

Reg No:.....
Name :.....

K25FY2461 C

Second Semester FYUGP Mathematics Examination
APRIL 2025 (2024 Admission onwards)
KU2DSCMAT111 (BASIC MATHEMATICS II)
(DATE OF EXAM : 02-05-2025)



Time : 120 min

Maximum Marks : 70

Part A (Answer any 6 questions. Each carries 3 marks)

1. Define dot product of two vectors. Also write the formula for angle between two vectors using dot product. 3
2. Define box product of three vectors. 3
3. Find parametric equation for a line through $(1, 1, 1)$ parallel to the z -axis. 3
4. In how many ways can a committee of 5 boys and 4 girls be selected out of 12 boys and 9 girls? 3
5. In a class, there are 30 boys and 20 girls. From the class list, one name is picked up randomly. Calculate the probability that it is a boy's name. 3
6. Find a_0 for the fourier series of $f(x) = \frac{1}{2}(\pi - x)$ on $[-\pi, \pi]$. 3
7. Define a periodic function. Check whether the constant function is periodic or not. 3
8. Show that sum of two odd function is also an odd function. 3

Part B (Answer any 4 questions. Each carries 6 marks)

9. Give geometrical description of the sets of points in space whose coordinates satisfy the given equations.
(a) $x = 1, y = 0$.
(b) $y^2 + z^2 = 1, x = 0$. 6
10. Let $\mathbf{v} = \mathbf{i} + 2\mathbf{j} - 3\mathbf{k}$. Find
(a) the terminal point of \mathbf{v} if the initial point is $(2, 1, 4)$
(b) the initial point of \mathbf{v} if the terminal point is $(2, 1, 4)$. 6
11. Find a vector perpendicular to the plane of $P(1, 1, 1)$, $Q(2, 1, 3)$ and $R(3, -1, 1)$. 6

12. Find the Fourier series of the function

$$f(x) = \begin{cases} 0, & -\pi < x < 0 \\ \pi, & 0 < x < \pi \end{cases} \text{ and } f(x+2\pi) = f(x).$$

6

13. Find the Fourier series expansion of $f(x) = |x|$ in the interval $-1 < x < 1$. 6

14. Find the Fourier Cosine series expansion of $f(x) = x^2$ in $(-\pi, \pi)$. 6

Part C (Answer any 2 question(s). Each carries 14 marks)

15. Evaluate the following Integrals

a $\int \sin^3 x \, dx.$

b $\int \cos^5 x \, dx.$

c $\int_0^{\frac{\pi}{2}} \sin^6 x \, dx.$

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16. Compute the following Integrals using reduction formula.

(a) $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^6 x \, dx.$

(b) $\int_0^{\frac{\pi}{2}} \sqrt{\sin x} \cos^5 x \, dx.$

14

17. A five figure number is formed by the digits 0,1,2,3,4 without repetition. Find the probability that the number formed is divisible by 4. 14