B. Sc. (Honours) Part-II Examination-2023
Department of Applied Mathematics
Course: A. Math.-220
(Practical using FORTRAN)

Exam. Marks: 70 Class Assessment, Lab. Tutorial, Note Book Marks:30 Total Marks: 100

1. Write a FORTRAN program to print the area and perimeter of a triangle when three vertices of the triangle are given.
2. Write a FORTRAN program to print the area and perimeter of a triangle when two sides and angle between them of the triangle are given.
3. Write a FORTRAN program to print the area and perimeter of a rectangle when four vertices of the rectangle are given.
4. Write a FORTRAN program to print the area and circumference of an inner circle of a triangle whose three vertices are given.
5. Write a FORTRAN program to print the area and circumference of an outer circle of a triangle whose three vertices are given.
6. Write a program in Fortran'90 to evaluate u, v of the expressions: $u = \frac{|a+b^{-1}|}{\sin(r-d)}$; $v = \frac{cu^{-1}-u\cos x}{b}$.
7. Write a FORTRAN program to solve a quadratic equation $ax^2+bx^2+cx+d=0$ and print the roots (real or complex) by normally.
8. Write a FORTRAN program to solve a quadratic equation $ax^2+bx^2+cx+d=0$ and print the roots (real or complex) by using Case construct.
9. Write a FORTRAN program, which reads n elements in an array and prints them in ascending order and descending order.
10. Write a FORTRAN program to print prime numbers and how many prime numbers between a specified range (m, n; $m < n$).
11. Write a program to find the biggest number of u, v, & w
12. Write a FORTRAN program to print some Fibonacci sequence (*i.e.* $n \leq 20$).
13. Write a Fortran'90 program to find the sum of digits of any integer number and prints the reverse of the number.
14. Write a FORTRAN program to print the product of an expression such as $(1/2)(3/4)(5/6)$ .... *upto n terms.*
15. Write a FORTRAN program to print the product of an expression such as $(1/(a+b))(2/(a+2b))(3/(a+3b))$..... *upto n terms.*
16. Write a FORTRAN program to print the product of an expression: $(b/r)(2b/(r+a)^2)(3b/(r+2a)^3)$ . . . *upto n terms.*
17. Write a FORTRAN program to print the sum of an expression such as $1+1/2^2+1/3^2+$ ... *upto n terms.*
18. Write a FORTRAN program to print the sum of an expression such as $1/a+2/(a+b)+3/(a+2b)+4/(a+3b)+$ ..... *upto n terms.*
19. Write a FORTRAN program to print the sum of an expression such as $x + x^2/2! + x^3/3! +$ ..... *upto n terms.*
20. Write a FORTRAN program to print the sum of an expression such as $b/r+2b/(r+a)^2+3b/(r+2a)^3+$ . . . *upto n terms.*
21. Write a FORTRAN program to calculate the sum of series such as $(1-2x)^{-1}$; *when* $|x| \leq 1/2$

22. Write a FORTRAN program to calculate the sum of series such as $\sin x$.

23. Write a FORTRAN program to calculate the sum of series such as $\cos x$.

24. Write a FORTRAN program to calculate the sum of series such as $\tan x$.

25. Write a FORTRAN program to calculate the sum of series such as e^x.

26. Write a FORTRAN program to calculate the sum of series such as $Log\ (1 + x)$.

27. Write a FORTRAN program to calculate the sum of series such as $(1 + x)^{-1}$; *when* $|x| \leq 1$

28. Write a FORTRAN program to calculate the sum of series such as $(1 - x)^{-1}$; *when* $|x| \leq 1$

29. Write a FORTRAN program to calculate the sum of series such as $(1 + bx)^{-1}$; *when* $|x| \leq 1/|b|$

30. Write a FORTRAN program, which reads n elements in an array and Given a set of points (x_1, y_1), (x_2, y_2), (x_3, y_3), ... (x_n, y_n) to fit a straight line $y = mx + c$.

31. Write a FORTRAN program, which reads n elements in an array and Given a set of points (x_1, y_1), (x_2, y_2), (x_3, y_3), ... (x_n, y_n) to fit a straight line $y = mx + c$ with the help of function subprogram.

32. Write a FORTRAN program, which reads n elements in an array and Given a set of points (x_1, y_1), (x_2, y_2), (x_3, y_3), ... (x_n, y_n) to fit a straight line $y = mx + c$ with the help of subroutine subprogram.

33. Write a FORTRAN program, which reads two matrices and print their Sum in matrix form.

34. Write a FORTRAN program, which reads two matrices and print their Subtraction in matrix form.

35. Write a FORTRAN program, which reads two matrices and print their Multiplication in matrix form.

36. Write a FORTRAN program, which reads two matrices and print their Sum, Subtraction and Multiplication in matrix form.

37. Write a FORTRAN program, which reads a matrix and print their determinant.

38. Write a FORTRAN program, which reads a matrix and print their transpose and inverse in the matrix form.

39. Write a FORTRAN program, which reads n elements and write some Functions subprogram to print the values of Sum, AM, GM and SD.

40. Write a FORTRAN program, which reads n elements and write some Subroutine subprogram to print the values of Sum, AM, GM and SD.

41. Write a FORTRAN program to solve a quadratic equation $ax^2 + bx^2 + cx + d = 0$ and print the roots (real or complex) by subroutine subprogram.

42. Write a FORTRAN program to calculate the the value of y from the following using function.
$y = 2x^2 + 3x + 4\ for \quad x < 2$
$y = 0 \quad for \quad x = 2$
$y = 2x^2 + 3x - 4\ for \quad x > 2.$

43. Write a FORTRAN program to solve a quadratic equation $ax^2 + bx^2 + cx + d = 0$ and print the roots (real or complex) by function subprogram.

44. Write a FORTRAN program to output along with the following input data, the charges for use of electricity of customers. An electricity company has three categories of customers: Industrial, Bulk Industrial and Domestic. The rates are: (*a*) For Industrial minimum upto 150 units tk. X fixed. Next 150 units rate tk. P per unit. Next 200 units rate tk. Q per unit and above this units rate tk. R per unit. (*b*) For Bulk Industrial minimum upto 100 units tk. Y fixed. Next 100 units rate tk. U per unit. Next 200 units rate tk. V per unit and above this units rate tk. W per unit. (*c*) For Domestic minimum upto 50 units tk. A per unit and minimum upto 75 units tk. B per unit. Next 125 units rate tk. C per unit. Next 200 units rate tk. D per unit and above this units rate tk. G per unit.
Given the customer id number, category of customer, the previous meter reading and the current reading, demand charge tk. 60 then including vat 5%.