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Reg. No.:....

Name:.....



K19U 2473

III Semester B.Sc. Degree (CBCSS-Reg./Sup./Imp.)

Examination, November - 2019

(2017 Admn. Onwards)

CORE COURSE IN MATHEMATICS

3B 03 MAT : ELEMENTS OF MATHEMATICS-I

Time: 3 Hours Max. Marks: 48

SECTION - A

All the first 4 questions are compulsory. They carry 1 mark each.

- State True/False, the square of an odd integer is odd.
- 2. Find the remainder when $x^3 7x 1$ is divided by x + 2.
- 3. State Sturm's theorem.
- 4. The greatest common divisor of -17 and 17 is?

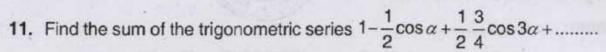
SECTION-B

Answer any 8 questions from among the questions 5 to 14. These questions carry 2 marks each.

- 5. If A_m is a countable set for each $m \in N$ prove that the union $A = \bigcup_{m=1}^{\infty} A_m$ is countable.
- 6. Prove that square of an odd integer is also an odd integer.
- 7. Form a polynomial equation of fourth degree with rational coefficients having one root $\sqrt{2} + \sqrt{-3}$.
- **8.** If α, β, γ are the roots of $2x^3 + 3x^2 x 1 = 0$ find the equation whose roots are $\alpha\beta, \beta\gamma, \gamma\alpha$.
- 9. If $\alpha, \beta, \gamma, \delta$ are the roots of $x^4 + px^3 + qx^2 + rx + s = 0$ find the value of $\sum (\alpha \beta)^2$
- 10. Show that $x^5 2x + 7 = 0$ has at least two imaginary roots.

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- 12. If % and % with gcd(a,b)=1 prove that ab/c
- 13. Prove that there is an infinite number of primes.
- 14. Find the remainder when 250 is divided by 7.

SECTION-C

Answer any 4 questions from among the questions 15 to 20. These questions carry 4 marks each.

- 15. State and prove Cantor's theorem.
- **16.** Solve $x^4 8x^3 + 14x^2 + 8x 15 = 0$ given that the roots are in arithmetic progression.
- 17. Solve the reciprocal equation $x^4 + 6x^3 5x^2 + 6x + 1 = 0$
- 18. Solve the Diophantine equation 172x+20y=1000
- 19. Prove that the integer 53103+10353 is divided by 39.
- 20. Find all prime numbers that divide 50!.

SECTION-D

Answer any 2 questions from among the questions 21 to 24. These questions carry 6 marks each.

- 21. a) Prove that the Q of rational numbers is denumerable
 - b) Show that the propositions $\neg(p \land q)$ and $\neg p \lor \neg q$ are logically equivalent.
- 22. If α , β , γ are the roots of $x^3 + qx + r = 0$ find the equation whose roots are

$$\frac{\beta}{\gamma} + \frac{\gamma}{\beta}, \frac{\gamma}{\alpha} + \frac{\alpha}{\gamma}, \frac{\alpha}{\beta} + \frac{\beta}{\alpha}$$
.

- 23. Solve $x^3 + 6x = 20$ using carden's method.
- 24. Using Euclidean algorithm obtain the gcd(826, 1890) and find integers x and y such that gcd(826,1890) = 826x + 1890y.