



DQ-003-1164005

Seat No. _____

M. Sc. (Sem. IV) Examination

April - 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) Define : Put option.
- (2) State minimum three differences between option and contracts.
- (3) Define: Smaller order effects on the portfolio.
- (4) Name any two financial markets.
- (5) Define: Asian option and give an example.
- (6) Obtain the stochastic differential equation for $f(S) = S^{999}$.
- (7) Define: Dividend and their types.
- (8) Name any three popular indices of the world with the names of respective countries.
- (9) Define with examples: Barrier options.
- (10) Define: Market price.

2 Attempt the following : (Any two) 14

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

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 in detail the elimination of randomness from Itô 's lemma.

4 Attempt the following : **14**

- (a) What is put-call parity?
- (b) Pratiksha holds an option on 28th October 2018 to purchase 100 shares of Narayan industries for Rs. 4000 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 28th October 2019 then find the total profit to Pratiksha on exercising the option. Also find the profit in percentage corresponding to up-front premium paid.

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

- (a) Why would anyone write an option?
- (b) Explain the simple model for asset prices.
- (c) State the Black-Scholes differential equation and show that $\frac{\partial v}{\partial \tau} = \frac{\partial^2 v}{\partial x^2} + (k-1)\frac{\partial v}{\partial x} - kv$ where notations are being usual.
- (d) What are dividends? Also explain discrete dividend structure and derive the jump conditions for the same.