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BBE-003-1164005

Seat No. ________

M. Sc. (Sem. IV) Examination

July - 2021

Mathematics : EMT-4011

(Financial Mathematics)

Faculty Code : 003
Subject Code : 1164005

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

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

1 Attempt the following. **14**

(1) Explain the term holder.
(2) Define cost of option.
(3) Define Market price.
(4) Define exercise price.
(5) Obtain the stochastic differential equation for $f(S) = S^{100}$.
(6) Name any two popular indices of the world with the names of respective countries.
(7) When any investment is called a Risk free? Also give two examples of it.

2 Attempt the following. **14**

(1) Name any three popular indices from India.
(2) Distinguish between European option and American option in minimum three points each.
(3) Define smaller order effects on the portfolio.
(4) What are financial derivatives?
(5) Which options are used by oil refiners?
(6) Define the term: Sensitivity to interest rate.
(7) Name any two financial markets and their dealing.

3 Attempt-the following. **14**

(a) What are options for?

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

4 Attempt the following. **14**

(a) Explain the simple model of asset pricing.

(b) State and prove It's lemma and extend the result for $f = f(S, t)$.

5 Attempt the following. **14**

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

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

6 Attempt the following. **14**

(a) Derive the Black- Scholes partial differential equation.

(b) Discuss mathematical significant Black - Scholes equations. Also derive the boundary and final conditions for European options.

7 Attempt the following. **14**

(a) Solve the Black-Scholes differential equation.

(b) Explain the situation of a call option and put option at the time $t = T$.

8 Attempt the following **14**

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

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

9 Attempt the following **14**

(a) Avani holds an option on 1st June 2016 to purchase 500 shares of Suman 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 10000 per share on 1st June 2017 then find the total profit to Avani on exercising the option. Also find the profit in percentage corresponding to up-front premium paid.

(b) A company whose share price is Rs 500 offers bonus shares in the ration 1:1. What will be the asset price and how should option be altered?

10 Attempt the following **14**

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

(b) 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.