U.G. DEGREE EXAMINATION — JUNE, 2018.

Second Year

Functional Tamil

ENVIRONMENTAL STUDIES

Time : 3 hours   Maximum marks : 75

PART A — (3 × 5 = 15 marks)

Answer any THREE questions.

Each answer should not exceed 2 pages.

1. What is meant by environmental studies? Why is it important?

    சுற்றுச்சூழல் ஆய்வுகள் என்றால் என்ன? அதன் முக்கியத்துவம் என்ன?

2. What are ecological pyramids?

    சூழியல் பிரமிடுகள் என்றால் என்ன?

3. Explain the term 'disaster management'.

    'பேரிடர் மேலாண்மை' - விளக்கவும்.

4. What are the causes of air pollution?

காற்று மாசுபாட்டின் காரணங்கள் என்ன?

5. Briefly write about rain water harvesting.

மழைநீர் அறுவடை பற்றி சுருக்கமாக எழுது.

PART B — (4 × 15 = 60 marks)

Answer any FOUR questions.

Each answer should not exceed 5 pages.

6. How to create awareness about environmental protection?

சுற்றுச்சூழல் விழிப்புணர்வு எப்படி உருவாக்க வேண்டும்?

7. Give an account on Mineral resources.

கனிம வளங்கள் - விளக்கவும்.

8. Write the functional aspects of ecosystem.

சுற்றுச்சூழலின் செயல்பாட்டு அம்சங்களை விளக்கவும்.

9. Write the importance of biodiversity.

பல்லுயிரியலின் முக்கியத்துவத்தை விளக்கவும்.

10. What is nuclear hazard? Explain.

அணுசக்தி ஆபத்து என்றால் என்ன? விளக்கவும்.

2 **UG–139**

11. Write an account on environment protection laws.

சுற்றுச்சூழல் பாதுகாப்பு சட்டங்களை விளக்கவும்.

12. Give an account on Value Education in Environment.

சுற்றுச்சூழல் கல்வி - விளக்கவும்.

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B.Sc. DEGREE EXAMINATION — JUNE, 2018.

Second Year

Mathematics

GROUPS AND RINGS

Time : 3 hours   Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Show that $f : \Re \to \Re$ defined by $f(x) = 2x + 1$ is a bijection and find its inverse. Compute $f^{-1} \circ f$ and $f \circ f^{-1}$

2. Check whether the given permutation is odd or even?

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 2 & 3 & 4 & 5 & 1 & 6 & 7 & 9 & 8 \end{pmatrix}$$

3. Let G he a group, then prove that

   (a) The identity element of G is unique

   (b) Every $a \in G$ has unique inverse in G.

4. Show that every group of prime order is cyclic

5. Show that every subgroup of an abelian group is normal.

6. Let p be a prime number. Then prove that Z_p, the ring of integers modulo p, is a field.

7. Prove that every field is an integral domain.

8. Prove that a Euclidean ring possesses unit element.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. If $f : A \to B$ and $g : B \to C$ are bijections, then show that $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$.

10. (a) Prove that every cyclic group is abelian.

   (b) Let G he a cyclic group of order n generated by $a \in G$, then $a^k \in G$ is a generator of G if and only if k and n are co-prime

11. State and prove Cayley's theorem.

12. State and prove Fundamental theorem of group homomorphism.

13. Let R be a commutative ring with identity. Show that an ideal M of R is maximal if and only if R/M is a field.

14. Show that the ring of Gaussian integers is an Euclidean domain.

15. Prove that every integral domain can he imbedded in a field.

16. Let I be an ideal of a ring R. Show that R/I is also a ring.

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B.Sc. DEGREE EXAMINATION — JUNE 2018.

Second Year

Mathematics

STATISTICS AND MECHANICS

Time : 3 hours   Maximum marks : 75

SECTION A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Find the arithmetic mean of the following frequency distribution :

   x :   1   2   3   4   5   6   7

   f :   5   9   12   17   14   10   6

2. Explain curve fitting and principle of least squares.

3. The first four central moments of distribution are 0, 2.5, 0.7 and 18.75. Test the skewness.

4. Write the methods of interpolation.

5. From the following data construct an index for 1999 taking 1998 as base by average method calculate arithmetic mean.

Commodities P_0 Price index P_1 Price index

Commodities	1998	1999
A	50	70
B	40	60
C	80	90
D	100	120
E	20	20

6. Given that the means of X and Y are 65 and 67, their standard deviation are 2.5 and 3.5 and the coefficient of correlation them is 0.8 write down the two regression lines.

7. A particle moves in a straight line. If V be its velocity when at a distance x from a fixed point in the line and $v^2 = \alpha - \beta x^2$ where α and β are constants. Show that the motion is simple harmonic and determine its period and amplitude.

8. A ball A impriges directly on an exactly equal and similar ball B lying on a smooth horizontal plane. If 'C' be the coefficient the restitution. Prove after impact the velocity of B will be that of A as $1 + e : 1 - e$.

SECTION B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Calculate standard deviation from the data given below :

C.I.	0-10	10-20	20-30	30-40
f	5	8	7	12

C.I.	40-50	50-60	60-70	70-80
f	28	20	10	10

10. Find rank correlation for the following data :

x : 84 56 89 58 59 67 74 78

y : 38 69 56 58 63 78 87 77

11. Calculate Karl Pearson's coefficient of correlation for the following data :

x : 28 32 38 42 46 52 54 57 58 63

y : 0 1 3 4 2 5 4 6 7 8

12. Explain "Time series" and its utilities.

13. What is a contingency table? Describe how χ^2 distribution may be used to test whether the two criteria of classification of $m \times n$ contingency table are independent.

14. Show that the resultant motion of two SHM of same period along the perpendicular lines is alling on ellipse.

15. Find the range on an inclined plane.

16. Derive the pedal equation $(p - r)$ of central orbits.

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| UG–653 | BMS–23 |

B.Sc. DEGREE EXAMINATION – JUNE, 2018.

Second Year

Mathematics

CLASSICAL ALGEBRA AND NUMERICAL METHODS

Time : 3 hours   Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Prove that

$$(1+x)^n = 2^n \left\{ 1 - n\left(\frac{1-x}{1+x}\right) + \frac{n(n+1)}{1.2}\left(\frac{1-x}{1+x}\right)^2 - ... \right\}$$

2. Show that $n^n > 1.3.5..(2n-1)$.

3. State and prove Cauchy's inequality.

4. Frame an equation with rational coefficients, one of whose roots is $\sqrt{5} + \sqrt{2}$.

5. Find the root of the equation $x^3 - 4x + 1 = 0$ correct to three decimal places by method of false position.

6. Find a polynomial for $f(x)$ given that $f(0) = 2,\ f(1) = 3,\ f(2) = 12$ and $f(3) = 35$. Hence find $f(5)$.

7. Using Simpson's $\dfrac{3}{8}th$ rule, evaluate $\displaystyle\int_0^{0.3}(1 - 8x^3)^{\frac{1}{2}}\,dx$.

8. If $u_1 = 10$, $u_2 = 15$, $u_3 = 42$, then find u_4 .

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

9. Sum to infinity the series
$$\frac{8}{1.2.3}\left(\frac{5}{7}\right) + \frac{9}{2.3.4}\left(\frac{5}{7}\right)^2 + \frac{10}{3.4.5}\left(\frac{5}{7}\right)^3 + \cdots$$

10. (a) Prove that if $n > 2$, $(n!)^2 > n^n$.

    (b) If $a_1, a_2, \cdots, a_n$ are in arithmetical progression, then show that $a_1^2\, a_2^2 \cdots a_n^2 > a_1^n a_n^n$.

11. Solve the equation $3x^4 - 40x^3 + 130x^2 - 120x + 27 = 0$ given that it has two integral roots.

12. Solve the equation
$6x^5 - x^4 - 43x^3 + 43x^2 + x - 6 = 0$.

13. Solve the following system of equations by Gauss-Seidal method.

$$8x - y + z = 8$$
$$2x + 5y - 2z = 3$$
$$x + y - 3z = -6$$

14. Evaluate $\int_0^6 \dfrac{dx}{1+x}$, by using

(a) Simpson's one-third rule.

(b) Simpson's three-eight rule.

15. Find the first and second derivatives of the function tabulated below at the point $x = 3.0$.

x : 3.0   3.2   3.4   3.6   3.8   4.0

$f(x)$: -14.000 -10.032 -5.296 0.256 6.672 14.000

16. Given $\dfrac{dy}{dx} = xy + y^2, y(0) = 1$. Find $y(0.1)$ and $y(0.2)$ correct to four decimal places using the fourth order Runge-Kutta formula.

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3   **UG–653**