

(2)

[Total No. of Questions: 8]

[Total No. of Printed Pages : 2]

- Q.5 a) Expand the function
 $f(x) = e^x$ by Maclurin's Theorem's
- b) Discuss the maximum and minimum of the function

$$u = x^3 + y^3 - 3axy$$

Q.6 a) Prove that $\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x + \sqrt{\cos x}}} dx = \frac{\pi}{4}$

b) if $x^x + y^y = a^x = a^y$, then find $\frac{dy}{dx}$

Q.7 a) Evaluate $\int_0^2 \int_0^1 (x^2 + y^2) dx dy$

b) Find the equation of tangent and normal at the point 't' on the curve $x = a \cos^3 t$ $y = a \sin^3 t$

Q.8 a) if $u = \log\left(\frac{x^4 + y^4}{x + y}\right)$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 3$

b) Define Beta and Gamma function and prove that

$$n\sqrt{n} = \sqrt{n+1}, n > 0$$

Enroll No.....

MA-11

B.Tech.-I Sem. (Reg./Ex) & II (Ex.)

Examination, March-2021

Mathematics-I

Time: Three Hours

Maximum Marks:70

Note: i) Attempt any five questions. (Each question carries equal marks)

Q.1 a) Find the Eigen value and Eigen vector of the matrix

$$A = \begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix}$$

b) Verify Cayley-Hamilton theorem of the matrix

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix} \text{ and Find } A^{-1} ?$$

Q.2 a) Verify Rolle's theorem for the function $f(x) = 10x - x^2$ in the interval [0,10]

b) if $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$, then show that

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$$

Q.3 a) Evaluate $\lim_{n \rightarrow \infty} \left(\frac{1}{n} + \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{3n}\right)$

Q.4 a) Prove that $\sqrt{\frac{1}{2}} = \sqrt{\pi}$

b) Prove that $\beta(m, n) = \beta(m + 1, n) + \beta(m, n + 1), m, n > 0$

www.bhabhauniversity.edu.in

www.bhabhauniversity.edu.in