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120080 (Pages : 2) Reg. No:..............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester BSc Degree Examination, March/April 2020

BMT2C02 – Mathematics – 2

(2019 Admission onwards)

: 2 hours Max. Marks : 60

Section A

A maximum of 20 markscan be earned from this section.
Each question carries 2 marks.

. Find the Cartesian equation of $= \frac{4}{2cos\theta - sin\theta}$.

. Evaluate $\int \frac{4dx}{(e^x+e^{-x})^2}$.

. Prove that $\text{sech}^{-1} x = \cosh^{-1}\frac{1}{x}$.

. Show that $\sum_{i=1}^{\infty}\frac{i+1}{i}$diverges.

. If $f(x) = \frac{1}{1-x}$, $|x| < 1$, find series for $f'(x)$.

. Define absolute convergence and conditional convergence of a series.

. Test the convergence of the series $\sum_{n=1}^{\infty}\frac{2^n}{n^2}$.

. Define vector space.

. Show that the determinant of every orthogonal matrix is ± 1.

0. Define eigen value and eigen vector of a matrix.

1. Find the inverse of $A = \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$ with the help of Cayley Hamilton theorem.

2. Define Linear span of a nonempty subset S of a vector space V.

Section B

A maximum of 30 marks can be earned from this section.
Each question carries 5 marks.

3. Graph the curve $r^2 = sin2\theta$.

4. Find the length of the graph of the function $f(x) = \frac{x^4}{8} + \frac{1}{4x^2}$on $[1, 3]$.

5. Show that $\int_a^{\infty}\frac{1}{x^p}dx$(p is a constant and $a > 0$) converges if $p > 1$and diverges if $p \leq 1$.

6. Use Newton's method to find a solution of $x^3 - 8x^2 + 2x + 1 = 0$.

7. Check whether the set$\{1, 1 + x, (1 + x)^2, x^2\}$. a subset of P_2, is linearly independent or not.

8. Show that $\{(0,1,1), (1,1,0), (1,0,1)\}$is a basis of $\mathbb{R}^3$.

9. Solve the system of equations $2x - y + z = 7; 3x + y - 5z = 13; x + y + z = 5$ using Gaussian elimination Method.

Section C

Answer any One question. Each question carries 10 marks

20. Diagonalize the matrix $\begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$.

21. .

a. Find the length of the curve $r = 1 - cos\theta, 0 \leq \theta \leq 2\pi$.

b. Find the area shared by the circles $r = a\sqrt{2}$ and $r = 2a\ cos\theta$.

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2M20079 (Pages : 2) Reg. No:.............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester BSc Degree Examination, March/April 2020

BMT2B02 – Calculus – 2

(2019 Admission onwards)

me: 2 ½ hours Max. Marks : 80

SectionA (*Short Answer type)*

Ceiling (Maximum marks)– 25Marks

Each question carries 2 marks

1. Find the area of the region between the graph of $y = x^2 + 2$ and $y = x - 1$ and the vertical lines $x = -1$ and $x = 2$
2. Draw the graph of the natural logarithmic function y = ln x.
3. Find the derivative of $\ln(2x^2 + 1)$.
4. Solve $e^{2-3x} = 6$.
5. Find $\int \frac{\sqrt{\ln x}}{x} dx$.
6. Evaluate $\int_0^3 2^x \, dx$.
7. Find the derivative of $y = cos^{-1}3x$.
8. Evaluate $\sin(sin^{-1} 0.7)$.
9. Prove the identity $\cosh^2 x - \sinh^2 x = 1$
10. Define Improper Integrals.
11. State Monotone Convergence Theorem for Sequences.
12. Define theterm partial sum and when a series $\sum_{n=1}^{\infty} a_n$ is said to be convergent.
13. Find the radius of convergence and interval of convergence of $\sum_{n=0}^{\infty} n! \; x^n$.
14. Find the Maclaurin series of f(x) = sin x.
15. What is a Taylor series?

(Ceiling =25Marks)

Section B (*Paragraph type)*

Ceiling (Maximum marks) – 35Marks

Each question carries 5 marks

16. Find the length of the graph $f(x) = \frac{1}{3}x^3 + \frac{1}{4x}$ on the interval [1, 3].
17. Find the volume of the solid obtained by revolving the region bounded by the graphs of $y = x^3$, y =8, and x = 0 about the y axis.
18. Using l'Hopital rule, evaluate$\lim_{x \to 0} \frac{x^3}{x - tanx}$.
19. Find $\int \frac{1}{x\sqrt{x^4 - 16}} dx$.

20. Find the valuesof p for which $\int_1^\infty \frac{1}{x^p}\,dx$ is convergent.

21. a) State the integral Test for the convergence or divergence of the series $\sum_{n=1}^{\infty} a_n$.

b) Determine whether the series $\sum_{n=1}^{\infty} \frac{1}{n^2+1}$ converge or diverge.

22. Prove that every absolutely convergent series is convergent.

23. Determine whether the series $\sum_{n=1}^{\infty} \frac{n!}{n^n}$ is convergent or divergent.

(Ceiling =35Marks)

Section C (*Essay type*)

Answer any two questions

Each question carries 10 marks

24.

a) Find the area of the surface obtained by revolving the graph of the function $f(x) = \sqrt{x}$ on the interval [0, 2] about the x-axis.

b) Show that $sinh^{-1}x = \ln\left(x + \sqrt{x^2+1}\right)$.

25. Using l'Hopital rule

a) Evaluate $\lim_{x\to 0^+}\left(\frac{1}{x}\right)^{\sin x}$.

b) Evaluate $\lim_{x\to 0^+}\left(\frac{1}{x} - \frac{1}{e^x - 1}\right)$.

26.

a) State the limit Comparison Test.

b) Determine whether the series $\sum_{n=1}^{\infty} \frac{2n^2+n}{\sqrt{4n^7+3}}$ converges or diverges.

27.

a) State and prove the alternating series Test.

b) Show that the alternating harmonic series $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{n} = 1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} +$ ....is convergent.

(2 x 10 =20 Marks)