

SEAT No. _____

No of printed pages: 2

[51]

Sardar Patel University

M.Sc. (Sem-IV), PS04EMTH21, Mathematics Education-II;

Friday, 20th 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]

- If $x = \log_b(\sqrt{b^{-4}})$, then the value of x is
(A) -2 (B) -4 (C) 2 (D) b
- The curve $y = \log_2 x$ passes through the point $(k, 3)$, then k is
(A) 3 (B) 9 (C) 8 (D) 2
- If $y = \ln\left(\sqrt{\frac{1+2x}{1-2x}}\right)$, then y' is
(A) $\frac{4x^2-1}{2}$ (B) $\frac{1-4x^2}{2}$ (C) $\frac{2}{4x^2-1}$ (D) $\frac{2}{1-4x^2}$
- $\lim_{n \rightarrow \infty} \left(1 - \frac{5}{n}\right)^n =$
(A) e^{-5} (B) e^5 (C) e (D) 1
- Which of the following inequalities is satisfied, if $-1 < x < 5$?
(A) $|x| < 5$ (B) $|x-1| < 5$ (C) $|x-2| < 3$ (D) $|x| > 0$
- Which of the following pair of sets are not in one to one correspondence ?
(A) $[-1, 1], [0, 1]$ (B) $\mathbb{R}, (-1, 1)$ (C) \mathbb{N}, \mathbb{Q} (D) \mathbb{Q}, \mathbb{R}
- Who first proposed four color problem ?
(A) Francis Guthrie (B) De Morgan
(C) Kempke (D) none of these
- The Bieberbach conjecture was proved by
(A) Fermat (B) Apple and Haken
(C) Louis de Branges (D) Paul Erdos

Q.2 Attempt any seven:

[14]

- If the pH of milk is 6.8, then find the hydrogen ion concentration.
- Find the center and radius of the sphere $x^2 + y^2 + z^2 - 3x + 5y - 4z = 0$.
- Transform $r = \frac{9}{4+5 \cos \theta}$ in cartesian form.
- What were the three major problems which gives rise to calculus ?
- Suppose one object is thrown off the top of the building and $f(t) = 50 + 5t - t^2$ represents its height in meters after t second. How much time it will take to hits the ground ?
- In a row of 54 students, A is 15th from the left side of the row and B is 20th from the right side of the row. Find the number of students in between A and B .
- What is Russell's paradox ?
- What is Riemann's hypothesis ?
- State prime number theorem.

(P.T.O.)

Q.3

- (a) Write biography from the following (any one): [6]
(i) Charles Babbage (ii) René Descartes
- (b) Discuss history of Logarithms. [6]

OR

- (b) In a triangle with vertices $A(-2, 0)$, $B(6, 6)$, $C(1, -4)$, find the length of bisector \overline{AE} and equations of lines \overleftrightarrow{AB} , \overleftrightarrow{BC} and \overleftrightarrow{AC} .

Q.4

- (a) Write biography from the following (any one): [6]
(i) Leibnitz (ii) Newton
- (b) Discuss applications of calculus. [6]

OR

- (b) Suppose $f(t)$ represents the amount of liters in a water tank after t days. What does $f'(-4) = -2$ mean? What does $f''(4) = 0.5$ mean? If $f''(t) = 0.5, \forall t$, then at what time will the tank no longer be losing water?

Q.5

- (a) Explain Zeno's paradox. [6]
(b) Discuss history of set theory and logic. [6]

OR

- (b) Six persons A, B, C, D, E and F participated in a running race and each of them completed the race in different positions. D finished the race after only two other persons finished the race. Also F is the only person to finish the race before A and after C . Moreover, E is not the first person to finish the race. Find positions of all these persons when the race is finished.

Q.6

- (a) State and prove Ramsey's problem. [6]
(b) Discuss Konigsberg seven bridge problem. [6]

OR

- (b) Discuss the development of modern mathematics.

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