



GRADE: XII Date:	MONTHLY TEST -03 (2023-24) APPLIED MATHEMATICS(241)	Marks: 20 Time: 50 minutes
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Name:

Class & Section:

Q.No.	Questions	Mark														
SECTION A																
1	The straight line trend is represented by the equation: (a) $y_c = a + bx$ (b) $y_c = a - bx$ (c) $y_c = na + b\sum x$ (d) $y_c = a - b\sum x$	1														
2	The present value of a perpetuity of Rs 3120 payable at the beginning of each year , if money is worth 6% effective is (a)Rs 55040 (b)55220 (c)55120 (d) 55160	1														
3	The supply of finished good was delayed for a month due to landslide in hilly terrain. Under which trend oscillation does this situation fall (a)Seasonal (b)Cyclical (c)Secular (d)Irregular	1														
4	How many components of Time series data have ? (a)0 (b) 1 (c)3 (d) 6	1														
SECTION B																
5	Mr X takes a loan of ₹ 2,00,000 with 10% annual rate for 5 years . Calculate EMI under Flat rate system.	2														
6	At what rate of interest will the present value of a perpetuity of Rs. 500 payable at the end of every 6 months be Rs. 10000?	2														
7	Find the trend values using 3 yearly moving average for the loans sanctioned to farmers by a particular branch of a bank in a village. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Year</td> <td>2016</td> <td>2017</td> <td>2018</td> <td>2019</td> <td>2020</td> <td>2021</td> </tr> <tr> <td>Amount (in ₹ lakh)</td> <td>25</td> <td>30</td> <td>32</td> <td>40</td> <td>45</td> <td>50</td> </tr> </table>	Year	2016	2017	2018	2019	2020	2021	Amount (in ₹ lakh)	25	30	32	40	45	50	2
Year	2016	2017	2018	2019	2020	2021										
Amount (in ₹ lakh)	25	30	32	40	45	50										
SECTION C																
8	Anil plans to send his daughter for high studies abroad after 10 years.He expects the cost of the studies to be Rs 2,00,000. How much he set aside at the end of each quarter for 10 years to	3														

	accumulate this amount, if money is worth 6% compound quarterly? [Given $(1.015)^{40} = 1.8140$]													
9	A couple wishes to purchase a house for Rs 15,00,000 with a down payment of Rs 400,000 .If they can amortize the balance at an interest rate 9% per annum compounded monthly for 10 years.Find the monthly installment. [Given: $(1.0075)^{-120} = 0.4079$]	3												
SECTION D														
10	<p>Case Study</p> <p>When observed over a long period of time, a time series data can predict trend that can forecast increase or decrease or stagnation of a variable under consideration. Such analytical studies can benefit a business for forecasting or prediction of future estimated sales or production. Mathematically, for finding a line of best-fit to represent a trend, many methods are available. Methods like moving-averages and least-squares squares are some of the techniques to predict such trends. Mrs. Shamita runs a bread factory and the record of her sales of bakery items for the period of 2015 - 2019 is as follows:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Year</th> <th>2015</th> <th>2016</th> <th>2017</th> <th>2018</th> <th>2019</th> </tr> </thead> <tbody> <tr> <td>Sales (in ₹ thousands)</td> <td>35</td> <td>42</td> <td>46</td> <td>41</td> <td>48</td> </tr> </tbody> </table> <p>Based on the above information, answer the following questions. Show steps to support your answers.</p> <p>(a) By taking year 2017 as origin, use method of least-squares to find the best-fit trend line equation for Mrs. Shamita’s business. Show the steps of your working.</p> <p>(b) What are the estimated sales for Mrs. Shamita’s business for year 2020?</p> <p>(c) What are the estimated sales for Mrs. Shamita’s business for year 2022?</p>	Year	2015	2016	2017	2018	2019	Sales (in ₹ thousands)	35	42	46	41	48	2 1 1
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