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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.

Name of the Examination :

☛ **Second Year B. Sc. (Sem.3)**

Name of the Subject :

☛ **EG-Mathematics *(New) Group Symmetries - I***

☛ Subject Code No. : **3 0 2 0** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

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 Improper rotation symmetry operation keeps _________ fixed.

(A) a plane

(B) a line

(C) a point

(D) everything

2 A group $(G.*)$ is called a cyclic group if it _________

(A) has finite number of elements

(B) satisfies commutative property

(C) has infinite number of elements

(D) has a generator.

3 Every object has. _________.

(A) may or may not have any symmetry

(B) at least one symmetry I

(C) at least one symmetry E

(D) no symmetry

4 In a group (Go) for any $a, b \in G$ _________

(A) $(aob)^{-1} = a^{-1} o\, b^{-1}$

(B) $(aob)^{-1} = b^{-1} o\, a^{-1}$

(C) $(aob)^{-1} = ao\, b^{-1}$

(D) $(aob)^{-1} = a^{-1}\, ob$

5 If there are more than one C2 operations, they are denoted by _________.

(A) $C2_1, C2_2, C2_3, ...$

(B) $C2^1, C2^1, C2^3, ...$

(C) $C2^{(1)}, C2^{(2)}, C2^{(3)}, ...$

(D) $C2_1, C2_2, C2_3, ...$

6 The multiplicative identity in a set of real numbers is _________

(A) e

(B) 1

(C) -1

(D) 0

7 Identity symmetry operation keeps _________ fixed.

(A) a plane

(B) a line

(C) a point

(D) everything

8 In a group(G,o) an element $e \in G$ is an identity element if _________

(A) $aoe = eoa = e, \forall e \in G$

(B) $aoe = eoa = a, \forall e \in G$

(C) $aoe = eoa = e, \forall a \in G$

(D) $aoe = eoa = a, \forall a \in G$

9 The order of Reflection symmetry operation is _________.

(A) 2

(B) 1

(C) 0

(D) 4

10 The Improper rotation symmetry operation is denoted by _________.

(A) I

(B) E

(C) R

(D) S

11 A non-empty subset H of a group G is a subgroup of G if and only if _________

(A) $a, b \in H \Rightarrow ab \in H$

(B) $a, b, c \in H \Rightarrow a(bc) \in (ab)c$

(C) $a, b \in H \Rightarrow ab^{-1} \in H$

(D) None of these

12 Rotation symmetry keeps _________ fixed and is called. _________

(A) plane, plane of rotation

(B) point, point of rotation

(C) line, lime of rotation

(D) None of these

13 Set N of all natural numbers with the operation of multiplication _________.

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

(B) satisfies closure property but doesn't hold associative property,

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

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

14 If the reflection plane is oblique, horizontal or vertical then the symmetry operations are denoted by _________ respectively.

(A) $Co, Ch, C\text{v}$

(B) $Ra, Rh, R\text{v}$

(C) $\sigma_a, \sigma_h, \sigma_\text{v}$

(D) $\sigma_o, \sigma_h, \sigma_\text{v}$

15 The Identity symmetry is denoted by _________ and its order is _________

(A) I,1

(B) E,1

(C) I,2

(D) E,2

16 In a group (G, ·) the left cancellation law and right cancellation laws are ________.

(A) aoc = boc $\Rightarrow$ a = b, and coa = cob $\Rightarrow$ a = b, $\forall$ a, b, c $\in$ G, respecitvely

(B) ac = bc $\Rightarrow$ a = b, and ca = cb $\Rightarrow$ a = b, $\forall$ a, b, c $\in$ G, respecitvely

(C) coa = cob $\Rightarrow$ a = b, and aoc = boc $\Rightarrow$ a = b, $\forall$ a, b, c $\in$ G, respectively

(D) ca = cb $\Rightarrow$ a = b, and ac = bc $\Rightarrow$ a = b, $\forall$ a, b, c $\in$ G, respectively

17 The set $H=\{m^a / a \in Z, \text{m is a fixed nonzero int eger}\}$ is a subgroup of a group_________.

(A) (R, X)

(B) (R_0, X)

(C) $(Q_0, +)$

(D) $(R_0, +)$

18 In a group $G = \{6, 12, 18, 24\}$ with the operation multiplication modulo 30 inverse elements of 6, 12, 18, 24 are _________ respectively.

(A) $6, 12, 18, 24$

(B) $12, 6, 24, 18$

(C) $6, 18, 12, 24$

(D) $6, 18, 24, 12$

19 The set _________ is a subgroup of a group $(I, +)$

(A) $H = \{ma \,/\, a \in Q, \text{m is a fixed nonzero inte ger}\}$

(B) $H = \{m^a \,/\, a \in Q, \text{m is a fixed nonzero inte ger}\}$

(C) $H = \{m^a \,/ \in I, \text{a is a fixed inte ger}\}$

(D) $H = \{ma \,/\, a \in Z, \text{m is a fixed nonzero int eger}\}$

20 The symmetry elements of Reflection symmetry, Rotation symmetry and Inversion symmetry operation are _________ respectively.

(A) axis of reflection, point of rotation, plane of inversion

(B) point of inversion, plane of reflection, axis of rotation

(C) plane of reflection, axis of rotation, point of inversion

(D) plane of reflection, point of rotation, axis of inversion

21 The symmetry elements are _________

(A) plane of reflection, axis of rotation, point of inversion

(B) plane of rotation, axis of reflection, point of inversion

(C) plane of inversion, axis of reflection, point of rotation

(D) plane of reflection, axis of inversion, point of rotation

22 The multiplicative inverse of $a+ib$ 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) $\frac{a}{a^2+b^2}-\frac{ib}{a^2+b^2}$

23 If the angle of rotation is $90^\circ, 180^\circ, 60^\circ$, then the rotation symmetry is denoted by _________ respectively.

(A) $C2,\ C4, C6$

(B) $C4, C2, C6$

(C) $C3, C4, C6$

(D) $C2, C6, C3$

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

(A) (Q, X) satisfies closure property but does not satisfies associative property

(B) (Q, X) satisfies associative property but does not satisfies closure property

(C) (Q, X) satisfies closure property but is not a subset of (R_0, X)

(D) (Q, X) satisfies closure property but does not hold identity element.

25 The set __________ is a group with respect to operation of addition.

(A) N

(B) R

(C) $R-\{0\}$

(D) $C-\{0\}$

26 The English letter "H" has __________ symmetries.

(A) $E, C4, I$

(B) $I, E, C2$

(C) $C6, I, S$

(D) R, I, E