

B. Sc. DEGREE END SEMESTER EXAMINATION : OCTOBER 2022
SEMESTER 5 : MATHEMATICS
COURSE : 19U5CRMAT08 : HUMAN RIGHTS AND MATHEMATICS FOR
ENVIRONMENTAL STUDIES

(For Regular - 2020 Admission and Supplementary - 2019 Admission)

Time : Three Hours

Max. Marks: 75

PART A

Answer any 10 (2 marks each)

1. Mention a few methods in which an individual can help in preventing pollution.
2. What is biogas composed of?
3. What is the definition of human rights according to The Protection of Human Rights Act 1993?
4. What is MSW? What are its sources?
5. What led Gattei to find a solution that involves the golden ratio?
6. In atoms, state how the Fibonacci sequence and the Lucas sequence occurs?
7. What is the Russian Revolution?
8. Define mining.
9. What relationship exists between golden ratio and the Newton's method?
10. State the recurrence relationship connecting Fibonacci numbers and bees.
11. Does Pineapples show any Fibonacci pattern? Justify.
12. What can we say about the ratio $\frac{F_{n+1}}{F_n}$ when n is odd and when n is even?

(2 x 10 = 20)

PART B

Answer any 5 (5 marks each)

13. State a few civil and political rights that comes under the ICCPR.
14. Explain how Fibonacci numbers are related to flowers in general and sunflower in particular.
15. Define traingular numbers. List out the Fibonacci and Lucas traingular numbers, illustrating how they are traingular numbers.
16. What are the ecological problems created by hydroelectric power projects?
17. Find the number of subsets including the null set of a set of n points such that consecutive points are not allowed if the points lie on a line.
18. Given a bilinear transformation $\omega = \frac{az+b}{cz+d}$, if we have $a - d = b = c \neq 0$, prove that the bilinear transformation has two distinct fixed points α and β , where a, b, c and d are integers; $a, d > 0$ and $ad - bc = 1$.
19. Noise pollution can affect human health adversely. Elaborate.
20. Establish the relationship that exists between the approximations x_n of $f(x) = x^2 - x - 1$ and the golden ratio, given that it is true for all values upto n .

(5 x 5 = 25)

PART C

Answer any 3 (10 marks each)

21. (a) Compute the sum $\sum_1^n F_i^2$ and $\sum_1^n L_i^2$ for $n = 6$.
(b) Verify that $L_n = F_{n-1} + F_{n+1}$ for $n = 4$ and $n = 7$.
(c) Verify that $F_{2n+1} = F_{n+1}^2 + F_n^2$ for $n = 4$.
22. Determine the quadratic equation that yields the golden ratio from the Fibonacci numbers and also depict its occurrence in the construction of the great Pyramids.
23. Elaborate on the role of solar energy in our lives.
24. Discuss about the causes, effects and control measures of urban and industrial waste.
- (10 x 3 = 30)**