2021

MATHEMATICS

[General]

PAPER – IV

Full Marks : 90

Time : 3 hours

The figures in the right hand margin indicate marks

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

Illustrate the answers wherever necessary

GROUP – A

Answer any **one** of the following : 10×1

1. Distinguish between the function of compiler and assembler. What are the source and object program ? What are the advantages and disadvantages of high level language and machine language ? 10

2. If A and B be any two events corresponding to a random experiment E, then prove that

$$P(A \cup B) = P(A) + P(B) - P(A \cap B).$$ 10

GROUP – B

Answer any **four** of the following : 20×4

3. (*a*) Define postulates of Boolean algebra. 10

(*b*) Find the probability distribution of the number of heads when a coin is thrown repeatedly until the first tail appears. 10

4. (*a*) Calculate the arithmetic mean and standard deviation of the following distribution : 10

Class Interval	0-9	10-19	20-29	30-39	40-49	50-59
Frequency	15	20	25	24	32	12

(*b*) What is the difference among bit, byte, nibble and word ? Give the basic structure of a computer system. 10

5. (*a*) Convert the number $(35{\cdot}3125)_{10}$ to binary form. Using binary arithmetic multiply $(11011)_2$ by $(1101)_2$ and divide $(1001000)_2$ by $(110)_2$. 10

(*b*) Write a short note on frequency polygon. 10

6. (*a*) Write a FORTRAN program to find the roots of a quadratic equation. 10

(*b*) What is meant by the term 'Statistical regularity' ? Explain how the frequency definition of probability is related to the concept of statistical regularity. 10

7. (*a*) What is CPU ? Name and discuss the functions of different units of CPU. 10

(*b*) There are two identical boxes. The first box contains 5 white and 7 red balls and the second box contains 5 white and 5 red balls. One box is chosen at random and a ball is drawn from it. If the ball drawn be found to be white, calculate the probability that it is drawn from the first box. 10

8. (*a*) Write a FORTRAN program to find the sum of two $m \times n$ matrices. 10

(*b*) Prove that var $(aX + b) = a^2$ var (X). 10

9. (*a*) Draw a flowchart to count the number of digits of a number whose value is greater than 100. 10

(*b*) Obtain Poisson distribution as a limit of Binomial distribution. 10

10. (*a*) If $4x + y = 52$ and $x + y = 32$ be the regression lines of x on y and of y on x respectively, obtain the correlation coefficient. 10

(*b*) Discuss, with suitable examples, the use of DO-loops in FORTRAN. 10