CON 608 **Serial No. 900000231**

[मराठी] [इंग्रजी]

MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI

Examination—April, 2018 (Two Year Diploma Courses)

Group–All Groups

[TIME ALLOWED — 3 HOURS]

(MARKS — 70)

ELECTIVE–II–BUSINESS MATHEMATICS (THEORY)

Notes.— (1) All questions are *compulsory*.
(2) Figures at right indicate *full* marks.

Marks

1. (*a*) Fill in the blanks (any *eight*).— 8

(*i*) If $y=a^x$ then $\frac{dy}{dx}$ = ...

(*ii*) $\int sin^{-1} \times dx$ = ...

(*iii*) If $log_{10}^{2} = 0.30103$ then find the value of if log_{10}^{256} = ...

(*iv*) If $f(x) = 7x + a\ log_{4}^{256}$ and $f(4) = 54$, then a = ...

(*v*) $15^2 + 16^2 + 17^2 + 18^2 +$ ..... $+ 29^2 + 30^2$ = ...

(*vi*) $\binom{6}{0}+\binom{6}{1}+\binom{6}{2}+\binom{6}{3}+\binom{6}{4}+\binom{6}{5}+\binom{6}{6}$ = ...

(*vii*) $lim_{x\to 9} \frac{\left(x^3 - 729\right)}{(x-9)}$ = ...

(*viii*) $\frac{d}{dx}(e^{7x} + 8a^x - e^{3e})$ = ...

(*ix*) Complete the D'morgans law $(A \vee B)'$ = ...

(*x*) ..... is the range of the $4cos(x/2)$ function.

(*b*) Solve the following (any *four*).— 4

(*i*) Find the cofactor of the elements of the following matrix.

$\begin{bmatrix} 5 & -3 \\ -3 & 2 \end{bmatrix}$.

(*ii*) Find values of x and y using Cramer's rule $6x–4y=2$ and $3x+4y=25$.

(*iii*) Find value of x if $\frac{1}{4!} + \frac{3}{6!} = \frac{x}{8!}$.

(*iv*) Find $\frac{dy}{dx}$ if $x=e^{sint}$ and $y=e^{cost}$.

(*v*) Integrate the following function with respect to x

$\int cos^2 x\ dx$.

[*Turn over*

Marks

(*c*) Match the following.— 4

A Group	**B** Group
(*i*) Arithmetic mean of 5.4, 5.1, 6.5, 5.2 and 4.8 is	(*a*) 3.33
(*ii*) Median of single digit natural number arranged in ascending order	(*b*) 50.5
(*iii*) $0.5log_{10}10000000000+log_{100}10$	(*c*) 5.4
(*iv*) Standard Deviation of 50, 55, 45	(*d*) 4.5
	(*e*) 00

2. Attempt any *two* of the following.— 12

(*a*) Following are the sales in Rupees of departmental store for six days of week : 75000, 109000, 150000, 90000, 130800 and 128000. Calculate the range and co-efficient of range.

(*b*) Evaluate—

(*i*) $\int \frac{2x-1}{(x-1)(x+1)(x-3)} dx$

(*ii*) $\int_0^1 \frac{2x}{1+x^4} dx$

(*c*) The equations of the two regression lines are $2x+3y=0$ and $5x+7y=12$ find—

(*i*) co-efficient of regression

(*ii*) $\pm_x / \pm_y$

(*d*) Devijee wants to buy some filing cabinets for her office. The cost of cabinet X is Rs. 1000 per unit requires six square feet of floor space and hold eight cubic feet of files. Cabinet Y cost Rs. 2000 per unit, requires eight square feet of floor space, and holds twelve cubic feet of files. She has Rs. 8000 for this purchase, thought she does not have to spend that much. The office has room for no more than 72 square feet of cabinets. Formulate this problem as L.P.P. in order to maximize storage volume.

3. Attempt any *two* of the following.— 12

(*a*) For a moderately skewed distribution, mean = 200, median = 198.4 and S.D. = 16, Find the mode and Personian Co-efficient of skewness (SK_p) of the distribution.

(*b*) Prove that

(*i*) $sec^{4-} - sec^{2-} = tan^{4-} + tan^{2-}$

(*ii*) $sec^{4-} + cos^{4-} = 1 - 2sin^{2-} + 2sin^{4-}$

(*c*) Differentiate with respect to x, if $f(x) = (cosx)^x$

(*d*) The cost C of production $\times$ articles is given as $C=x^3-16x^2+47x$. For what values of x, the average cost is decreasing ?

4. Give brief answers (any *two*).— 14

(*a*) Raju gets a commission at 10% on cash sales and 7% on credit sales. If he receives Rs. 1795 as commission on the total sale of Rs. 22000. Find the sale made by him in cash and on credit.

(*b*) Find the Age specific Death Rate for following data :—

Age Group	Population	Number of Deaths
0-20	7000	140
20-45	20000	180
45-65	10000	120
65 and above	4000	160

(*c*) Solve following simultaneous equation by any matrix method.

4X+3Y+2Z=150; X+2Y+3Z=125 and 6X+2Y+3Z=175.

(*d*) The first four moments of a variable are 0, 1.47, -0.54 and 4.09 respectively, find the co-efficient of Kurtosis Y_2.

5. Attempt any *four* of the following :— 16

(*a*) In a beauty contest two judges ranked the 12 entries as follows :—

x	1	2	3	4	5	6	7	8	9	10	11	12
y	12	9	6	10	3	5	4	7	8	2	11	1

What degree of agreement is there between the two judges ?

(*b*) Find the Harmonic Mean (H.M.) of two positive numbers whose A.M. is 7 and G.M. is 10.

(*c*) Find n if ${}^{2n}C_r = {}^{2r}C_{r+2}$

(*d*) Calculate the co-efficient of correlation between age of husband and age of wifes.

Age of Husband	23	27	28	29	30	31	33	35	36	39
Age of Wife	18	22	23	24	25	26	28	29	30	32

Draw scatter diagram and identify the type of correlation.

(*e*) A fair coin is tossed 8 times. Find the probability of getting

(*i*) Exactly 5 heads.

(*ii*) At least 3 heads.

(*iii*) At most 2 heads.

(*f*) Find the sequence that minimizes total elapsed time (in hours) required to complete the following jobs on two machines M_1 and M_2 in the order M_1 M_2. Also find the minimum elapsed time T and idle time for the two machines.

Job	1	2	3	4	5	6
M_1	30	120	50	20	90	110
M_2	80	100	90	60	30	10