

SEAT No. _____

[24]

No of printed pages: 2

Sardar Patel University

M.Sc. (Sem-III), PS03EMTH21, Mathematics Education-I;

Tuesday, 24th April, 2018; 02.00 p.m. to 05.00 p.m.

Maximum Marks: 70

Note: (i) Notations and terminologies are standard; (ii) Figures to the right indicate marks.

Q.1 Answer the following.

[8]

1. Who is known as a founder of zero ?

- (A) Ramanujan (B) Brahmagupta
(C) Aryabhatta (D) none of these

2. $(10101)_2 = ()_{10}$.

- (A) 16 (B) 12 (C) 21 (D) 25

3. $\sum_{n=1}^{\infty} \left(\frac{1}{3}\right)^n =$

- (A) $\frac{2}{3}$ (B) $\frac{3}{2}$ (C) $\frac{1}{2}$ (D) $\frac{1}{3}$

4. Which one is perfect number ?

- (A) 11 (B) 14 (C) 28 (D) 2

5. Which one from the following is not a group ?

- (A) $(\mathbb{Z}, +)$ (B) $(\mathbb{Z}, -)$ (C) $(2\mathbb{Z}, +)$ (D) none of these

6. Which one is not a Pythagorean triplet ?

- (A) (3, 4, 5) (B) (6, 7, 8) (C) (6, 8, 10) (D) (5, 12, 13)

7. Euler's formula for planer graph is

- (A) $V + E = F + 2$ (B) $V - E = 2 - F$
(C) $V - E = F - 2$ (D) none of these

8. Who is known as Euler spoiler ?

- (A) Ramanujan (B) Shrikhande
(C) Bhaskaracharya (D) Aryabhatta

Q.2 Attempt any *seven*:

[14]

(a) List Peano's postulates on arithmetic.

(b) What is Fermat's conjecture on prime numbers ?

(c) Define Fibonacci sequence.

(d) If $a \equiv b \pmod{n}$, $c \equiv d \pmod{n}$, then show that $ac \equiv bd \pmod{n}$.

(e) State Pigeonhole principle.

(f) State Fermat's last theorem.

(g) Is $\sqrt{5 + \sqrt{5}}$ algebraic over \mathbb{Q} ? Justify.

(h) Give postulates of Euclidean geometry.

(i) Find the volume of the cylinder with radius 3 inches and height is 4 inches.

[P.T.O.]

Q.3

- (a) Write any one biography from the following: [6]
(i) Aryabhata (ii) Brahmagupta
- (b) Give a brief short note on 'arithmetic'. [6]

OR

- (b) Convert (i) $(426)_{10}$ into octal number; (ii) $(348)_{10}$ into hexadecimal number;
(iii) $(235)_8$ into binary number.

Q.4

- (a) Write any one biography from the following: [6]
(i) Pythagoras (ii) Ramanujan
- (b) Discuss Fibonacci sequence and relation with Golden ratio. [6]

OR

- (b) Show that for any Pythagorean triplet (a, b, c) , abc is divisible by 60.

Q.5

- (a) Write any one biography from the following: [6]
(i) Bhaskaracharya (ii) Évariste Galois
- (b) Let $G = \mathbb{R} \setminus \{1\}$ and define $x * y = x + y - xy$, where $x, y \in G$. Show that $(G, *)$ is [6]
a group.

OR

- (b) Discuss Cardan's method.

Q.6

- (a) Give brief history about trigonometry. [6]
(b) Discuss Euler's problem of 36 soldiers. [6]

OR

- (b) Discuss the crazy cube problem.

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