Reg. No................................

FIFTH SEMESTER B.Sc. DEGREE (U.G.—CCSS) EXAMINATION NOVEMBER 2014

(SDE)

Mathematics

MM 5B 07—BASIC MATHEMATICAL ANALYSIS

Time : Two Hours and Forty-five Minutes

Maximum : 27 Weightage

Part A

Answer all the **nine** *questions.*

1. Define direct image and inverse image of a set under a function with example.
2. Check whether the function f : A $\to$ R, where A $= \{x \in R / x \neq 1\}$ defined as $f(x) = \frac{}{x} - 1$ is an injective map
3. Determine the set A of real numbers x such that $2x + 3 < 6$
4. State the supremum properly and infimum property of R.
5. Show that a sequence of real numbers can have atmost one limit.
6. Find $\lim \frac{2n}{\sqrt{n^2 +}}$
7. If $x = \lim x_n$ then prove that $|x| = \lim |x_n|$
8. Show that : (a) $\left| e^{iQ} \right| = 1$; (b) $\left[e^{i\cap} \right] =$
9. Prove that z is real if and only if $z = z$.

(9 x 1 = 9 weightage)

Part B

Answer any **five** *questions.*

10. State and prove Bernoulli's inequality.
11. Prove that $|a + b| < |a| + |b|$ for any two real numbers a and b.

Turn over

12. Prove that Sup (a + S) = a + Sup S for any non-empty subset S of R that is bounded above and $a \in R$.

13. If the sequences (x_n) and (y_n) converges to x and y respectively. Show that $(x_n + y_n)$ and (cx_n), $c \in R$ converges to x + y and cx respectively.

14. State and prove squeeze theorem for sequences of real numbers.

15. Give an example of a bounded sequence that is not Cauchy.

16. Finf the principal argument Arg (z) when $z = (\sqrt{z} -$.

17. Find all values of $(-8i)^{1/3}$.

(5 x 2 = 10 weightage)

Part C

Answer any **two** *questions.*

18. Prove the existance of a positive real number x such that $x^2 = 2$.

19. Show that $(b \ )$ converges if and only if $0 < b < 1$.

20. Find all the nth roots of unity.

(2 x 4 = 8 weightage)