

Reg. No.

FY-51

Name :

## FIRST YEAR HIGHER SECONDARY EXAMINATION, MARCH 2020

Part – III

MATHEMATICS (COMMERCE)

Time : 2 Hours

Maximum : 60 Scores

Cool-off time : 15 Minutes

**General Instructions to Candidates :**

- There is a 'Cool-off time' of 15 minutes in addition to the writing time.
- Use the 'Cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- Read the instructions carefully.
- Calculations, figures and graphs should be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

**വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :**

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

**Answer any 6 questions from 1 to 8. Each carries 3 scores.**

**(6 × 3 = 18)**

1. Let  $A = \{1, 2, 3, 4\}$ ,  $B = \{2, 4, 6\}$ ,  $C = \{1, 3, 5\}$ , then (1)
  - (i)  $A \cap B = \underline{\hspace{2cm}}$ .
    - (a)  $\{1, 2, 3, 4, 6\}$                       (b)  $\{2, 3\}$
    - (c)  $\{2, 4\}$                                 (d)  $\{4\}$
  - (ii) Find :  $(B \cup C) - A$  (2)
  
2. (i) Choose the correct value of  $x$  from those given below such that  $\cos x = \frac{\sqrt{3}}{2}$  (1)
  - (a)  $\frac{\pi}{2}$     (b)  $\frac{\pi}{4}$
  - (c)  $\frac{\pi}{3}$     (d)  $\frac{\pi}{6}$
- (ii) Simplify :  $\frac{\cos\left(\frac{\pi}{2} - x\right)}{\cos\left(\frac{\pi}{2} + x\right)}$  (1)
- (iii)  $\sin(-x) + \sin x = \underline{\hspace{2cm}}$ . (1)
  - (a) 0    (b) 1
  - (c) -1    (d)  $2 \sin x$
  
3. (i) Solve the inequality : (2)

$$5(x - 2) \leq 2(2x - 1)$$
- (ii) Represent the solution of the above inequality in a number line. (1)
  
4. Consider the statement,  
 $P(n)$  ; “ $5^n - 5$  is a multiple of 4”
  - (i) The value of  $P(n)$  when  $n = 1$  is (1)
    - (a) 5    (b) 0
    - (c) 1    (d) -5
  - (ii) Using PMI, prove that  $P(n)$  is true for all  $n \in \mathbb{N}$ . (2)

5. Using Binomial theorem, prove that  $9^{n+1} - 8n - 9$  is divisible by 64, where  $n \in \mathbb{N}$ . (3)
6. If  $A(0, 4, 0)$ ,  $B(3, 0, 2)$  and  $C(0, 2, 1)$  are three points in the space,
- (i) A is a point on (1)
- (a) X axis (b) Y axis
- (c) Z axis (d) XZ plane
- (ii) Find the centroid of  $\Delta ABC$ . (2)
7. (i) The negation of the statement : “4 is a multiple of 2” is \_\_\_\_\_. (1)
- (ii) Using the method of contradiction prove that “ $\sqrt{2}$  is an irrational number”. (2)
8. (i) If A and B are two events in a random experiment, then which among the following is valid ? (1)
- (a)  $P(A) = 2$  (b)  $P(B) = -0.5$
- (c)  $P(A) = 0.2$  (d)  $P(A \cup B) = 1.6$
- (ii) A pair of dice are rolled. Write the following events in roster form : (2)
- A : The difference of numbers obtained is greater than 4.
- B : Both the numbers obtained are multiples of 3.

Answer any 6 questions from 9 to 16. Each carries 4 scores.

(6 × 4 = 24)

9. (i) If  $(x, 9) = (2, y)$ , then  $(x, y) =$  (1)

(a)  $(-2, 9)$  (b)  $(9, 2)$

(c)  $(2, -9)$  (d)  $(2, 9)$

(ii) Write the relation R given below in roster form.

$$R = \{ (x, 1 - x) : x \in A \},$$

where  $A = \{ -2, -1, 0, 1, 2 \}$  (2)

(iii) Find the range of R given above. (1)

10. (i) Find A if  $\sin x + \sin y = 2 \sin \left( \frac{x+y}{2} \right) \cos A$  (1)

(ii) Prove that :

$$\frac{\tan \left( \frac{\pi}{4} + x \right)}{\tan \left( \frac{\pi}{4} - x \right)} = \left( \frac{1 + \tan x}{1 - \tan x} \right)^2 \quad (3)$$

11. Solve the system of inequalities graphically :

$$2x + y \leq 6, x + y \leq 4, x \geq 0, y \geq 0 \quad (4)$$

12. (i) If  $8! + 9! = x \cdot 7!$ , then the value of x is (1)

(a) 80 (b) 100

(c) 90 (d) 8!

(ii) Find the number of arrangements of 8 books in a shelf. (1)

(iii) Find the number of ways of selecting 3 boys and 4 girls from 5 boys and 6 girls. (2)

13. Consider the ellipse  $\frac{x^2}{25} + \frac{y^2}{16} = 1$ . Match the following :

(1+1+1+1)

A	B
(i) Length of major axis	(a) $(\pm 3, 0)$
(ii) Foci	(b) $\frac{3}{5}$
(iii) Eccentricity	(c) $\frac{13}{5}$
(iv) Length of latus rectum	(d) 10
	(e) $(\pm 4, 0)$
	(f) $\frac{32}{5}$

14. (i) Find :

$$\lim_{x \rightarrow 0} \frac{\sin(mx)}{\sin(nx)} \quad (2)$$

(ii) Differentiate :

$$f(x) = \frac{ax + b}{cx + d} \quad (2)$$

15. Find the mean and mean deviation about mean of the following data :

11, 14, 10, 12, 16, 13, 14, 17, 12, 11 (4)

16. If  $S = \{ 1, 2, 3, 4, \dots, 20 \}$  is the sample space of a random experiment.

$A = \{ x : x \text{ is an even number } \geq 8 \}$  and  $B = \{ y : y \text{ is a perfect square} \}$  are two events.

Then find :

(i)  $P(A)$  (1)

(ii)  $P(B)$  (1)

(iii)  $P(A')$  (1)

(iv)  $P(A \cap B)$  (1)

Answer any 3 questions from 17 to 20. Each carries 6 scores.

(3 × 6 = 18)

17. (i) Find the conjugate of  $i$  (1)

(ii) By representing  $z = \frac{1}{2-3i}$  in  $a + ib$  form, find the real and imaginary parts of  $z$ . (3)

(iii) Find the sum and difference of the complex numbers  $a + ib$  and  $a - ib$ . (2)

18. (i) Find the equation of a straight line with slope 2 and making  $y$  intercept 3. (1)

(ii) Write the  $x, y$  intercepts made by the line  $2x + 3y = 6$ . (1)

(iii) Find the equation of a line which crosses the  $x, y$  axes at  $P$  and  $Q$  respectively; where the mid point of  $PQ$  is  $(3, 2)$ . (4)

19. (i) Let  $a_n$  be the  $n^{\text{th}}$  term of the sequence  $1, -1, 1, -1, \dots$ , then find  $a_n + a_{n+1}$  (1)

(ii) If  $a, b, c$  are three consecutive terms of an AP, then  $a + c =$  \_\_\_\_\_. (1)

(a)  $b$

(b)  $ac$

(c)  $2b$

(d)  $b^2$

(iii) How many terms of the sequence  $2, 2^2, 2^3, \dots$  are needed to get a sum 1022 ? Explain. (4)

20. Calculate mean, variance and standard deviation of the following data :

Class	0-20	20-40	40-60	60-80	80-100
Frequency	6	8	20	9	7

(6)