Seat No. _____

HD-003-1164005

M. Sc. (Sem. IV) Examination

April - 2023

Mathematics : EMT-4011

(Financial Mathematics)

Faculty Code : 003
Subject Code : 1164005

Time : $2\frac{1}{2}$ Hours / Total Marks : **70**

Instructions : (1) Attempt all the questions.
(2) There are total five questions.
(3) Each question carries equal marks.

1 Attempt the following (Any Seven) : **14**

(1) Define exercise price and speculative price.

(2) State minimum three differences between option and contracts.

(3) What are look back options ? Give an example.

(4) Obtain the stochastic differential equation for $f(S) = S^{10}$.

(5) Define the term : Sensitivity to volatility and sensitivity to interest rate.

(6) Explain the terms:
(i) Risk free investment, (ii) Dividends

(7) Explain the term financial derivatives and give two examples of it.

(8) Name any two financial markets and their dealings.

(9) Distinguish between European option and American option in minimum three points each.

(10) Name any four popular indices of the world with the names of respective countries.

2 Attempt the following : **14**

(a) How much one should pay now to receive a guaranteed amount E at the future time T.

(b) Explain : Higher the exercise price more is received for the asset at expiry of put option.

OR

(b) Akash holds an option on 1st April 2019 to purchase 300 shares of Milan industries for Rs. 5000 per share after one year. If the up-front premium is Rs. 50 per share and price of share is Rs. 6000 per share on 1st May 2020 then find the total profit to Akash on exercising the option. Also find the profit in percentage corresponding to up-front premium paid.

3 Attempt the following : **14**

(a) Define call option and explain how the call option value is a function of exercise price and time of expiry.

(b) State and prove Ito's lemma and extend the result for $f \equiv (S, t)$.

OR

(a) Explain the simple model of asset pricing.

(b) Explain in brief the central idea behind the theory and practice of option pricing.

4 Attempt the following : **14**

(a) What is put call parity ?

(b) Stating the assumptions of the Black-Scholes analysis, derive the Black-Scholes partial differential equation.

5 Attempt the following (Any Two) : **14**

(a) Explain : Higher the asset prices on expiry of call option, greater the profit.

(b) Solve the Black-Scholes differential equation.

(c) Define the term dividend yield and explain in detail the constant dividend yield structure and derive the Black-Scholes partial differential equation corresponding to it.

(d) Explain discrete dividend structure. Also derive the jump conditions for the same.
