

(113)

SEAT No. _____

No of printed pages: 02

Sardar Patel University

M.Sc. (Sem-III), PS03EMTH33, Financial Mathematics-I;
Thursday, 01st November, 2018; 02.00 p.m. to 05.00 p.m.

Maximum Marks: 70

Note: (i) Notations are standard; (ii) Calculator is allowed.

Q.1 Answer the following.

[8]

1. What is full form of CBOE ?
(A) Chicago Board on Exchange (B) Chicago Board Options Exchange
(C) Chicago Board of Exchange (D) none of these
2. Forward contracts traded on
(A) exchange traded market (B) over the counter market
(C) the counter market (D) none of these
3. What is the equivalent continuously compounding interest rate for 10 % per annum with semi annual compounding ?
(A) 9.531 % (B) 9.758 % (C) 5.000 % (D) none of these
4. Which one from the following futures contract is not available in India ?
(A) Double stock futures (B) Equity index futures
(C) Interest rate futures (D) Currency futures
5. The value of forward price in forward contract on stock equals
(A) $S_0 e^{rT}$ (B) $S_0 e^{-rT}$ (C) $S_0 e^{-qT}$ (D) none of these
6. The value of futures contract on currency equals
(A) $S_0 e^{(r-r_f)T}$ (B) $S_0 e^{(r_f-r)T}$ (C) $S_0 e^{(r+r_f)T}$ (D) none of these
7. A call option is in the money, when
(A) $S_T > K$ (B) $S_T < K$ (C) $S_T = K$ (D) $S_T \leq K$
8. The bounds for American put option is given by
(A) $\max\{K - S_0, 0\} \leq P \leq K$ (B) $\max\{S_0 - K, 0\} \leq P \leq K$
(C) $\max\{K + S_0, 0\} \leq P \leq K$ (D) $\max\{K - S_0, 0\} \leq P \leq T$

Q.2 Attempt any *seven*:

[14]

- (a) Define over the counter market.
- (b) Explain the difference between buying a call option and selling a put option.
- (c) Give three types of margin accounts in futures contracts.
- (d) How much would I pay now to receive a guaranteed amount E in the future time T . Assume that the risk free interest rate, r is continuously compounding and is constant during time T .
- (e) Define n year zero interest rate.
- (f) Define Dividend.
- (g) Give two differences between forward and futures contracts.
- (h) What are the factors affecting option prices ?
- (i) What is the lower Bound for European Call option on non-dividend paying asset ?

C.P.T.O.

Q.3

- (a) Explain speculator with an example. [6]
(b) Define (i) Exchange traded market; (ii) Futures contract; (iii) Hedger [6]

OR

- (b) Consider a call option of a share with striking price \$50, option value \$5 per share and it expires after 3 months. Under what circumstances will the seller of the option make a profit? Under what circumstances will the option be exercised? Draw a diagram illustrating how the profit from a short position in the option depends on the stock price at maturity of the option.

Q.4

- (a) Explain convergence of futures price. [6]
(b) Prove (i) $R_c = m \ln(1 + \frac{R_m}{m})$; (ii) $R_m = m(e^{\frac{R_c}{m}} - 1)$. [6]

OR

- (b) Suppose that spot interest rates with continuously compounding are as follows:

year	spot rate(%)
1	2.0
2	3.0
3	3.7
4	4.2
5	4.5

Calculate forward interest rates for 2nd, 3rd, 4th and 5th years.

Q.5

- (a) Derive formula for long forward contract on an asset paying dividend. [6]
(b) Explain 'short selling'. [6]

OR

- (b) Suppose that 2 - year interest rates in United States and Australia are 6% and 8% per annum with continuously compounding, respectively, and the spot exchange rate between US dollar to Australian dollar is 1.25 Australian dollars per US dollar. Find the value of futures contract and justify it.

Q.6

- (a) Derive the put-call parity for European options. [6]
(b) Discuss types of options. [6]

OR

- (b) The price of an American call option on non-dividend paying asset is \$15. The current price of an asset is \$ 250. The strike price of an option is \$ 245 and expiration time is 3 months. The risk free interest rate is 8% per annum with continuously compounding. Find bounds for price of American put option on the same stock having same striking price and expiration time.

