertex of a triangle. How many marbles are there in the base of the triangle?

Q11) A besieged fortress is held by 5700 men who have provisions for 66 days. If the garrison losses 20 men each day, for many days will be provisions last?

Q12) Find the four times of a series of which the sum to n terms is $\frac{1}{2}\ n\ (7n-1)$.

Q13) How many numbers are there between 256 and 789 that are divisible by 7?

Q14) Show that the sum of the common difference of the A.P. when

i. $T_4 = 7$ and T_{16} 31
ii. Its 8^{th} term is 7 and the 11^{th} term is -23.
iii. Its 5^{th} and 10^{th} terms are 86 and 146 respectively.

Q15) If |x| < 1, prove that:

$$\frac{\sqrt{1+x}+\sqrt[3]{(1-x)^2}}{1+x+\sqrt{1+x}} = 1-\frac{5}{6}\ x; \text{ nearly}$$

Q16) If c be a quantity, so small that c^3 may be neglected in comparison with l^3, prove that:

$$\sqrt{\frac{l}{l+c}}+\sqrt{\frac{l}{l-c}} = 2+\frac{3c^2}{4l^2}$$

Q17) If $y = \frac{3}{4}+\frac{3.5}{4.8}+\frac{3.5.7}{4.8.12}+\cdots$; prove that $y^2+2y-7=0$.

Q18) If $y = 2x+3x^2+4x^3+\cdots, show\ that$

$$x = \frac{1}{2}\ y-\frac{1.3}{2^2.2!}\ y^2+\frac{1.3.5}{2^3.3!}\ y^3-\frac{1.3.5.7}{2^4.4!}\ y^4+\cdots$$