Seat No. ______

M.Sc. Sem-4 March 2025

MASTER OF SCIENCE MATHEMATICS Examination

MSC MATHS Semester - 4 MARCH 2025 (Regular) MARCH - 2025

FINANCIAL MATHEMATICS

Faculty Code : 003

Subject Code : 16SI-MSMA-EL-04-00005

Time : 2:30 Hours] [Total Marks : 70

Instructions: All questions are compulsary

Q.1 Answer Briefly any seven of the following (Out of ten) **14**

1. Define Put Option and Exercise price.
2. What are financial derivatives?
3. Name any two financial markets.
4. Explain the terms: Bid ask and Bid offer.
5. Define with example: Barrier option.
6. Distinguish between European option and American option in minimum three points each.
7. When any investment is called risk free? Give two examples of risk-free investments.
8. Define: Smaller order effect on the portfolio.
9. Obtain the stochastic differential equation for $f(s)=s^{999}$.
10. Define: Sensitivity to interest rate.

Q.2 Answer the following (Any Two) **14**

1. Explain: Higher the exercise price more is received for the asset at expiry of put option.
2. Explain in detail: Put-call parity.
3. How much one should pay now to receive a guaranteed amount at the future time T?

Q.3 Answer the following **14**

1. Discuss the Mathematical significance of Black-Scholes equation and derive the boundary and final conditions for the same.
2. Define call option and explain how the call option value is a function of exercise price and time to expiry.

OR

Answer the following **14**

1. Solve the Black Scholes Partial differential equation.
2. What are option for? Explain how the option reduces the risk to investors.

Q.4 Answer the following questions (Any Two)

1 Explain the simple model on asset price.

2 . State and prove Ito's lemma and extend the result for $f=f(s,t)$.

Q.5 Answer the following (Any Two)

1 Explain Forward and Future Contracts in detail.

2 Explain the situation of call and put option at the time of expiry of options.

3 Explain in detail the elimination of randomness from Ito's lemma.

What are dividends? Explain in detail the constant dividend yield structure and derive the Black-Scholes partial differential equation corresponding to it.

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