

V.P.M's B. N. Bandodkar College of Science, Thane
F.Y.J.C Second Terminal Examination January 2020
Subject: Mathematics and Statistics

Date: 14.01.2020

Time: 02.30 pm to 04.00 pm

Day: Tuesday

Marks: 25

Note: Question paper consists of 13 questions divided into four sections, namely A, B, C and D:-

- 1) Section A: Q. No.1 contains TWO multiple choice type of questions carrying TWO marks of each.
Q. No.2 contains THREE very short answer type of questions carrying ONE mark each.
- 2) Section B: Q. No.3 to Q. No.8 contains 6 questions carrying TWO marks each out of which FOUR are to be attempted.
- 3) Section C: Q. No.9 to Q. No.11 contains 3 questions carrying THREE marks each out of which TWO are to be attempted.
- 4) Section D: Q. No.12 and Q. No.13 are 2 questions carrying FOUR marks each out of which ONE is to be attempted.
- 5) Use of log table is allowed. Use of calculator is not allowed.
- 6) Figures to the right indicate full marks.
- 7) Evaluation of each MCQ would be done for the 1st attempt only.
- 8) Start each section on new page.

Section - A

Q.1 Select and write the correct answer:- **04**

- i) Standard deviation of data is 12 and mean is 72 then coefficient of variation is
 a) 13.64 % b) 16.67 % c) 14.67 % d) 15.67 %
- ii) The 9th term in $\left(\frac{1}{3} + a^2\right)^{12}$ is
 a) $\frac{5a^{16}}{3}$ b) $\frac{55}{3}a^{16}$ c) $\frac{55}{9}a^{16}$ d) $\frac{55}{9}a^{12}$

Q.2 Answer the following: **03**

- i) Find the range of following data
575, 609, 335, 280, 729, 544, 852, 427, 967, 250.
- ii) Find the value of $\sin 15^\circ$.
- iii) Describe $A = \left\{x/x \text{ is an integer, } \frac{-3}{2} < x < \frac{9}{2}\right\}$ in Roster form.

Section - B

Attempt any FOUR:

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- Q.3** Find the value of $(\sqrt{3} + \sqrt{2})^4$ using binomial theorem.
- Q.4** Prove that $\frac{\sin 2x + \sin 2y}{\sin 2x - \sin 2y} = \frac{\tan(x+y)}{\tan(x-y)}$
- Q.5** The means of two samples of sizes 60 and 120 respectively are 35.4 and 30.9 and the standard deviation 4 and 5. Obtain the standard deviation of the sample of size 180, obtained by combining the two sample.
- Q.6** If $\left(x + \frac{1}{3}, \frac{y}{3} - 1\right) = \left(\frac{1}{2}, \frac{3}{2}\right)$ find x and y .
- Q.7** Complete the variance and S.D

X	31	32	33	34	35	36	37
Frequency	15	12	10	8	9	10	6

Q.8 Let X be the universal set, for the non - empty sets A and B verify.

- i) $(A \cup B)' = A' \cap B'$
 ii) $(A \cap B)' = A' \cup B'$
 where $X = \{1,2,3,4,5,6,7,8,9,10\}$
 $A = \{1,2,3,4,5\}$, $B = \{1,2,5,6,7\}$

Attempt any *TWO*:-

Q.9 Prove that $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos 8x}}} = 2\cos x$

Q.10 Prove by method of Induction, for all $n \in \mathbb{N}$.

$$1^2 + 3^2 + 5^2 + \dots (2n - 1)^2 = \frac{n}{3}(2n - 1)(2n + 1)$$

Q.11 There are 260 persons with a skin disorder. If 150 had been exposed to the chemical A, 74 to the chemical B, and 36 to both chemicals A and B, find the number of person exposed to

- i) Chemical A but not chemical B.
- ii) Chemical B but not chemical A.
- iii) Chemical A or chemical B.

Section - D

Attempt any *ONE*:

Q.12 The mean of 5 observations is 4.8 and the variance is 6.56. If three of the five observation are 1, 3 and 5. Find the other two observations.

Q.13 Prove that $\sec 840^\circ \cdot \cot(-945^\circ) + \sin 600^\circ \cdot \tan(-690^\circ) = \frac{3}{2}$

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