

BACHELOR OF VOCATION
Automotive Manufacturing
Automotive Mechatronics
Subject: Applied Mathematics
Subject Code: ZBSC-101
Semester: Second
October 2020
Theory (External): 70 Marks
Time: 03 Hours

INSTRUCTIONS TO THE STUDENTS

1. Read the questions carefully and write the answers in the answer sheets.
2. Wherever necessary, the diagram drawn should be neat and properly labelled.
3. This questions paper comprises of 8 questions out of which student need to attempt any 4 questions.
4. All questions carry equal marks.
5. The time allotted will be 3 hours for examinations including time of downloading of question paper to emailing of answer books to the concerned Dean/IC.

ESSAY TYPE QUESTIONS

1. (a) In a survey of 400 students in a school, 100 were listed as taking apple juice, 150 as taking orange juice and 75 were listed as taking both apples as well as orange juice. Find how many students were taking neither apple juice nor orange juice.

(b) Expand the following expression using binomial expression
 $(3x + 2)^5$

2. (a) Prove that

$$\cot x = \frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x}$$

(b) Show that

$$\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$$

3. (a) Find X and Y if, $2X + 3Y = \begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix}$ and $3X + 2Y = \begin{bmatrix} 2 & -2 \\ -1 & 5 \end{bmatrix}$

(b) Find the determinant of the following matrices

i. $\begin{bmatrix} \sin x & \sin x \\ \cos x & \cos x \end{bmatrix}$

ii. $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 2 \\ 3 & 5 & 4 \end{bmatrix}$

4. (a) Differentiate with respect to x,

$$Y = \frac{\sin(ax + b)}{\cos(ax + b)}$$

(b) If $Y = 3e^{2x} + 2e^{3x}$. Then show that $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y$

5. (a) Evaluate the integral

$$\int \frac{1}{x(\log x)^2} dx$$

(b) Evaluate the integral

$$\int \sin x e^x dx$$

6. Solve the following system of linear equations using Cramer's rule.

$$6x + y - 3z = 5$$

$$x + 3y - 2z = 5$$

$$2x + y + 4z = 8$$

7. (a) Differentiate the following function with respect to x

$$\sqrt{5x^2 + 9} + \frac{5x}{(3x^2 + 8)}$$

(b) Evaluate the integral

i. $\int e^{mx} dx$

ii. $\int \log x dx$

8. (a) In a survey it was found that 21 people liked product A, 26 liked product B and 29 liked product C. If 14 people liked products A and B, 12 people liked products C and A, 14 people liked products B and C and 8 liked all the three products. Find how many liked product C only.

(b) In a class of 35 students, 24 like to play cricket and 16 like to play football. Also, each student likes to play at least one of the two games. How many students like to play both cricket and football?

*****END OF PAPER*****