Time allowed: 2 Hrs 30 Min

Max Marks: 50

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means.** In case of rough work please use answer sheet.

Students are allowed to use Scientific Calculator.

Sections	No. of Questions to attempt	Marks	Marks
A	3 out of 5 (Short Questions)	5 Marks each	3*5 = 15
B	2 out of 3 (Long Questions)	10 Marks each	2*10 = 20
C	Compulsory Case Study	15 Marks	15
		Total Marks	**50**

Section A: Attempt any 3 out of 5

Question 1

If "i" is the earning rate "e" is the effective rate of interest "j" is the inflation rate then
Write the mathematical (formula) relation between three rates and show that e is equal to $((1 + i)/(1 + j)) - 1$
Also what will be the impact on e i.e. relation between e & e'

a) If i increases
b) If j increases
c) Both i and j increases by same percentage
   (Here e' is after the increase in both i & j)

[5]

Question 2

Let X denote the present value of an annuity consisting of payments of ₹2,000 payable at the end of each of the next 8 years, valued using an interest rate of 8.00% pa and let Y denote the present value of an annuity consisting of payments of ₹4,000 payable at the end of every fourth year for the next 16 years, valued using an interest rate of 8.00% pa. Calculate the ratio X / Y.

[5]

Question 3

For a Valuation of Employee Benefits Scheme under Indian circumstances
(i) What is the method prescribed by AS15 for the valuation of Employee Benefits? [1]
(ii) What is the data required for the actuarial valuation of Gratuity? [2]
(iii) List any 4 assumptions used for the actuarial valuation of Gratuity. [2]

Question 4

Explain the following notations in words:

i. $\overline{A}_x$

ii. $A^1_{x:\overline{n}|}$

iii. $_{n|}\ddot{a}_x$

iv. $a_{x:\overline{n}|}$

v. What is $\ddot{a}_x - a_x$ equal to?

[5]

Question 5

A special temporary annuity pays ₹2,500 annually in advance to a man aged exactly 45. The annuity will be paid for four years or until the policyholder's earlier death. If the policyholder survives to his 49th birthday, he will receive an additional lump sum payment of ₹8,000. Calculate the expected present value of this annuity using 6% pa interest and the following table:

x	lx
45	7,51,923.22
46	7,42,243.34
47	7,32,447.96
48	7,22,511.20

Question 6

A woman takes out a home improvement loan for ₹110,000 over 5 years. She makes yearly repayments in arrears and the bank charges an effective rate of interest of 6% pa.

(i)   What is the yearly repayment?

(ii)   How much interest will she pay during the said Term of 5 years?

(iii)   How much capital is repaid in the 3rd instalment?

(iv)   At the end of the fourth year she decides to make further improvements to her house and wants to borrow another ₹40,000 at that stage. If her total balance is to be repaid over 3 years by level annual payments and there is no alteration to the interest rate, how much is each payment?

[10]

Question 7

i. Complete the following table:

x	l_x	q_x	d_x	D_x
20		0.000999	999.00	
21	9,99,001.00	0.001033		
22	9,97,969.03		1,060.84	1,83,566.93
23	9,96,908.19			
24		0.001113		1,57,040.40

Assume an interest rate of 8% p.a.

[5]

ii.

a)   Define Pure Endowment, Term Assurance and Endowment Assurance.   [3]

b)   Calculate the value of Endowment Assurance for a life aged 20, sum assured ₹100 and a term of 3 years using the assumptions given in part (i).   [4]

Question 8

[10]

A loan is repayable by an annuity certain, which is payable annually in arrear for 16 years and calculated at an effective rate of interest of 5% pa.

(i). The first two payments are ₹100 each, the next two ₹120 each, the following two ₹140 each, and so on up to payments of ₹240 each at the end of the last two years. Calculate the amount of the loan.

(ii). The first two payments are ₹100 each, the next two ₹145 each, the following two ₹225 each, and so on up to payments of ₹275 each at the end of the last two years along with a lumsum of ₹ 1000 as an additional payment. Calculate the amount of the loan.

Question 9

Given below is the Revenue account for Company Z for the Financial Years 2011 and 2012.

	Company Z	
	2012	**2011**
Gross premiums	978,975,895	1,118,244,557
Reinsurers' share of gross premiums	(564,043,665)	(601,778,686)
Net premium	414,932,230	516,465,871
Movement in unearned premium Reserve	22,278,116	(21,110,753)
Net premiums earned	**437,210,346**	**495,355,118**
Gross claims paid	(444,256,433)	(505,855,452)
Reinsurance and other recoveries	227,427,767	257,810,100
Movement in outstanding claims Reserve	15,081,000	(33,430,000)
Net commission	12,542,633	16,376,894
Income from underwriting	**248,005,314**	**230,256,660**
General and administrative expenses	(62,931,467)	(83,937,944)
Provision for doubtful debts	(1,606,648)	-
Depreciation of property and equipment	(1,740,438)	(4,459,431)
Total Expenses	**(66,278,552)**	**(88,397,376)**
Operating Income	181,726,761	141,859,285
Investment income	279,934,551	271,682,982
Intercompany Facility Interest/Dividend	108,281,708	71,262,029
Other income	262,392	690,112
Advisory Fee	(28,235,000)	(6,606,701)
Total Investment & Other Income	**360,243,651**	**337,028,422**
Profit for the period	**541,970,412**	**478,887,707**

1   Calculate the following ratios for the specified years
  a.   Gross Premium Growth Ratio for 2012   [1]
  b.   Net Premium Growth Ratio for 2012   [1]
                    For both the years
  c.   Net Retention Rate   [1]
  d.   Net Claims Ratio   [2]
  e.   Expense Ratio (Use Gross Premiums as denominator)   [1]
  f.   Investment Income Ratio (Use Gross Premiums as Denominator)   [1]
  g.   Profit Ratio (Use Gross Premiums as denominator)   [1]
  h.   Underwriting Ratio   [1]

2   What is the movement in Outstanding Claims Reserve (Give the formula)   [1]

3   What is the movement in Unearned Premium Reserve (Give the formula)   [1]

4   List the reasons which you feel have affected the profitability of FY 2012 as opposed to FY 2011.   [4]