

## M.Sc. (ACTUARIAL SCIENCE)

Term-End Examination

December, 2011

00599

## MIA-011 (F2F) : FINANCIAL ECONOMICS

*Time : 3 hours**Maximum Marks : 100*

*Note : Answer any 10 questions. Each question carries 10 marks.*

1. (a) What do you understand by Efficient Markets Hypothesis (EMH) ? What are its different forms ? **2+2**
- (b) Discuss the evidence for and against each form of EMH. **6**
2. (a) Define the following types of investors and the respective behaviour of their utility functions. **2+2+2**
- (i) risk-averse investor
- (ii) risk-seeking investor
- (iii) risk-neutral investor
- (b) Consider the following utility function : **2**
- $$U = 2000 + 3C$$
- Where  $U$  = Utility and  $C$  = Capital what do you say about the nature of the investor having the above utility function ?
- (c) State any two limitations of utility theory **2**

3. (a) Explain the relationship between risk measures and utility functions. 2
- (b) Investment  $x$  whose returns follow a continuous uniform distribution over the range 0% to 10% per annum. 2+2+4
- (i) Write down the probability density function for the investment returns.
- (ii) What is the mean investment return ?
- (iii) Calculate the variance and semi-variance measures of investment risk.
4. (a) When you call a portfolio is efficient ? What are the assumptions in defining efficient portfolios ? 4
- (b) Why do the investor's indifference curves slope upward ? What determines their gradient ? 6
5. (a) What do you understand by systematic return and specific return ? 4
- (b) A portfolio consists of  $n$  assets. Explain why the specific risk  $\text{var}(\epsilon_p)$  is sometimes referred to as the "diversifiable risk", giving an algebraic justification for your answer ? 6
- Hint : Consider the following single index model :
- $$R_i = \alpha_i + \beta_i R_m + \epsilon_i$$

6. (a) Write any five assumptions of CAPM. 5
- (b) Consider Security X, which has a standard deviation of investment returns of 4%. If : 3+2
- the standard deviation of the market return is 5%
  - the correlation between X's return and that of the market is 0.75.
  - the risk free rate is 5%
  - and the expected return on the market is 10%
- then calculate :
- (i) the beta of security X
- (ii) Security X's expected return
7. (a) What is the advantage of Geometric Brownian motion over standard Brownian motion ? Define Geometric Brownian motion. Write its expected value and variance. 6
- (b) What do you understand by the term "martingale" ? In martingales what does the following condition mean ? 4
- $E(X_t/F_s)$

8. (a) Consider the following updating education in Wilkie model :
- $$I(t) = 0.03 + 0.55 [I(t-1) - 0.03] + 0.45 \cdot QZ(t)$$
- where  $QZ(t) \sim N(0, 1)$
- (i) Explain an economic justification for using an AR (1) process for inflation. 2
- (ii) Interpret the above equation 2
- (iii) Calculate the 95% confidential interval for the force of inflation over the following year given inflation over the past year was 2.75% 6
9. (a) Differentiate between intrinsic value and time value of a derivative. 2
- (b) Company X issues 3 month European call options on its own shares with a strike price of Rs. 120. The current share price is Rs. 123. The current risk free rate of interest is 6% pa and the dividends are payable contineously at the rate of 12 pa. The current option price is Rs. 30 per share. Calculate the price for European put options on the share price at the same strike price. 8
10. (a) (i) What is delta hedging ? 2+2+2
- (ii) How Gamma is different from delta ?
- (iii) Which one is more advantage. Explain with reasons.
- (b) Define Rho and Vega in Greeks 4

11. (a) Write the PDE for Black - scholes formula. 2
- (b) Why do you think Black-scholes PDE contains only three of six Greeks ? 4
- (c) Write any 4 assumptions of Black-scholes model. 4
12. (a) Write the limitations of one factor models. 3
- (b) Write any 4 characteristics of a term structure model. 4
- (c) Write the general Stochastic Differential Equation (SDE) for  $r(t)$ . 3
13. (a) What is a credit default ? Give any two situations of credit default. 3
- (b) Describe three types of credit-risk models. 6
- (c) The Merten model is an example of which type of credit risk model ? 1
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