



NF-014-003109

Seat No. _____

M. P. M. (Sem. I) (CBCS) Examination

January – 2017

Remedial Mathematics (BP-105 A)

(Pharmacy) (Old Course)

Faculty Code : 014

Subject Code : 003109

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 80

Instructions :

- (1) Answer and tie up both the sections separately.
- (2) Figure to the right indicates marks.
- (3) Answer any three (03) questions from each section.
- (4) Question (I) and (V) [Q. 1, 5] are compulsory.

SECTION - I

1 Attempt any seven :

7×2=14

- (1) Let $A = \{x, y, z\}$, $B = \{1, 2, 3\}$. Write down all the elements of the set $A \times B$.
- (2) Find out both the empty set from the followings :
 $\{\{\ \}\}$, ϕ , $\{0\}$, $\{\phi\}$, $\{\ \}$.
- (3) Let $A = \{1\}$, $B = \{b\}$. Find out $A \cup B$ and $A \times B$. Also write down number of elements in the sets $A \cup B$ and $A \times B$.
- (4) What is value of $\lim_{x \rightarrow 2} 3x^2 + 6x + 8$?
- (5) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a function defined by $f(x) = \frac{x+1}{3}$, $\forall x \in \mathbb{R}$.
Find out the inverse function f^{-1} of f .
- (6) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a map defined by $f(x) = 3x^2 + 4x - 1$.
What is value of $f(1)$?
- (7) Find out derivative of $\sin(x^3)$.
- (8) Find the value of $\int (x^5 + 3x^2) dx$.
- (9) Let $f : \mathbb{N} \rightarrow \mathbb{N}$ be a function defined by $f(x) = x^2$, $\forall x \in \mathbb{N}$.
Find out range of the function f .

(10) Write down following formula :

$$\frac{d}{dx} (\tan x) = \dots\dots\dots, \frac{d}{dx} (\sec x) = \dots\dots\dots ?$$

2 (a) Attempt following four questions : **4×2=8**

(1) Let $A = \{1, 2, 3\}$, $B = \{2, 3, 5\}$. Find $A \cup B$ and $A \cap B$.

(2) Give definition of a relation from a set A into another set B .

(3) Find derivative of $(2x+5)^2$.

(4) Find value of $\frac{d}{dx}(4e^x + 5x^2)$.

(b) Attempt any one : **1×5=5**

(1) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = x^3$. Prove that f is one-one and onto map.

(2) Find out value of $\lim_{x \rightarrow 0} \frac{\tan x - \sin x}{x^3}$.

3 (a) Attempt any one : **1×4=4**

(1) Find the value of $\lim_{x \rightarrow 0} \left[\frac{e^x + \tan x - 1}{x} \right]$.

(2) Find the value of $\lim_{x \rightarrow 0} \left[\frac{a^x - b^x}{x} \right]$.

(b) Attempt any one : **1×3=3**

(i) Prove that $\frac{d}{dx} \left(\sqrt{5+e^x} \right) = \frac{e^x}{2\sqrt{5+e^x}}$.

(ii) Define following terms :
One-one function, onto function, inverse function.

(c) Answer following question : **6**

Describe about method of substitution for integration. Using it prove

$$\text{that } \int (x^2 + x + 1)^4 (2x + 1) dx = \frac{1}{5} (x^2 + x + 1)^5 + C.$$

4 (a) Let $A = \{1, 2, 3, 4\}$, $B = \{b, c, d, e\}$. Let R be a relation from A **4**

into B and $R = \{(1, e), (2, b), (3, c), (4, d)\}$. Find out the inverse

relation R^{-1} from B into A . Also draw Van diagram for R^{-1} .

(b) Attempt any three :

3×3=9

(1) Find the value of $\frac{d}{dx} \left(e^{\cos x} \right)$.

(2) Draw graph of the function $f : \mathbb{R} \rightarrow \mathbb{R}$ defined by

$$f(x) = x^2, \quad \forall x \in \mathbb{R}.$$

(3) Let $f(x) = 4x - 3$, $g(x) = \frac{x+3}{4}$. Find $fof(x)$ and $gof(x)$.

(4) Find the value of $\int \cos^2 x dx$.

SECTION - II

5 Attempt any two :

2×7=14

(a) Find the value of $\int (x^2 + 2x + 1) e^x dx$.

(b) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a function defined by $f(x) = \frac{1}{1-x}$, $\forall x \in \mathbb{R}$.
Find the value of $fof(x)$ and $fofof(x)$.

(c) Let $y = a \cos(\log x) + b \sin(\log x)$. In standard notation derive the differential equation $x^2 y_2 + xy_1 + y = 0$.

(d) Let $y = e^{m \cos^{-1} x}$. Prove that $\frac{d}{dx} (\cos^{-1} x) = \frac{-1}{\sqrt{1-x^2}}$ and
 $(1-x^2) y_2 - xy_1 - m^2 y = 0$.

6 (a) Draw the graph of function $\log x$.

3

(b) Attempt any five :

2×5=10

(1) Let $y = f(x)$. Give definition of $\frac{dy}{dx}$ or $f'(x)$.

(2) Find the value of $\lim_{x \rightarrow 0} \frac{x^2 + 5x - 6}{2x - 11}$.

(3) Find the value of $g(0)$ and $g(1)$, when $g(x) = x^3 + 2x^2 + 11$.

(4) Find the value of $\lim_{n \rightarrow \infty} \frac{2n+3}{n+6}$.

- (5) Prove that $\frac{d}{dx}(\sin e^x) = e^x \cdot \cos e^x$.
- (6) Find the value of $\int (3x^2 + 4x + 5) dx$.
- 7 (a) Let $y = \frac{\tan^3 x}{3} - \tan x + x$. Prove that $\frac{dy}{dx} = \tan^4 x$. 5
- (b) Attempt any two : 2×4=8
- (1) Find $\frac{d}{dx}(\sec^2 x)$.
- (2) Find $f(0), f(2), f(3), f(4)$, when $f(x) = x^3 - 9x^2 + 26x - 24$.
- (3) Find the value of $\int \left(3x^2 + 6x + \frac{2}{x}\right) dx$.
- (4) Prove that $\frac{d}{dx}(\sin(e^{2x})) = 2 \cdot e^{2x} \cdot \cos(e^{2x})$.
- 8 (a) Let $A = \{1, 4, 6\}, B = \{6, 10, 11\}$. Find the value of 3
 $A \cup B, A \cap B, A \times B$.
- (b) Attempt any five : 5×2=10
- (1) What is $f^{-1}(x)$? When $f(x) = 2x$.
- (2) Find $\frac{d}{dx}(e^x + x^2)$.
- (3) Draw Van-diagram of any one to one relation from A into B , when $A = \{1, 2, 3\}$ and $B = \{c, b, a\}$.
- (4) $\int (6x^5) dx = \dots\dots\dots ?$
- (5) $\int a^x \cdot dx = \dots\dots\dots ?$
- (6) $\frac{d}{dx}\left(\frac{x^5}{5} + \frac{x^2}{2} + 7\right) = \dots\dots\dots ?$
- (7) Write down value of $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$.