Avinashilingam Institute for Home Science and Higher Education for Women
Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD [now MoE]
Re-accredited with 'A++' Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore-641 043, Tamil Nadu, India

Continuous Internal Assessment Test II – April 2025
II Semester

Class: I PG **Time: 2 Hrs**
Major: Mathematics **Max. Marks: 60**

23MMAC11 – Mathematical Finance

Course Outcomes:

CO1: Understand financial markets and derivatives including options and futures
CO 2: Know about the concept of bonds and derivatives
CO 3: Appreciate pricing and hedging of options, interest rate swaps and no-arbitrage pricing concepts
CO 4: Learn stochastic analysis and the Black−Scholes model
CO 5: Study and use Hedging parameters, trading strategies and currency swaps

PART-A **6 x 1 = 6**
Choose the correct answer

1. What is the lower bound for the option price for a European call option on a non-dividend paying stock when the stock price is $50, the strike price is $50, the time to maturity is 6 months and the risk free interest rate is 12% per annum? CO3K2
   a) $2.91 b) $0.79 c) $1.79 d) $1.04

2. Put-call parity will hold only for ---------- CO3K1
   a) European options b) American options c) both (a) and (b) d) none

3. Construction of riskless portfolio is referred to as -------- CO4K1
   a) Delta hedging b) Rho hedging c) vega hedging d) theta hedging

4. The discount rate used for the expected payoff on an option is the CO4K2
   a) risk-free rate b) risk neutral valuation
   c) risk-less rate d) risk valuation

5. The -------- of a portfolio of options is the rate of change of the value of the portfolio with respect to the passage of time with all else remaining the same. CO5 K2
   a) theta b) gamma c) rho d) beta

6. The rho of a portfolio of options is the rate of change of the value of the portfolio with respect to the passage of time with all else remaining the same. CO5 K2
   a) $\partial\Pi/\partial r$ b) $\partial\Pi/\partial t$ c) $\partial\Pi/\partial T$ d) $\partial\Pi/\partial d$

PART – B **3 x 6 = 18**

Answer all the questions

7. a) Derive the lower bounds for option prices. CO3K3

(or)

7. b) Derive the relationship between the prices of European put and call options that have the strike price and time to maturity. CO3K4

8. a) Explain briefly about the risk-neutral valuation. CO4K4

(or)

8. b) (i) Describe the lognormal property of stock prices. CO4K3

(ii) Consider a stock where the current price is $20, the expected return is 20% per annum, and the volatility is 40% per annum, Find the expected stock price and the variance of the stock price in one year.

9. a) Describe about Delta and gamma hedging. CO5 K4

(or)

9. b) Discuss the valuation of interest rate swaps. CO5 K3

PART – C **3 x 12 = 36**

Answer all the questions

10. a) Explain briefly about the factors affecting the option prices. CO3K4

(or)

10. b) Derive the upper bounds for option prices with suitable examples. CO3K4

11. a) Derive the generalization of no-arbitrage argument. CO4K5

(or)

11. b) Derive the Black-Scholes-Merton differential equation with assumptions. CO4K4

12.a) Define combination and Explain about its types. CO5K4

(or)

12. b) Discuss the types of spreads in detail. CO5K5

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