Multiple-choice questions (all multiple-choice questions carries Two marks each)

Q1. ___________ rate of return is sensitive to the timing and size of cash flows:
   a) Money weighted rate of return
   b) Time weighted rate of return
   c) Internal rate of return
   d) None of above.

Q2. Graduation is a process of smoothing out ___________
   a) Survival rates
   b) Crude mortality rates
   c) Central death rates
   d) Standardised death rates

Q3. If i=10% p.a., find the value of \((\bar{a}\ddot{a})\infty\)
   a) \((\bar{a}\ddot{a})\infty = 121\)
   b) \((\bar{a}\ddot{a})\infty = 100\)
   c) \((\bar{a}\ddot{a})\infty = 1.21\)
   d) None of the above

Q4. The rate of interest realized on the loan under lender’s sinking fund is called the
   a) Reproductive rate
   b) Remunerative rate
   c) Charging rate
   d) None of the above

Q5. If \(i = 2\%\), then \(i\) represents A+B-I
   a) Money weighted rate of return
   b) Time weighted rate of return
   c) Average interest yield
   d) Linked internal rate of return

Q6. If \(d=0.038467\) find \(i\)
   a) 0.038   b) 0.04   c) 0.03660   d) None

Q7. In the context of mortality tables which of the following is the correct statement for the same age attained:
   a) Aggregate rates are higher than ultimate rates but heavier than the select rates.
b) Aggregate rates are heavier than ultimate rates but lighter than the select rates.

c) Aggregate rates are lighter than both ultimate rates and select rates

d) Aggregate rates are heavier than both ultimate rates and select rates.

Q8. Which equation of value correctly represents the Increasing Temporary Assurance:  

a) \( (IA)^{x:n} = \frac{R_x - R_{x+n} - nM_{x+n}}{D_x} \)

b) \( (IA)^{x:n} = \frac{R_x - R_{x+n} - nM_{x+n} + nD_{x+n}}{D_x} \)

c) \( (IA)^{x:n} = \frac{R_x - R_{x+n} - nM_{x+n}}{D_{x+n}} \)

d) \( (IA)^{x:n} = \frac{R_x - R_{x+n} - nM_{x+n} + nD_{x+n}}{D_{x+n}} \)

Q9. Assuming uniform distribution of death over age \( x \) and \( x+1 \), if \( q_x = 0.2 \) find the value of \( m_x \).  

a) 0.22  
b) 0.11  
c) 0.18  
d) None of above

Q10. Given that \( A_x = 0.7115 \) and \( a_x = 6.5 \) find the value of "d"  

a) 0.0385  
b) 0.0495  
c) 0.0565  
d) None of above

Q11. On the basis of IALM (94-96) modified ultimate table at 6% which of the following is the net annual premium for a sum assured of Rs.1000 for endowment assurance for 25 years on (30).

a) Rs. 8.15  
b) Rs. 18.42  
c) Rs. 6.14  
d) None of these

Q12. If \( a_x = 9.381 \) find the value of \( a_{x(12)} \)

a) 8.325  
b) 9.839  
c) 10.025  
d) None of these

Q13. What is the benefit represented by \( \delta_{x:n} - a_{x:n} \)?

a) \( I - A_{x:n} \)

b) \( A_{x:n} \)

c) \( I - A_{x:n} \)

d) None of these

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Q14. If two dice are thrown what is the probability that the number 3 appears on the 1st dice and number 4 appears on the second dice?
   a) 1/6
   b) 1/36
   c) 1/3
   d) None of the above

Q15. (a) \( m | a_n = V^m a_{\overline{n}} \)
   (b) \( m | a_{\overline{n}} = a_{m-n} - a_{\overline{n}} \)
   (c) \( m | a_{\overline{n}} = a_{\overline{n}} - a_{\overline{\overline{n}}} \)
   (a) Only ‘a’ is correct
   (b) a & b are correct
   (c) Only ‘b’ is correct
   (d) All are incorrect

(Essay type questions: All essay type questions carries Ten marks each)

Q16. (i) In how many days Rs. 5,000 will accumulate to Rs. 10000 at:
   a) A simple rate of interest of 12% per annum
   b) A compound rate of interest of 12% per annum convertible half yearly
   c) A compound rate of interest of 12% per annum convertible quarterly
   (iii) Explain why it takes longest time to accumulate the amount under a) above

Q17. (a) The profits of a company for the next ten years are estimated to be Rs. 25000/- at the end of the first year and there after increasing every year in a constant ratio of 3% p.a. If the profits realized each year are immediately transferred to a fund which earns interest at 6% p.a. find accumulated value of the fund at the end of 10 years.
   (b) What is the benefit that is represented by \( a_{\overline{x,n}} - a_{\overline{x,\overline{n}}} \)?
   Give general reasoning for the same.

Q18. Mr. Gopalan takes a loan which is to be repaid in installments, annually in arrears. The first installment is Rs. 160, the second Rs. 155 and so on with the payments reducing by Rs. 5 p.a. until the end of the 15th year after which there are no further payments. The rate of interest charged by the lender is 8% p.a. effective.
   a) Calculate the amount of the loan.
   b) Calculate the interest and capital components of the third payment.
   c) Calculate the amount of capital repaid in the installment at the end of the thirteenth year.

Q19. a) Given that \( A_x = 0.7115 \) and \( a_x = 6.5 \), determine the rate of interest.
   b) Define the following probabilities and give relation in terms of \( l_x \).
Q.20. a) What is meant by perpetuity annuity? Derive expression for present value of a perpetuity annuity due of 1 p.a.  
   b) Derive mathematical expression for level annual premium under a double endowment assurance plan for sum assured of Rs. 1 in terms of commutation function.  
   c) Define net premium

Q.21. A special policy provides for the following benefits:  
   i) An initial sum of Rs. 20000/- with guaranteed annual additions of Rs. 200/- for each year’s premium paid after the first, if death occurs within the term of assurance.  
   ii) Rs. 20000/- payable on survival to the end of the term of assurance, and  
   iii) Free paid up assurance of Rs. 10000/- payable at death after expiry of the term of assurance.  
Calculate the net annual premium under the above policy on life of (35) for 25 years.  
Basis IALM (94.96) modified ultimate table and at 6% rate of interest.

Q.22. a) Give consequences of withdrawal in the case of level premium method  
   b) Compare the following  
   i) Time weighted rate of return and money weighted rate of return  
   ii) Nominal and effective rate of interest

END