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Seat No.: _____

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Sardar Patel University

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

Friday, 28th October, 2016; 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) Aryabhata (B) Brahmagupta (C) Ramanujan
 (D) none of these
2. Which of the following number system has base 60 ?
 (A) Egyptian (B) Hindu-Arabic (C) Babylonians
 (D) none of these
3. The value of Golden ratio is
 (A) $\frac{\sqrt{2+1}}{5}$ (B) $\frac{1-\sqrt{5}}{2}$ (C) $\frac{\sqrt{5}-1}{2}$ (D) $\frac{\sqrt{5}+1}{2}$
4. Which one is not a perfect number ?
 (A) 111 (B) 28 (C) 6 (D) none of these
5. Which one from the following is a field ?
 (A) $(\mathbb{Z}, +, \cdot)$ (B) $(2\mathbb{Z}, +, \cdot)$ (C) $(\mathbb{Q}, +, \cdot)$ (D) none of these
6. Which one is not a Pythagorean triplet ?
 (A) (3, 4, 5) (B) (6, 8, 10) (C) (5, 12, 13) (D) (6, 7, 8)
7. Euler's formula for planer graph is
 (A) $V + F = E + 2$ (B) $V - F = E + 2$
 (C) $V + F = E - 2$ (D) none of these
8. The number of faces in octahedron is
 (A) 12 (B) 6 (C) 8 (D) 20

Q.2 Attempt any *seven*:

[14]

- (a) List Peano's postulates on arithmetic.
- (b) If $(45)_6 + (54)_6 = (x)_6$ then find x .
- (c) The 3rd and 6th term in arithmetic progression are -8 and -17 respectively. Find 30th term of it.
- (d) What is Waring's conjecture ?
- (e) What are three problems of antiquity ?
- (f) Define algebraic number with an example.
- (g) Give postulates of Euclidean geometry.
- (h) Give applications of trigonometry.
- (i) What is Pigeonhole principle ?

Q.3

- (a) Write any one biography from the following: [06]
(i) Aryabhatta (ii) Brahmagupta (iii) Peano
- (b) Write a short note on 'arithmetic'. [06]

OR

(b) Evaluate: $\sqrt{2 + \sqrt{2 + \sqrt{2 + \dots}}}$

Q.4

- (a) Write any one biography from the following: [06]
(i) Pythagoras (ii) Ramanujan (iii) Euler
- (b) Discuss Fibonacci sequence and relation with Golden ratio. [06]

OR

- (b) Let a and b be two nonzero consecutive even integers with $\frac{1}{a} + \frac{1}{b} = \frac{p}{q}$, where $(p, q) = 1$.
Prove that $(p, q, q + 1)$ is a Pythagorean triplet.

Q.5

- (a) Discuss Modern Algebra. [06]
(b) Discuss Cardan's method. [06]

OR

(b) Let $60^a = 3$ and $60^b = 5$. Find $12^{\frac{1-a-b}{2(1-b)}}$.

Q.6

- (a) Give brief history about trigonometry. [06]
(b) Discuss the relation of geometry with arithmetic and algebra. [06]

OR

- (b) Discuss Euler's problem of 36 soldiers.
