

B.A. /B.Sc. Part-III (Honours) Special Examination, 2020 (1+1+1)

Subject: Mathematics

Paper: VIII

Time: 2 Hours

Full Marks: 50

The figures in the margin indicate full marks.

Candidates are required to write their answers in their own words as far as practicable.

[Notation and Symbols have their usual meaning]

1. Answer any seven questions:

7 × 5 = 35

- (a) Describe rounding off error. Find the number of significant figures in V_A and V_T where $V_A = 0.0050411$ and $V_T = 1.0504018$. 3+2
- (b) Prove that the form of Lagrangian function remains invariant under linear transformation. Also deduce the linear interpolation formula. 3+2
- (c) Describe Gauss-Seidel iteration method for solving a system of linear algebraic equations. Mention its condition of convergence. 4+1
- (d) Evaluate $\Delta^{10}(1-ax)(1-bx^2)(1-cx^3)(1-dx^4)$.
- (e) Define divided difference of n th order and also prove that divided difference is a linear operator. 2+3
- (f) Define degree of precision of a mechanical quadrature formula. Prove that the degree of precision of Trapezoidal rule is 1. 2+3
- (g) Give the geometrical significance of Simpson's 1/3 rd rule.
- (h) Derive the composite Trapezoidal formula for evaluating $\int_a^b f(x)dx$.
- (i) Derive the convergence criterion of Newton-Raphson method for solving nonlinear equation $f(x) = 0$. Also describe the geometrical interpretation of this method. 2+3

2. Answer any three questions:

3 × 5 = 15

- (a) Give the comparison between interpreter and compiler. Calculate the binary sum of 11011.01 and 10.1101. 3+2
- (b) Classify the different types of variables in C. Write down the mathematical expression of $\frac{(a+b)(c+d)}{(a-b)(c-d)}$ in C. 3+2
- (c) Write a C program to examine whether a given number is even or odd.
- (d) Write the syntax of "if-else" statement and "do-while" loop in C. 3+2
- (e) Write a C-program which converts a given temperature from Centigrade scale to Fahrenheit scale.

B.A. /B.Sc. Part-III (Honours) Special Examination, 2020 (1+1+1)

Subject: Mathematics (Old Syllabus)

Paper: VIII

Time: 2 Hours

Full Marks: 50

The figures in the margin indicate full marks.

Candidates are required to write their answers in their own words as far as practicable.

[Notation and Symbols have their usual meaning]

1. Answer any seven questions:

7 × 5 = 35

- (a) Describe rounding off error. Find the number of significant figures in V_A and V_T where $V_A = 0.0050411$ and $V_T = 1.0504018$. 3+2
- (b) Prove that the form of Lagrangian function remains invariant under linear transformation. Also deduce the linear interpolation formula. 3+2
- (c) Describe Gauss Seidel iteration method for solving a system of linear algebraic equations. Mention its condition of convergence. 4+1
- (d) Evaluate $\Delta^{10}(1-ax)(1-bx^2)(1-cx^3)(1-dx^4)$.
- (e) Define divided difference of n th order and also prove that divided difference is a linear operator. 2+3
- (f) Define degree of precision of a mechanical quadrature formula. Prove that the degree of precision of Trapezoidal rule is 1. 2+3
- (g) Give the geometrical significance of Simpson's 1/3 rd rule.
- (h) Derive the composite Trapezoidal formula for evaluating $\int_a^b f(x)dx$.
- (i) Derive the convergence criterion of Newton-Raphson method for solving nonlinear equation $f(x) = 0$. Also describe the geometrical interpretation of this method. 2+3

2. Answer any three questions:

3×5 = 15

- (a) Give the comparison between Interpreter and Compiler. Calculate the binary sum of 11011.01 and 10.1101. 3+2
- (b) Classify the different types of variables in Fortran. Write the mathematical expression of $\frac{(a+b)(c+d)}{(a-b)(c-d)}$ in Fortran. 3+2
- (c) Write a Fortran program to check whether a given number is even or odd.
- (d) Write the syntax of "if" statement and "do" loop in Fortran. 3+2
- (e) Write a Fortran-program which converts a given temperature from Centigrade scale to Fahrenheit scale.