



DF-3020

Second Year B. Sc. (Sem. III) Examination

March / April - 2016

EG-Mathematics

(Group of Symmetries - I)

(New Course)

Time : 2 Hours]

[Total Marks : 50

Instructions :

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="Second Year B. Sc. (Sem.3)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="EG-Mathematics (New) Group Symmetries - I"/>	<input type="text"/>
Subject Code No. : <input type="text" value="3"/> <input type="text" value="0"/> <input type="text" value="2"/> <input type="text" value="0"/>	<input type="text"/>
Section No. (1, 2,.....): <input type="text" value="Nil"/>	<input type="text"/>
	Student's Signature

- (2) All questions are compulsory.
- (3) Figures to the right indicate marks of the corresponding question.
- (4) There are three sections A, B, C in this question paper having 26 questions.
- (5) There is only one correct answer for each question.
- (6) Follow usual symbols.

SECTION - A : Questions 1 to 11 each of 1 marks

SECTION - B : Questions 12 to 17 each of 2 marks

SECTION - C : Questions 18 to 26 each of 3 marks

***O.M.R. Sheet ભરવા અંગેની અગત્યની સૂચનાઓ આપેલ
O.M.R. Sheet-ની પાછળ છાપેલ છે.***

***Important instructions to fillup O.M.R. Sheet are
given on back side of the provided O.M.R. Sheet.***

- 1 In a group (G, \circ) an element $e \in G$ is an identity element if _____
- (A) $aoe = eoa = e, \forall a \in G$
 (B) $aoe = eoa = a, \forall a \in G$
 (C) $aoe = eoa = e, \forall e \in G$
 (D) $aoe = eoa = a, \forall e \in G$
- 2 The order of Reflection symmetry operation is _____.
- (A) 0
 (B) 4
 (C) 2
 (D) 1
- 3 The Improper rotation symmetry operation is denoted by _____.
- (A) R
 (B) S
 (C) I
 (D) E
- 4 A non-empty subset H of a group G is a subgroup of G if and only if _____
- (A) $a, b \in H \Rightarrow ab^{-1} \in H$
 (B) None of these
 (C) $a, b \in H \Rightarrow ab \in H$
 (D) $a, b, c \in H \Rightarrow a(bc) \in (ab)c$
- 5 Improper rotation symmetry operation keeps _____ fixed.
- (A) a point
 (B) everything
 (C) a plane
 (D) a line
- 6 A group $(G, *)$ is called a cyclic group if it _____
- (A) has infinite number of elements
 (B) has a generator
 (C) has finite number of elements
 (D) satisfies commutative property

- 7 Every object has. _____.
- (A) at least one symmetry E
 (B) no symmetry
 (C) may or may not have any symmetry
 (D) at least one symmetry I
- 8 In a group (G, o) for any $a, b \in G$ _____
- (A) $(aob)^{-1} = aob^{-1}$
 (B) $(aob)^{-1} = a^{-1}ob$
 (C) $(aob)^{-1} = a^{-1}ob^{-1}$
 (D) $(aob)^{-1} = b^{-1}oa^{-1}$
- 9 If there are more than one C_2 operations, they are denoted by _____.
- (A) $C_2^{(1)}, C_2^{(2)}, C_2^{(3)}, \dots$
 (B) $C_{2_1}, C_{2_2}, C_{2_3}, \dots$
 (C) $C_{2_1}, C_{2_2}, C_{2_3}, \dots$
 (D) $C_2^1, C_2^2, C_2^3, \dots$
- 10 The multiplicative identity in a set of real numbers is _____
- (A) -1
 (B) 0
 (C) e
 (D) 1
- 11 Identity symmetry operation keeps _____ fixed.
- (A) a point
 (B) everything
 (C) a plane
 (D) a line

12 The set $H = \{m^a / a \in \mathbb{Z}, m \text{ is a fixed nonzero integer}\}$ is a subgroup of a group_____.

(A) $(\mathbb{Q}_0, +)$

(B) $(\mathbb{R}_0, +)$

(C) (\mathbb{R}, X)

(D) (\mathbb{R}_0, X)

13 Rotation symmetry keeps _____ fixed and is called. _____

(A) line, line of rotation

(B) None of these

(C) plane, plane of rotation

(D) point, point of rotation

14 Set N of all natural numbers with the operation of multiplication _____.

(A) satisfies closure property, associative property but hasn't identity element.

(B) satisfies closure property, associative property and holds identity element.

(C) satisfies closure property, associative property and holds inverse of each element.

(D) satisfies closure property but doesn't hold associative property.

- 15 If the reflection plane is oblique, horizontal or vertical then the symmetry operations are denoted by _____ respectively.
- (A) $\sigma_a, \sigma_h, \sigma_v$
- (B) $\sigma_o, \sigma_h, \sigma_v$
- (C) C_o, C_h, C_v
- (D) R_a, R_h, R_v
- 16 The Identity symmetry is denoted by _____ and its order is _____
- (A) I,2
- (B) E,2
- (C) I,1
- (D) E,1
- 17 In a group (G, \cdot) the left cancellation law and right cancellation laws are _____.
- (A) $coa = cob \Rightarrow a = b$, and $aoc = boc \Rightarrow a = b$,
 $\forall a, b, c \in G$, respectively
- (B) $ca = cb \Rightarrow a = b$, and $ac = bc \Rightarrow a = b$,
 $\forall a, b, c \in G$, respectively
- (C) $aoc = boc \Rightarrow a = b$, and $coa = cob \Rightarrow a = b$,
 $\forall a, b, c \in G$, respectively
- (D) $ac = bc \Rightarrow a = b$, and $ca = cb \Rightarrow a = b$, $\forall a, b, c \in G$,
 respectively

- 18 The symmetry elements are _____
- (A) plane of inversion, axis of reflection, point of rotation
 (B) plane of reflection, axis of inversion, point of rotation
 (C) plane of reflection, axis of rotation, point of inversion
 (D) plane of rotation, axis of reflection, point of inversion
- 19 The multiplicative inverse of $\alpha + ib$ in the set of all nonzero complex numbers is
- (A) $\frac{a}{a^2 + b^2} + \frac{ib}{a^2 + b^2}$
 (B) $\frac{a}{a^2 + b^2} - \frac{ib}{a^2 + b^2}$
 (C) $\frac{a}{a^2 - b^2} + \frac{ib}{a^2 - b^2}$
 (D) $\frac{a}{a^2 - b^2} - \frac{ib}{a^2 - b^2}$
- 20 If the angle of rotation is 90° , 180° , 60° , then the rotation symmetry is denoted by _____ respectively.
- (A) C_3, C_4, C_6
 (B) C_2, C_6, C_3
 (C) C_2, C_4, C_6
 (D) C_4, C_2, C_6

21 The set (Q, X) is not a subgroup of a group (R_0, X) because

- (A) (Q, X) satisfies closure property but is not a subset of (R_0, X)
- (B) (Q, X) satisfies closure property but does not hold identity element
- (C) (Q, X) satisfies closure property but does not satisfies associative property
- (D) (Q, X) satisfies associative property but does not satisfies closure property

22 The set _____ is a group with respect to operation of addition.

- (A) $R - \{0\}$
- (B) $C - \{0\}$
- (C) N
- (D) R

23 The English letter "H" has _____ symmetries.

- (A) $C6, I, S$
- (B) R, I, E
- (C) $E, C4, I$
- (D) $I, E, C2$

- 24 In a group $G = \{6, 12, 18, 24\}$ with the operation multiplication modulo 30 inverse elements of 6, 12, 18, 24 are _____ respectively.
- (A) 6, 18, 12, 24
- (B) 6, 18, 24, 12
- (C) 6, 12, 18, 24
- (D) 12, 6, 24, 18
- 25 The set _____ is a subgroup of a group $(I, +)$
- (A) $H = \{m^a / a \in I, m \text{ is a fixed integer}\}$
- (B) $H = \{ma / a \in Z, m \text{ is a fixed nonzero integer}\}$
- (C) $H = \{ma / a \in Q, m \text{ is a fixed nonzero integer}\}$
- (D) $H = \{m^a / a \in Q, m \text{ is a fixed nonzero integer}\}$
- 26 The symmetry elements of Reflection symmetry, Rotation symmetry and Inversion symmetry operation are _____ respectively.
- (A) plane of reflection, axis of rotation, point of inversion
- (B) plane of reflection, point of rotation, axis of inversion
- (C) axis of reflection, point of rotation, plane of inversion
- (D) point of inversion, plane of reflection, axis of rotation