LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

FOURTH SEMESTER – **APRIL 2024**

UST 4601 – ACTUARIAL STATISTICS

Date: 15-04-2024 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

	SECTION A - K1 (CO1)	
	Answer ALL the Questions -	**(10 x 1 = 10)**
1.	**Definitions**	
a)	Present value	
b)	Effective rate interest	
c)	Annuity due	
d)	Perpetuity	
e)	Office premium	
2.	**Fill in the blanks**	
a)	The present value is always_____the sum of payable at some future date	
b)	The formula to find the nominal rate of interest corresponding to the effective rate is_____	
c)	Present value formula for immediate increasing annuity is _____.	
d)	Formula to evaluate $(1+i)^t\ a_n$ where t is greater than n is_____	
e)	_____ are the initial calculated premiums based on actuarial analysis and pricing models	
	SECTION A - K2 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
3.	**Match the following**	
a)	Determining the total value at the end of a period for a series of cash flows ------uniform instalments	
b)	Annuity provides equal periodic payments over its duration ------- Stochastic Rates of Interest Rates	
c)	Deferment periods------- Level annuity	
d)	Redemption of loan ------- Simple Accumulated Value	
e)	interest rates that follow a uncertain pattern over time --------m years	
4.	**True or False**	
a)	The higher the discount rate used in Present Value calculations, the higher the present value of future cash flows	
b)	The Effective Rate of Interest is always equal to the Nominal Rate in any given period	
c)	Annuity Due and Ordinary Annuity have the same present value when considering the same cash flows and discount rate	
d)	Loadings are additional charges applied to insurance premiums to cover administrative costs and provide for the insurer's profit	
e)	The Accumulated Value of an Increasing Annuity is the total worth of all payments received over time, taking into account the increasing nature of the payments	
	SECTION B - K3 (CO2)	
Answer any TWO of the following		**(2 x 10 = 20)**

5.	a) Find the nominal rate p.a. convertible quarterly corresponding to the effective rate 14% p.a. b) Find the rate of interest corresponding to a rate of discount of 0.08.
6.	a) What is present value of Rs.5900 due at the end of 25 years, the rate of interest being 8% p.a. for the first 15 years now and 8% convertible half yearly for the next 10 years? b) A sum of money is invested 12% p.a. effective. How long will it take to quintuple itself?
7.	Derive the present value and accumulated value of immediate annuity certain.
8.	Find the present value and accumulated value of an immediate annuity of 1 p.a. for term n years under which payment are made p times a year, the rate of interest being i.
SECTION C – K4 (CO3)	
Answer any TWO of the following	**(2 x 10 = 20)**
9.	A sum of Rs. 57922 at rate of interest 8 %p.a. After 15 years the rate of interest is changed 8% p.a. convertible half yearly. After a further period of 4 years the rate was again changed to 9 % p.a. convertible quarterly. What is the accumulated value at the end of 23 years from commencement?
10.	Calculate the present value of a deferred annuity payable for 10 years certain, the first payment falling due at the end of 6 years from the present time. The annuity is payable at the rate of Rs. 100 p.a. for the first 5 years and Rs.200 p.a. thereafter. (i = 0.05).
11.	To find the present value of increasing annuity wherein the successive installments of form of arithmetic progression
12.	Derive the present value of Increasing annuity due and increasing perpetuity due
SECTION D – K5 (CO4)	
Answer any ONE of the following	**(1 x 20 = 20)**
13.	a) Find the present value and accumulated value of an immediate annuity for n years where payments r are at each interval of r years, n being an exact multiple of r and the number of payments being n/r. b) Find the effective rate p.a. corresponding to the nominal rate 8% p.a convertible quarterly
14.	a) A person has purchased a bond of the face value of Rs.600 on which interest is payable yearly at 6% p.a. He received in all 4 interest payments, the first one falling due one year after purchase. At the end of 4th year the bond has matured for payment at par. If the person has realized an interest yield of 7% p.a. in the transaction, what is the final purchase price? b) Under a settlement of property Mr. Kumar is entitled to receive Rs.3279 p.a. ad infinitum, the first payment being due at the end of 9th years. Find the present value of Mr. Kumar's right at 9% p.a
SECTION E – K6 (CO5)	
Answer any ONE of the following	**(1 x 20 = 20)**
15.	a) Two loans of Rs.500 each are made out to A 3 years ago and 2 years ago respectively and an interest of 6% p.a. was agreed upon. A could only make a repayment of Rs. 400 at the present moment. He promises to clear the dues at the end of 2 years from now. How much will he have to pay then? b)Derive the relation between s_n and a_n
16.	a) Suppose a loan of Rs. 10,000 is taken at an 8% annual interest rate and is repayable over 5 years. In how many ways can the borrower repay the amount? b)Discuss advantages and disadvantages oflevel premium and term premium

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