

Govt. of Bihar
Department of Mathematics
BCF, GEB, GEBHOJPUR

Assign Assignment

Mathematics I

1st semester (C+BEE+M+EE+EC
+CSE) 2019

All the students are directed to ~~submit~~
submit their assignment to Dr. Rajshekhar Pd
on or before 23.11.2019.

Q1. Define the rank of a matrix. Find
the rank of the matrix

$$A = \begin{bmatrix} 1 & 4 & 5 \\ 2 & 6 & 8 \\ 3 & 7 & 22 \end{bmatrix}$$

Q2. Test the convergence of the following

(a) $\frac{1}{3} + \frac{1}{3} \cdot \frac{2}{5} + \frac{1}{3} \cdot \frac{2}{5} \cdot \frac{3}{7} + \dots$

(b) $\left(\frac{1}{3}\right)^2 + \left(\frac{1 \cdot 2}{3 \cdot 5}\right)^2 + \left(\frac{1 \cdot 2 \cdot 3}{3 \cdot 5 \cdot 7}\right)^2 + \left(\frac{1 \cdot 2 \cdot 3}{3 \cdot 5 \cdot 7}\right)^2 + \dots$

Q3. Find the rank of the matrix

$$A = \begin{bmatrix} 1 & 2 & 3 & -2 \\ 2 & -2 & 1 & 3 \\ 3 & 0 & 4 & 1 \end{bmatrix}$$

by reducing it
to Echelon form.

Q4. (a) solve $(1 + e^{x/y}) dx + e^{x/y} \left(1 - \frac{x}{y}\right) dy = 0$

(b) $\frac{dy}{dx} - y \tan x = y^4 \sec x$.

5. (a) $\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x dx dy}{\sqrt{x^2+y^2}}$ by changing order of ~~Integration~~

Integration.

(b) Prove that

$$\beta(m, \frac{1}{2}) = 2^{2m-1} \beta(m, n)$$

6 (a) Using Green's theorem, Evaluate

$$\int_c [(y - \sin x) dx + \cos y dy]$$

where c is the plane triangle enclosed by the lines $y=0$, $x = \frac{\pi}{2}$ and $y = \frac{2}{\pi} x$.

(b) Find the directional derivative of $f = x^2 - y^2 + 2z^2$ at the point $P(1, 2, 3)$ in the direction of the line PQ where Q is the point $(5, 0, 4)$. Also calculate the magnitude of the maximum directional derivative.

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