

MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI

Examination—April, 2018 (Two Year Diploma Courses)

Group—All Groups

[TIME ALLOWED — 3 HOURS]

(MARKS — 30)

ELECTIVE-I-APPLIED MATHEMATICS (PRACTICAL)

Instructions.— (1) All questions are *compulsory*.(2) Figures at right indicate *full* marks.**Marks**1. Attempt any *two* of the following.—

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(a) (i) Discuss the continuity of the following function in its domain, where.

$$f(x) = x^2 - 4 \quad \text{for } 0 \leq x \leq 2$$

$$f(x) = 2x + 3 \quad \text{for } 2 < x \leq 4$$

$$f(x) = x^2 - 5 \quad \text{for } 4 < x \leq 6$$

(ii) Determine the maximum and minimum values of the following function.

$$f(x) = x \log x$$

$$(b) (i) \int_0^{\pi/2} \frac{\sqrt{\cos x}}{\sqrt{\cos x} + \sqrt{\sin x}} dx$$

$$(ii) \int_2^7 \frac{\sqrt{9-x}}{\sqrt{x} + \sqrt{9-x}} dx$$

(c) Using Cramer's rule solve the simultaneous equation :

$$2x - y + 3z = 9 ; x + y + z = 6 ; x - y + z = 2.$$

(d) Maximize $z = 5x + 2y$ subject to $3x + 5y \leq 15, 5x + 2y \leq 10, x, y \geq 0$
Also find the maximum value of z .2. Attempt any *two* of the following :—

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(a) The slope of the tangent to the curve at any point is equal to $4x + 5y$. Find the equation of the curve passing through the origin.

(b) Using log table find value of the expression :—

$$(i) \frac{0.4553^3 \times 97.78}{29.78 \times \sqrt{2.07}} \quad (ii) \frac{585.56 \times \sqrt{55.34}}{78.45^2 \times 0.6448}$$

(c) Derive the formula for the derivate of following function from first principal :

$$(i) f(x) = a^x$$

$$(ii) f(x) = \cot x$$

(d) State the principal of duality.

[Turn over

3. Attempt any *one* of the following :— 5
- (a) State and prove Baye's theorem.
- (b) Using principal of mathematical induction prove binomial theorem.
4. Oral. 5
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