Roll No. Total No. of Pages : 02

Total No. of Questions : 09

B.Sc. (Non Medical) (2018 Batch) (Sem.–3)

ANALYSIS-I

Subject Code : BSNM-305-18

M.Code : 76904

Time : 3 Hrs. Max. Marks : 50

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

a) Prove that $\sum\left(\frac{n}{n+1}\right)^n$ is divergent.

b) Define Absolute and Conditional Convergence.

c) Define lower & upper Riemann integral.

d) If $f \in R\,[0, a]$, then prove that $\int_0^a f(x)\,dx = \int_0^a f(a-x)\,dx, a > 0$.

e) Define improper integral of first kind.

f) Examine the convergence of $\int_{-\infty}^{0} e^{4x}\,dx$.

g) Define Gamma Function.

h) Prove symmetry of Beta Function.

i) State comparison test for series.

j) Write the relation between Beta & Gamma function.

SECTION-B

2. Test the following series for convergence.

$$\sqrt{\frac{1}{2^3}}+\sqrt{\frac{2}{3^3}}+\sqrt{\frac{3}{4^3}}+\ldots\ldots$$

3. State and prove Necessary & Sufficient condition for a bounded function to be R-integrable on $[a, b]$.

4. State and prove Abel's Test.

5. Prove that $B(m, n) \int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}} dx = \int_0^\infty \frac{x^{m-1}}{(x)^{m+n}} dx ; m, n, > 0$.

6. If a function f is R-integrable on $[a, b]$ then f^2 is also R-integrable on $[a, b]$

SECTION-C

7. a) Show that the series $\frac{(-1)^n(n+2)}{2^n+5}$ is absolutely convergent.

   b) If a function f is integrable on $[a, b]$ then $m(b-a) \le \int_a^b f(x)\,dx \le M(b-a)$.

8. a) Show that $\int_0^1 \frac{\sin^{\frac{1}{x}}}{x^p} dx, p>0$ converges absolutely for $p < 1$.

   b) Prove that $\Gamma\left(n+\frac{1}{2}\right)=\frac{\sqrt{\pi}\,\Gamma(2n+1)}{2^2\Gamma(n+1)}$.

9. a) If f_1 & $f_2 \in R(a, b)$ & $f_1(x) \le f_2(x)\ \forall\ x \in [a, b]$ then $\int_a^b f_1(x)\,dx \le \int_a^b f_2(x)\,dx$.

   b) Prove that $B(m, n) = B(m, n+1) + B(m+1, n)$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.