M. P. SHAH ARTS & SCIENCE COLLEGE, SURENDRANAGAR.

Assignment-1 B. Sc. Semester-III (2019-20)

Mathematics Paper- 03(A)

Date of Submission: 13/08/2019 **Time: 01:45 to 02:40**

Q. 1 Answer the following questions.

1) Show that the sequence $\{S_n\}$ defined by $S_1 = 1, S_{n+1} = \frac{4+3S_n}{3+2S_n}, \forall n \in N$ is convergent and find its limit.

2) State and prove Cauchy's first theorem on limit.

3) Prove that every convergent sequence has a unique limit.

4) Prove that monotonic increasing and bounded above sequence is convergent.

5) Show that $\{S_n\}$ is divergent where $S_n = 1 + \frac{1}{2} + \frac{1}{3} + \ldots\ldots + \frac{1}{n}$.

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Assignment-2 B. Sc. Semester-III (2019-20)

Mathematics Paper- 03(A)

Date of Submission: 27/08/2019 **Time: 01:45 to 02:40**

Q. 1 Answer the following questions.

1) Prove that $rl(\varphi\bar{f}) = \varphi curl\bar{f} + grad\varphi \times \bar{f}$ **.**

2) If $\bar{f}$ **and** $\bar{g}$ **are irrational functions on D then show that** $\bar{f} \times \bar{g}$ **is a solenoidal function.**

3) In usual notation prove that $dir(r^n\bar{r}) = (n + 3)r^n$.

4) If $\bar{u} = log(x^2 + y^2 + z^2)$**, then find (i)** $grad\bar{u}$ **(ii)** $div(grad\bar{u})$ **at the point (1, 2, 3).**

5) Prove that $\nabla^2(logr) = \frac{1}{r^2}$ **where** $r = |\bar{r}| = \sqrt{x^2 + y^2 + z^2}$ **.**

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Assignment-3 B. Sc. Semester-III (2019-20)

Mathematics Paper- 03(A)

Date of Submission: 06/09/2019 **Time: 01:45 to 02:40**

Q. 1 Answer the following questions.

1) Discuss the convergence of the series $1 + 2^2.x + 3^2.x^2 + 4^2.x^3 + \cdots$

2) Show that the series $\sum_{i=1}^{\infty}(-1)^n(\sqrt{n^2+1}-n)$ **is conditionally convergent.**

3) Prove that $\beta(p,q) = \int_0^1 \frac{x^{p-1}+x^{q-1}}{(1+x)^{p+q}}dx$, **where** $p > 0, q > 0.$

4) Prove that $\beta(m,n) = \beta(m+1,n) + \beta(m,n+1)$.

5) Derive the relation between Beta and Gamma function.

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Assignment-4 B. Sc. Semester-III (2019-20)

Mathematics Paper- 03(A)

Date of Submission: 14/09/2019 **Time: 01:45 to 02:40**

Q. 1 Answer the following questions.

1) Find $\int_C xydx + (x^2 + y^2)dy$, **where** C **is an arc of curve** $y = x^2 - 4$ **from (2,0) to (4,12).**

2) State and prove Green's theorem.

3) Verify Stokes theorem for $\overline{F} = x^2\bar{\imath} + xy\bar{\jmath}$ **and S is a square whose sides are x=0, y=0, x=a, y=a, where z=0.**

4) Find $\iint_S x^2dydz + y^2dzdx + 2z(xy - x - y)dxdy$, **where** $S : 0 \leq x, y, z \leq 1$ **a solid surface.**

5) Verify Gauss divergence theorem for $\iint_S xdydz + ydzdx + zdxdy$, **where S is upper hemi-ellipsoid** $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1, z > 0$.