

PGDM-IBM, 2017-19
Adv. Actuarial Science (Elective)
INS-404-C

Trimester – IV, End-Term Examination: September 2018

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**. All other instructions on the reverse of Admit Card should be followed meticulously.

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

- A1. (a) What is Incurred but not reported claims (IBNR) ?
 (b) What is Incurred but not enough reported Claims (IBNER)?
 (c) Which are famous actuarial software used for IBNR Claim reserving ?
- A2. A loan of INR 50,00,000 is repayable by equal monthly payments for 5 years, with interest payable at 12% *pa* effective. Calculate the amount of each monthly installment (EMI).
- A3. (a) What is Combined operating ratio for an Insurance company?
 (b) what is process of arriving at Net Earned Premium (NEP) from Gross Underwritten premium (GWP) ?
- A4. The following net cash flows relate to two projects:

YEAR	NET CASH FLOWS (IN \$ 1,000)						
	0	1	2	3	4	5	6
PROJECT A	-60	20	20	20	20	20	20
PROJECT B	-72	45	22	20	13	13	13

- (i) Calculate the NPVs for each project, assuming 10% risk discount rate.
 (ii) Assuming that the two projects are independent, would you accept them if the cost of capital is 15%?
 (iii) What is the IRR of each project? 5

- (iv) Which of the two projects would you prefer if they are mutually exclusive, given a 15% discount rate?

A5. A bank offered a Car loan of INR 50,00,000 payable by 100 equal monthly instalment of INR 78,000 per month. Calculate the annual rate of Interest charged by the bank.

Section-B

B1. Calculate the reserve amount that an Insurance company has to hold at the end of FY 2018-19 using the average cost per claim method.

Total Amount of Claim				
Incremental Claim loss settlement	Development Year			
	0	1	2	3
2015-16	10,10,00,000	3,01,00,000	40,15,000	1,97,000
2016-17	11,89,00,000	3,55,00,000	46,32,000	
2017-18	13,02,00,000	4,04,00,000		
2018-19	13,78,00,000			

Total Number of claim				
Incremental Claim loss settlement	Development Year			
	0	1	2	3
2015-16	1,055	288	34	2
2016-17	1,134	300	36	
2017-18	1,167	315		
2018-19	1,201			

Calculate the reserve of Insurance company at the end of FY 2018-19.

B2. The following data relate to the assets of a small trust fund:

Date Market value

1 January 2018 INR 25,000

1 April 2018 INR 29,000

1 July 2018 INR 30,000

1 October 2018 INR 32,000

1 January 2019 INR 31,500

The only cash flow during 2018 that was not generated from the assets of the fund was

an injection of INR 5,000 on 31 March. Calculate:

- (1) the money-weighted rate of return for the fund for 2018
- (2) the time-weighted rate of return for the fund for 2018
- (3) the linked internal rate of return for the fund for 2018, using quarterly subintervals.

B3. There are two Investment opportunity for an Individual :

- (a) If INR 10,00,000 is invested today with a mutual fund company then a fixed monthly return of INR 10,000 is being received for 15 year.
- (b) If INR 20,00,000 is invested today with a mutual fund company then a fixed monthly return of INR 9,000 is being received for 20 year along with return of INR 20,00,000 at the end of 20th Year.

Based upon the information given above, calculate the following :

- (1) N.P.V of both Investment option
- (2) Rate of Return given by both the investment tool and which option is giving the higher return to individual.
- (3) Calculate the payback period for both option
- (4) Calculate the profitability Index of both option

Section-C

Case Study Compulsory:-

The actuarial Department of Insurance company wants to calculate the Reserves for Liability line of business at the end of FY 2018-19. From the information given below, calculate the Reserve amount that they have to hold at the end of FY 2018-19.

The incremental incurred claims for an Insurance company for the last 7 accident years are given below in the following table (Figures are in Crores) :

Incremental	Development Year							Premium Received (In Crores)	Loss Ratio	RBI Inflation Index	
	0	1	2	3	4	5	6			2011-12	97.34
2012-13	6,099	1,880	588	200	65	27	16	14,000		2012-13	100
2013-14	6,500	2,000	633	312	209	90		14,788		2013-14	102.8
2014-15	6,812	2,355	733	266	72			15,900		2014-15	106
2015-16	7,188	2,799	800					16,877		2015-16	109.32
2016-17	7,456	3,022	849					17,456		2016-17	113
2017-18	7,800	3,401						18,200		2017-18	117.05
2018-19	8,122							19,344		2018-19	120.65

The claims are fully run off after 7 years & the Loss ratio increases by 1 percentage point every year.

RBI Inflation index is given in the table for inflation adjustment calculation.

1. Calculate the reserve that insurance company has to hold at the end of FY 2018-19 using :
 - (a) Inflation adjusted chain Ladder method
 - (b) Bornhuetter - Ferguson Method (Inflation adjusted)
2. What are the four different method for the calculation of development factor.
