

Roll No.

Total No. of Pages : 02

Total No. of Questions : 16

B.Sc. (Computer Science) (2013 & Onwards) (Sem.-3)

SEQUENCE SERIES AND CALCULUS

Subject Code : BCS-302

M.Code : 71774

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **SIX** questions carrying **TEN** marks each and students have to attempt **ANY FOUR** questions.

SECTION-A

1. Test for convergence of $\sum \sin \frac{1}{n}$
2. Prove $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$
3. Test the convergence of $\sum \frac{5^n}{4^n + 3}$
4. Test the convergence of $\int_0^\infty \frac{4a}{x^2 + 4a^2} dx$
5. Test the convergence of $\sum \frac{1}{\left(1 + \frac{1}{n}\right)^{n^2}}$
6. Evaluate $\int_0^\infty \frac{x^8(1-x^6)dx}{(1+x)^{24}}$
7. State necessary and sufficient condition for a bounded function to be Riemann-integrable.
8. State Cauchy Condensation test.
9. If $[x]$ stands for integral part of x , then show that $\int_0^1 [5x] dx = 2$
10. State Cauchy's convergence criterion.

SECTION-B

11. a) Test the convergence of $\sum \frac{x^{n+1}}{(n+1)\sqrt{n}}$
- b) Test the convergence of $\sum (-1)^{n-1} \frac{1}{n}$. Is the series absolutely convergent?
12. Test the convergence of $\frac{x}{1.2} + \frac{x^2}{3.4} + \frac{x^2}{5.6} + \dots \infty$.
13. Prove that $\int_0^{\pi/2} \sin^p \theta \cos^q \theta d\theta = \frac{1}{2} \beta\left(\frac{p+1}{2}, \frac{q+1}{2}\right)$.
14. Let $f(x) = x^3$ on $[0, a]$, $a > 0$. Show that f is R-integrable on $[0, a]$ and compute $\int_0^a f(x) dx$
15. Show that $\int_0^1 \frac{\log(1+x)}{1+x^2} dx = \frac{\pi}{8} \log^2$.
16. Discuss the convergence of the series $\sum \frac{1.4.7\dots(3n-2)}{2.5.8\dots(3n-1)}$.

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.