



**DCM-003-1164005**

Seat No. \_\_\_\_\_

**M. Sc. (Sem. IV) Examination**

**July - 2022**

**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) Name any three financial markets and their dealing.
- (2) State minimum three differences between forward and future contracts.
- (3) Define the terms: Sensitivity to volatility and sensitivity to interest rate.
- (4) Explain the term financial securities.
- (5) Define with example: Asian option.
- (6) Define with example: Look-back option.
- (7) Define: Dividend and their types.
- (8) Obtain the stochastic differential equation for  $f(S) = S^{1001}$ .
- (9) Name any two popular indices of the world with the names of respective countries.
- (10) Define with examples: Barrier options.

**2** Attempt the following : (any two) **14**

- (a) Explain: Higher the asset price on expiry of call option, greater the profit.
- (b) What are options for? Also explain how the options reduce the risk to investors.
- (c) Define call option and explain how the call option value is a function of exercise price and time to expiry.

3 Attempt the following : 14

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

OR

- (a) Derive the Black- Scholes partial differential equation.
- (b) State and prove Itô's lemma and extend the result for  $f \equiv f(S, t)$ .

OR

- (b) Explain the simple model of asset pricing.

4 Attempt the following : 14

- (a) Explain in detail the elimination of randomness from Itô's lemma.

Prakash holds an option on 1st June 2018 to purchase 200 shares of Savan Industries for Rs 5000 per share after one year. If the up-front premium is Rs 100 per share and price of share is Rs 6000 per share on 1<sup>st</sup> June 2019 then find the total profit to Prakash on exercising the option. Also find the profit in percentage corresponding to up-front premium paid.

5 Attempt the following : (any two) 14

- (a) Explain the situation of a call option and put option at the time  $t = T$ .
- (b) A company whose share price is Rs 400 offers bonus shares in the ration 1:1. What will be the asset price and how should option be altered?
- (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.