# YASHWANTRAO CHAVAN MAHARASHTRA OPEN UNIVERSITY, NASIK

## HOME ASSIGNMENT (2016-17)

-------------------------------------------------------------------------------------------------------

### V96 - B.Sc. (Electives - Actuarial Science) Semester 2

-------------------------------------------------------------------------------------------------------

**Instructions for the Students :**

1. All Questions are compulsory.
2. Write every question's answer on separate page.
3. Use of Scientific Calculator is allowed.
4. Use of Actuarial Tables is permissible.

## S64221 (Financial Mathematics - 02)

Q1 A project has an initial outlay of Rs. 150,000, expenses of Rs. 20,000 at the end of $1^{st}$ Year and Rs. 15,000 at the end of $2^{nd}$ year. The income from the project is Rs. 20,000 at the end of each of the first 4 years and Rs. 200,000 at the end of the $5^{th}$ year.

Calculate the IRR (upto 1 decimal place) for this project? [5]

Q2 An ordinary share pays annual dividends. The next dividend is expected to be 10p per share and is due in exactly 9 months time. It is expected that subsequent dividends will grow at a rate of 5% per annum compound and that inflation will be 3% per annum. The price of the share is 250p and dividends are expected to continue in perpetuity.

Calculate the expected effective real rate of return per annum for an investor who purchases the share. [5]

Q3 An insurance company has liabilities of Rs. 10 million due in 10 years time and Rs. 20 million due in 15 years time, and assets consisting of two zero-coupon bonds, one paying Rs. 7.404 million in 2 years time and the other paying Rs. 31.834 million in 25 years time. The current interest rate is 7% per annum effective.

Show that Redington's first two conditions for immunisation against small changes in the rate of interest are satisfied for this insurance company. [5]

Q4 The expected annual effective rate of return from an insurance company's investments is 6% and the standard deviation of annual returns is 8%. The annual effective returns are independent and $(1 + i_t)$ is log-normally distributed, where $i_t$ is the return in the $t^{th}$ year.

Calculate the probability that the accumulation of the investment will be less than 90% of the expected value after ten years. [5]

_____

## YASHWANTRAO CHAVAN MAHARASHTRA OPEN UNIVERSITY, NASIK

## HOME ASSIGNMENT (2016-17)

----------------------------------------------------------------------------------------------------

### V96 - B.Sc. (Electives - Actuarial Science) Semester 2

----------------------------------------------------------------------------------------------------

**Instructions for the Students :**

1.    All Questions are compulsory.
2.    Write every question's answer on separate page.
3.    Use of Scientific Calculator is allowed.
4.    Use of Actuarial Tables is permissible.

### S67231 (Actuarial Statistics - 02)

Q1    A random sample of 10 bulbs are selected and their survival times (in months) are recorded as 1, 1, 1, 2, 3, 4, 7, 7, 8, 16 and suppose that the survival times X is a random variable from exponential distribution with mean $1/\lambda$ .

i)      Find the Method of Moments estimate of $\lambda$.                                              [2]

ii)     Find the Maximum Likelihood Estimate of $\lambda$.                                      [3]

Q2    i)      The random variable X has a normal distribution with mean $\mu$ and variance 100.

In a test of $H_0 : \mu = 20$ against $H_1 : \mu = 30$, it is decided to reject $H_0$ in favour of $H_1$ if the sample mean $\overline{X}$ is greater than 25.

Determine the smallest sample size required to make the probability of a Type I error less than 0.02.                                              [2.5]

ii)     Support for the current government is assessed by means of a survey of 5,000 people. Of those questioned 2,185 said that they would vote for the current government in the next election.

Test whether this proportion is greater than 42%.                        [2.5]

Q3    In a random sample of 200 stomach cancer patients yielded 92 having blood type *A*, 20 having blood type *B*, 4 having blood type *AB* and 84 having blood type *O*.

Are these data significant enough, at 5% level of significance to enable us to reject the null hypothesis that the blood type distribution of stomach cancer sufferers is the same as that of the general population?                                              [5]

Q4    The following date shows the time in minutes, it takes a secretary to complete a certain form in the morning (x) and in the late afternoon (y):

x      8.2  9.6  7.0  9.4  10.9  7.1  9.0  6.6  8.4  10.5

y      8.7  9.6  6.9  8.5  11.3  7.6  9.2  6.3  8.4  12.3

Calculate the sample correlation coefficient and test $H_0: \rho = 0$ against $H_1: \rho \neq 0$ at 1% level of significance.                                              [5]

_____

------------------------------------------------------------------------------------------------------

### V96 - B.Sc. (Electives - Actuarial Science) Semester 2

------------------------------------------------------------------------------------------------------

**Instructions for the Students :**

1. All Questions are compulsory.
2. Write every question's answer on separate page.
3. Use of Scientific Calculator is allowed.
4. Use of Actuarial Tables is permissible.


## S71241 (Corporate Finance)


Q1      Explain and distinguish between Leasing and Hire Purchase.                [5]


Q2      Many large companies issue debentures as a means of raising long term finance. These are often quoted on the stock exchange.

Describe the risks associated with investing in such debentures.                [5]


Q3      Explain how the company's share price might react to this purchase:

1. on the announcement of the buy-back

2. at the time of the buy-back                [5]


Q4      (a)      What are the three main steps that must be taken in order to deal with the risks inherent in a given activity?                [3]

(b)      Name two sub-categories which might be included under political risks.        [2]


_____