

PARUL UNIVERSITY
FACULTY OF APPLIED SCIENCE
B.Sc., Winter2017-18 Examination

Semester: 2

Subject Code: 11106151

Subject Name: Mathematics-II

Date: 09/01/2018

Time: 10:30 pm to 1:00 pm

Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1. (A) Answer the following questions:

(08)

(a) Integrate $\int e^{4x} \sin 2x \cos 4x dx$

(b) Evaluate $\int_0^{\pi/2} \cos^6 x dx$

Q.1. (B) Answer the following questions (Any two)

(a) 1. Find the $\int \frac{x^2-2x+4}{x^3} dx$

(04)

2. If $A = \begin{bmatrix} 2 & 0 & -2 \\ 0 & -1 & -2 \\ 4 & -3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 3 \\ 0 & 2 & 4 \\ 2 & 2 & -1 \end{bmatrix}$. Find $2A - 3B$

(b) Express the matrix A as sum of a symmetric and a skew-symmetric matrix, where

(04)

$$A = \begin{bmatrix} 1 & -2 & -13 \\ -1 & -3 & 6 \\ -5 & 10 & 0 \end{bmatrix}$$

(c) Find the inverse of $A = \begin{bmatrix} -4 & 2 & -6 \\ -4 & 3 & -6 \\ 6 & -3 & 8 \end{bmatrix}$ by determinant method.

(04)

Q.2. (A) Answer the following questions.(a) 1. Integrate $\sin 3x \cos 5x$ with respect to x .

(04)

2. Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 0 \\ 1 & 2 & 1 \\ -2 & -4 & 2 \end{bmatrix}$ by determinant method.(b) Obtain a reduction formula for $\int_0^{\pi/2} x^n \cos x dx$

(04)

Q.2. (B) Answer the following questions (Any two)

(a) 1. $\int e^{\frac{3x}{2}} dx$ _____

(03)

2. If $A = \begin{bmatrix} 11 & 12 \\ 12 & 13 \\ 13 & 14 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & -2 & -3 & 4 \\ 4 & 3 & -2 & -1 \end{bmatrix}$ then dimension of matrix AB is _____,3. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 5 & 6 & 7 \end{bmatrix}$ then $\det(A)$ is _____

(b) Evaluate $\int \frac{e^{\sqrt{x}} \sin e^{\sqrt{x}}}{\sqrt{x}} dx$.

(03)

(c) Evaluate $\int \frac{\sin^4 x}{\cos^2 x} dx$

(03)

Q.3. (A) Answer the following questions:

(08)

(a) Find the Eigen values and Eigen vectors of $\begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix}$ (b) Find the inverse by using Cayley Hamilton theorem for $\begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$.

Q.3. (B) Answer the following questions (Any two)

(a) Evaluate $\int \frac{x+1}{(x-1)(x+2)} dx$ (04)

(b) Find the volume of the solid generated when the region between the graph $y = x$ and $y = \frac{1}{2} + x^2$ over the interval $[0,2]$ is revolved about the $x - axis$. (04)

(c) Evaluate $\int \tan^6 x dx$. (04)

Q.4. (A) Answer the following questions.

(a) Find the inverse of $A = \begin{bmatrix} 1 & 0 & 1 \\ -1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ by using Reduced Row-Echelon form. (04)

(b) Using Cramer's Rule solve the system of equation (04)

$$\begin{aligned} x + y &= 1 \\ 5x + 4y + z &= 7 \\ y + 2z &= 4 \end{aligned}$$

Q.4. (B) Answer the following questions (Any two)

(a) 1. If $A = \begin{bmatrix} 101 & 0 \\ -102 & 110 \end{bmatrix}$ then eigen values of A are _____ (03)

2. If $A = \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$ then $A - I = ?$

3. Define row matrix.

(b) If $A = \begin{bmatrix} 1 & 2 \\ -1 & -1 \end{bmatrix}$ and $p(x) = x^2 - 2x + 1$ then find $p(A)$. (03)

(c) Find Algebraic multiplicity and geometric multiplicity of eigen values of the identity matrix I_3 . (03)