



MBW-003-1164005

Seat No. _____

M. Sc. (Sem. IV) Examination

April / May - 2018

Mathematics : EMT - 4011

(Financial Mathematics) (New Course)

Faculty Code : 003

Subject Code : 1164005

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :**
- (1) Attempt all the questions.
 - (2) Each question carries equal marks.
 - (3) There are 5 questions.

1 Attempt the following : (any seven) 14

- (1) Define up-front premium and speculative price.
- (2) Distinguish between call option and put option in minimum two points each.
- (3) Giving the examples explain the terms Asian option and Look back option.
- (4) Name the two indices of the Indian stock market.
- (5) Obtain the stochastic differential equation for $f(s) = S^n$.
- (6) Explain the terms :
 - (i) Arbitrage
 - (ii) Risk and their types.
- (7) Name any two financial markets and their dealing.
- (8) Explain the term financial derivatives.
- (9) Distinguish between European option and American option in minimum two points each.
- (10) Explain the terms bid-ask and bid-offer.

2 Attempt the following : **14**

- (a) Akshar holds an option on 1st March 2017 to purchase 200 shares of Pioneer industries for Rs. 5,500 per share after one year. If the cost of option is Rs 100 per share and price of share is Rs 8000 per share on 1st March 2018 then find the total profit to Akshar on exercising the option. Also find the profit in percentage corresponding to up-front premium paid.
- (b) Explain: How the call option value is a function of exercise price and time to expiry.

OR

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

3 Attempt the following : **14**

- (a) Explain the simple model of asset- prices.
- (b) How much one should pay now to receive a guaranteed amount at the future time T.

OR

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

4 Attempt the following : **14**

- (a) Explain in detail :
 - (i) Forward and future contracts
 - (ii) Portfolio and Hedging
 - (iii) Smaller order effect on portfolio
 - (iv) Sensitivity to volatility
- (b) Derive the Black- Scholes partial differential equation.

5 Attempt the following : (any **two**)

14

- (a) Discuss the mathematical significance of Black-Scholes equation and derive the boundary and final conditions for the same.
 - (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 and derive the jump conditions for the same.
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