Series : SSJ/2

SET – 4

प्रश्न पत्र कोड नं.
Question Paper Code No. **057/2/4**

रोल नं.
Roll No.

2	3	7	0	3	7	0	8

परीक्षार्थी प्रश्न-पत्र (QP) कोड को OMR उत्तर-पत्रक के मुख-पृष्ठ पर अवश्य लिखें/भरें ।
Candidates must write / fill the QP Code in the space allotted on OMR Sheet.

नोट / NOTE

(i) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **32** हैं ।
Please check that this question paper contains **32** printed pages.

(ii) कृपया जाँच कर लें कि इस प्रश्न-पत्र में **60** बहुविकल्पीय प्रश्न (MCQs) हैं ।
Please check that this question paper contains **60** multiple choice questions (MCQs).

(iii) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए QP कोड नम्बर को छात्र OMR शीट में उपयुक्त स्थान पर लिखें ।
QP Code given on the right hand side of the question paper should be written on the appropriate place of the OMR Sheet by the candidates.

(iv) परीक्षा शुरू होने के वास्तविक समय से पहले इस प्रश्न-पत्र को पढ़ने के लिए **20** मिनट का अतिरिक्त समय आबंटित किया गया है ।
20 minutes additional time has been allotted to read this question paper prior to actual time of commencement of examination.

जीव विज्ञान (सैद्धान्तिक)
BIOLOGY (Theory)

सत्र – I
Term - I

निर्धारित समय : **90** मिनट
Time allowed : 90 Minutes

अधिकतम अंक : **35**
Maximum Marks : 35

General Instructions : ENGLISH VERSION

Read the following instructions very carefully and strictly follow them :

(i) *This question paper contains* ***60*** *questions out of which* ***50*** *questions are to be attempted.* ***All*** *questions carry equal marks.*

(ii) *The questions paper consists* ***three*** *Sections – Section* ***A****,* ***B*** *and* ***C****.*

(iii) ***Section – A*** *contains* ***24*** *questions. Attempt any* ***20*** *questions from Ques. No.* ***1*** *to* ***24****.*

(iv) ***Section – B*** *contains* ***24*** *questions. Attempt any* ***20*** *questions from Ques. No.* ***25*** *to* ***48****.*

(v) ***Section – C*** *contains* ***12*** *questions. Attempt any* ***10*** *questions from Ques. No.* ***49*** *to* ***60***

(vi) *There is only one correct option for every Multiple Choice Questions (MCQs). Marks will not be awarded for answering more than one option.*

(vii) *There is not any negative marking.*

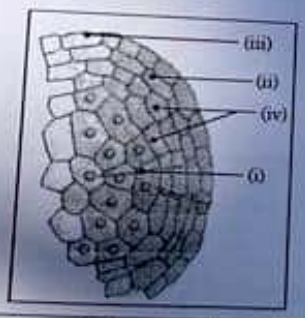
SECTION – A

Section-A consists of 24 questions. Attempt any 20 questions from this section.

The first attempted 20 questions would be evaluated.

1. The hilum in a typical angiospermic ovule represents the junction between –
   (a) Integuments and the embryo sac.
   (b) Embryo sac and the nucellus
   (c) Body of the ovule and the funicle
   (d) Nucellus and the funicle

2. In the given diagram of a transverse section of a young anther. Choose the labellings showing the correct placement of the wall layers from the table given below :



	(i)	(ii)	(iii)	(iv)
(a)	Epidermis	Middle layers	Tapetum	Endothecium
(b)	Tapetum	Endothecium	Epidermis	Middle layers
(c)	Endothecium	Tapetum	Middle layers	Epidermis
(d)	Middle layers	Epidermis	Endothecium	Tapetum

3. The term used for the embryo entering into the state of inactivity as the seed mature is –

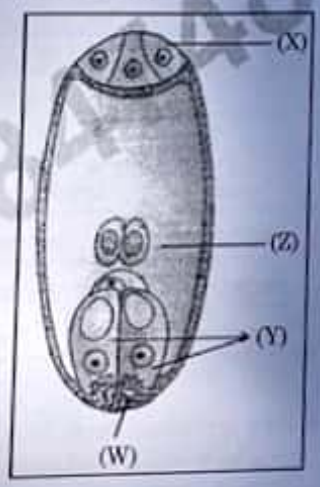
(a) Quiescent
(b) Parthenogenesis
(c) Parthenocarpy
(d) Doremancy

4. The ploidy of the apomictic embryo developed from the integument cells and megaspore mother cell without reduction division respectively will be –

(a) 2n and 2n
(b) n and n
(c) 2n and n
(d) 3n and 2n

5. Given below is a diagrammatic representation of a mature embryo sac of a typical angiosperm plant.

Choose the option showing the correct labellings for the parts W, X, Y and Z from the table given below.



	W	X	Y	Z
(a)	Micropylar end	Antipodals	Synergids	Central cell
(b)	Chalazal end	Antipodals	Central cell	Synergids
(c)	Micropylar end	Synergids	Central cell	Antipodals
(d)	Chalazal end	Synergids	Central cell	Antipodals

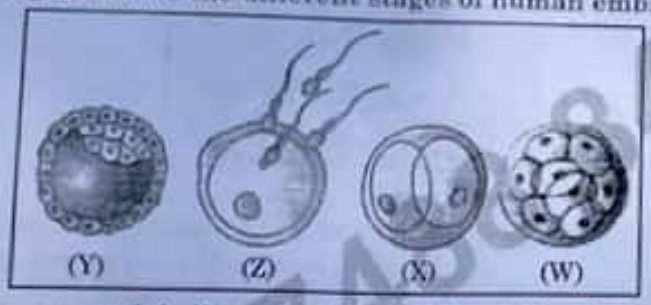
6. Breast-feeding the baby acts as a natural contraceptive for the mother because it prevents :

(i) Ovulation
(ii) Menstruation
(iii) Insemination
(iv) Fertilisation

Choose the correct option :

(a) (ii) and (iv)
(b) (i) and (iii)
(c) (i) and (iv)
(d) (i) an (ii)

7. The given figure shows the different stages of human embryo.



Identify the correct labellings for W, X, Y and Z and choose the correct option from the table below :

	W	X	Y	Z
(a)	Cleavage	Blastocyst	Morula	Fetilisation
(b)	Blastocyst	Morula	Cleavage	Fetilisation
(c)	Morula	Cleavage	Blastocyst	Fetilisation
(d)	Morula	Blastocyst	Cleavage	Fetilisation

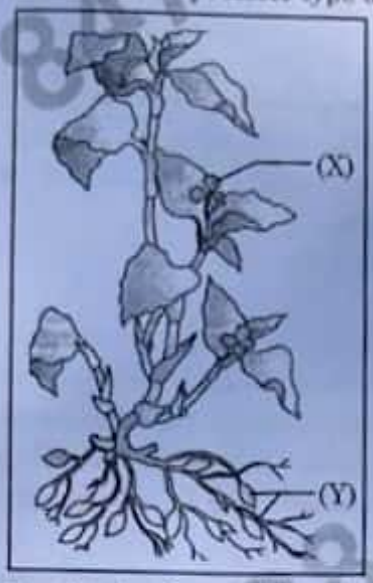
8. During human embryonic development the external genital organs are well developed in the foetus by the end of –

(a) 6 weeks of pregnancy
(b) 12 weeks of pregnancy
(c) 18 weeks of pregnancy
(d) 24 weeks of pregnancy

9. The accessory ducts in the human male reproductive system consists of –

(a) Epididymis, Prostrate, Rete testis
(b) Rete testis, Vas efferentia, Seminal vesicles
(c) Vas efferentia, Bulbourethral, Epididymis
(d) Rete testis, epididymis, Vas deferens

10. Given below is a figure of an angiosperm plant showing two different types of flowers 'X' and 'Y' and the possible type of pollination in them :



Select the correct option for the flower (X) and flower (Y) and the possible type of pollination from the given table :

	Flower X	Flower Y
(a)	Chasmogamous, assured seed set	Cleistogamous, cross pollination
(b)	Cleistogamous self/cross pollination	Chasmogamous, assured seed set
(c)	Chasmogamous, self/cross pollination	Cleistogamous, self pollination
(d)	Cleistogamous self pollination only	Chasmogamous, cross pollination only

11. An undifferentiated sheath covering the root cap of a monocotyledonous embryo is

(a) Scutellum
(b) Coleorhiza
(c) Coleoptile
(d) Epiblast

12. The cause of Down's syndrome in humans is :

(a) Extra copy of an autosome
(b) Extra copy of a sex chromosome
(c) Absence of an autosome
(d) Absence of a sex chromosome

13. Which of the following features show the mechanism of sex determination in honey-bee ?
(i) An offspring formed from the union of a sperm and egg develops as a male.
(ii) Males have half the number of chromosomes than that of female.
(iii) The females are diploid having 32 chromosomes.
(iv) Males have father and can produce sons.
(a) (i) and (ii) (b) (ii) and (iii)
(c) (i) and (iv) (d) (ii) and (iv)

14. Select the pair that is incorrect :
(a) Sickle-cell anemia : Autosome linked recessive trait
(b) Haemophilia : Autosome linked recessive trait
(c) Colour blindness : Sex linked recessive trait
(d) Thalassemia : Autosome linked recessive trait

15. An example of a human trait where a single gene can exhibit multiple phenotypic expression is –
(a) Phenyl ketonuria (b) Cystic fibrosis
(c) Thalassemia (d) Haemophilia

16. Life cycle of Drosophila melanogaster is completed in –
(a) 7 days (b) 14 days
(c) 21 days (d) 28 days

17. How many types of gametes would develop by an organism with genotype AaBBCcDD ?
(a) 1 (b) 2
(c) 3 (d) 4

18. Given below are the observations drawn in HGP. Select the option that shows the correct observations.
(i) The human genome contains 3164.7 billion base pairs.
(ii) The average gene consists of 3000 bases.
(iii) Less than 2% of the genome codes for proteins.
(iv) Chromosome one has most genes (2698).
(a) (i) and (ii) (b) (ii) and (iii)
(c) (iii) and (iv) (d) (i) and (iii)

19. The phosphoester linkage in the formation of a nucleotide involves the bonding between
(a) Phosphate group and OH of 3'C of a nucleoside
(b) Phosphate group and OH of 5'C of a nucleoside
(c) Phosphate group and H of 3'C of a nucleoside
(d) Phosphate group and H of 5'C of a nucleoside

20. The switching 'on' and 'off' of the lac operon in prokaryotes is regulated by
(a) Glucose
(b) Galactose
(c) Lactose
(d) Fructose

21. For 'in-vitro' DNA replication, which one of the following substrates need to be added along with the necessary enzymes, the DNA template and specific conditions ?
(a) Ribonucleotide triphosphate
(b) Deoxyribonucleoside triphosphate
(c) Deoxyribonucleotide triphosphate
(d) Ribonucleoside triphosphate

22. Which one of the following factor will associate transiently with RNA polymerase to terminate transcription in prokaryotes ?
(a) sigma factor
(b) RHO factor
(c) delta factor
(d) theta factor

23. Choose the correct pair of codon with its corresponding amino acid from the following list :
(a) UAG : Glycine
(b) AUG : Arginine
(c) UUU : Phenylalanine
(d) UGA : Methionine

24. During elongation process of translation, the peptide bond formation between amino acids is catalysed by –
(a) ribosomal RNA
(b) protein in small subunit of ribosome
(c) protein in large subunit of ribosome
(d) transfer RNA

SECTION – B

Section-B consists of 24 questions. (Sl. No. 25 to 48)

Attempt any 20 questions from this section.

The first attempted 20 questions would be evaluated :

Question No. 25 to 28 consists of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below :

(a) Both (A) and (R) are true and (R) is the correct explanation of (A).

(b) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(c) (A) is true but (R) is false.

(d) (A) is false but (R) is true.

25. **Assertion (A) :** Through Reproductive and Child Health (RCH) programmes in India, we could bring down the population growth rate.

Reason (R) : A rapid increase in MMR and IMR were the reasons, along other reasons for this.

26. **Assertion (A) :** Sterilisation methods are generally advised for male/female partner as a terminal method to prevent any more pregnancies.

Reason (R) : These techniques are less effective and have high reversibility.

27. **Assertion (A) :** The inner cell mass of blastocyst gets attached to the endometrium during embryonic developed in humans.

Reason (R) : The blastomeres in the blastocyst gets arranged into trophoblast and inner cell mass.

28. **Assertion (A) :** There is expression of only one gene of the parental character in a Mendelian Monohybrid cross in F_1 generation.

Reason (R) : In a dissimilar pair of factors one member of the pair dominates the other.

29. Select the correct option for Human Chorionic Gonadotropin (HCG) released during embryonic development in humans.
(i) Helps in maintenance of pregnancy.
(ii) Leads to rupture of Graafian follicle.
(iii) Cause strong uterine contraction during childbirth.
(iv) Brings metabolic changes in the mother.
(a) (i) and (ii) (b) (i) and (iv)
(c) (ii) and (iii) (d) (ii) and (iv)

30. Residual persistent nucellus in black pepper is known as
(a) Perisperm (b) Pericarp
(c) Pulvinus (d) Perianth

31. Amongst the insects the dominant biotic pollinating agents are –
(a) Ants (b) Wasps
(c) Beetles (d) Bees

32. The source of gonadotropin LH and its corresponding function is
(a) Anterior pituitary, ovulation
(b) Anterior pituitary, Graafian follicle formation
(c) Hypothalamus, Ovulation
(d) Hypothalamus, Graafian follicle formation

33. A specialized procedure to form an embryo in the laboratory in which sperm is directly, injected into the ovum is
(a) IUT (b) IUI
(c) ICSI (d) ZIFT

34. Listed below are all reproductive tract infections except
(a) Genital herpes (b) Filariasis
(c) Trichomoniasis (d) Syphilis

35. A genetic mechanism which prevents inbreeding depression in majority of angiospermic plants is
(a) Parthenogenesis (b) Parthenocarpy
(c) Mutation (d) Self-incompatability

36. In *Pisum sativum* the flower colour may be Violet (V) or White (v). What proportion of the offsprings in a cross of VV × vv would be expected to be violet ?

(a) 25%
(b) 50%
(c) 75%
(d) 100%

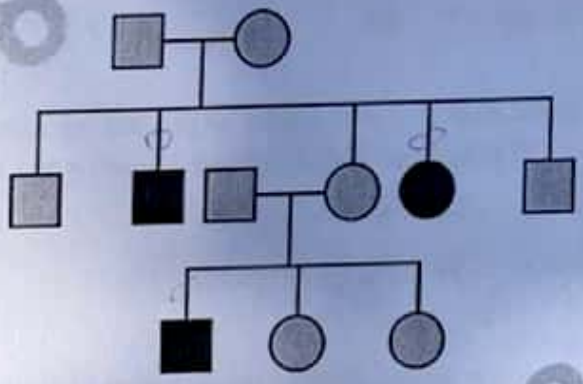
7. Which one of the gene pair is expected to give a ratio of 1 : 1 : 1 : 1 in the progeny of a Mendelian Dihybrid cross ?

(a) AaBb × AaBb
(b) AABB × AaBb
(c) AaBb × aabb
(d) AABB × aabb

The progeny of a cross between two snap-dragon plants, heterozygous for flower colour, bearing different coloured flower would be :

(a) 50% pink, 50% white
(b) 25% red, 50% pink, 25% white
(c) 50% red, 50% white
(d) 75% red, 25% white

Study the given pedigree of a family and select the trait that shows this pattern of inheritance :



(a) Autosomal recessive, Phenylketonuria
(b) Sex-linked recessive, Colour-blindness
(c) Autosomal dominant, Myotonic dystrophy
(d) Sex-linked dominant, Vitamin-D resistant rickets

40. A child with blood Group A has father with blood group B and mother with blood group AB. What would be the possible genotypes of parents and the child ? Choose the correct option :

	Father	Mother	Child
(a)	I^Ai	I^Bi	I^Ai
(b)	I^AI^B	I^Ai	I^AI^A
(c)	I^Bi	I^AI^B	I^Ai
(d)	I^BI^B	I^AI^B	I^AI^A

41. In a dihybrid Mendelian cross, garden pea plants heterozygous for violet flowers and round seeds are crossed with homozygous white flowers and wrinkled seeds. The genotypic and phenotypic ratio of F_1 progeny would be

(a) 9 : 3 : 3 : 1
(b) 1 : 2 : 2 : 1
(c) 1 : 1 : 1 : 1
(d) 3 : 1

42. A region of coding strand of DNA has the following nucleotide sequence :

5' – TGCGCCA – 3'

The sequence of bases on mRNA transcribed by this DNA stand would be :

(a) 3' – ACGCGGT – 5'
(b) 5' – ACGCGGT – 3'
(c) 5' – UGCGCCA – 3'
(d) 3' – UGCGCCA – 5'

43. A DNA molecule is 160 base pairs long. It has 20% adenine. How many cytosine bases are present in this DNA molecule ?

(a) 192
(b) 96
(c) 64
(d) 42

44. A template strand in a bacterial DNA has the following base sequence :

5' – TTTAACGAGG – 3'

What would be the RNA sequence transcribed from this template DNA ?

(a) 5' – AAATTGCTCC – 3'
(b) 3' – AAATTGCTCC – 5'
(c) 3' – AAAUUGCUCC – 3'
(d) 5' – CCUCGUUAAA – 3'

45. Colour-blindness is a sex linked recessive trait in humans. A man with normal colour vision marries a women who is colourblind. What would be the possible genotypes of the parents, the son and the daughter of this couple ?

	Mother	Father	Daughter	Son
(a)	XX	X^CY	X^CX	XY
(b)	X^CX^C	X^CY	X^CX^C	X^CY
(c)	X^CX	XY	X^CX	XY
(d)	X^CX^C	XY	X^CX	X^CY

46. tRNA has an _____ that has bases complementary to the codon. Its actual structure is a compact molecule which looks like _____.
Select the option that has correct choices for the two 'blanks'.
(a) amino acid acceptor end, clover-leaf
(b) anticodon loop, clover-leaf
(c) amino acid acceptor end, inverted L
(d) anticodon loop, inverted L

47. Which type of RNA is correctly paired with its function ?
(a) small nuclear RNA : Pocesses rRNA
(b) transfer RNA : attaches to amino acid
(c) ribosomal RNA : involved in transcription
(d) micro RNA : involved in translation

48. Given below are the pairs of contrasting traits in Pisum sativum as studied by Mendel. Select the incorrectly mentioned option from the table given below :

	Character	Dominant	Recessive
(a)	Flower position	Terminal	Axial
(b)	Seeds shape	Round	Wrinkled
(c)	Pod colour	Green	Yellow
(d)	Pod shape	Constricted	Inflated

SECTION – C

Section-C consists of one case followed by 6 questions linked to this case (Q. No. 49 to 54). Besides this, 6 more questions are given. Attempt any 10 questions in this section. The first attempted 10 questions would be evaluated.

Case :

A women of 35 years age with a married life of eight years and having normal reproductive cycles visits a doctor along with her husband for consultation for infertility. They were not using any contraceptive methods. They have no child. The doctor advises them after a detailed physical examination of both of them to undergo following investigations :

- Seminal analysis of the husband
- Follicular study of the wife
- Blood test for Follicle Stimulating Hormone (FSH) estimation for both

With your basic knowledge of human embryology and the case given above, answer the following questions (49-54) :

49. Seminal analysis of the husband was done for determining

(i) Sperm morphology and sperm count

(ii) Quantity and pH of semen

(iii) Rate of sperm release into the Vagina

(a) (i) only (b) (i) and (ii)

(c) (ii) and (iii) (d) (ii) only

50. An ultrasound – guided follicular study was done for the wife for determining the size and physical appearance of the

(a) Ovary (b) Oogonia

(c) Antral follicles (d) Corpus Luteum

51. The blood test report of the wife showed low FSH value, which is indicative of –

(a) low rate of formation of ovarian follicles

(b) high rate of formation of ovarian follicles

(c) low rate of maturation of ovarian follicles

(d) high rate of maturation of ovarian follicles

52. In the above case if the husband is found to have sperm count of less than 20 million/mL and the wife is diagnosed with blockage in the oviduct, the couple would be advised for :

(i) ZIFT

(ii) AI

(iii) IVF

(iv) ICSI

(a) (i) and (iii)

(b) (ii) and (iii)

(c) (iii) and (iv)

(d) (i) and (iv)

53. The high level of which gonadotropin/ovarian hormone in the blood sample of the wife taken on day 20 of her reproductive (menstrual) cycle would indicate the letual phase of the ovarian cycle ?

(a) FSH

(b) LH

(c) Estrogens

(d) Progesterone

54. In which phase of the menstrual cycle is the blood sample of a women taken if, on analysis, it shows high levels of L.H. and estrogen ?

(a) Ovulatory phase

(b) Menstrual phase

(c) Secretory phase

(d) Follicular phase

55. How many types of gametes can be produced in a diploid organism which is heterozygous for 4 loci ?

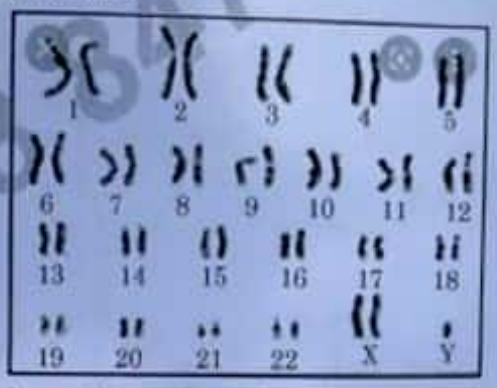
(a) 4

(b) 8

(c) 16

(d) 32

56. Given below a Karyotype obtained after analysis of foetal cells for probable genetic disorder.



Based on the above Karyotype, the chromosomal disorder detected in unborn foetus and the consequent symptoms the child may suffer from are –

(a) Down's syndrome : Gynaecomastia, overall masculine development
(b) Down's syndrome : Furrowed tongue, short stature
(c) Klinefelter's syndrome : Gynaecomastia, Masculine development
(d) Klinefelter's syndrome : Rudimentary ovaries, short stature

57. The recombinant Frequency between the four linked genes is as follows :

(i) between X and Y is 40%.
(ii) between Y and Z is 30%.
(iii) between Z and W is 10%.
(iv) between W and X is 20%.

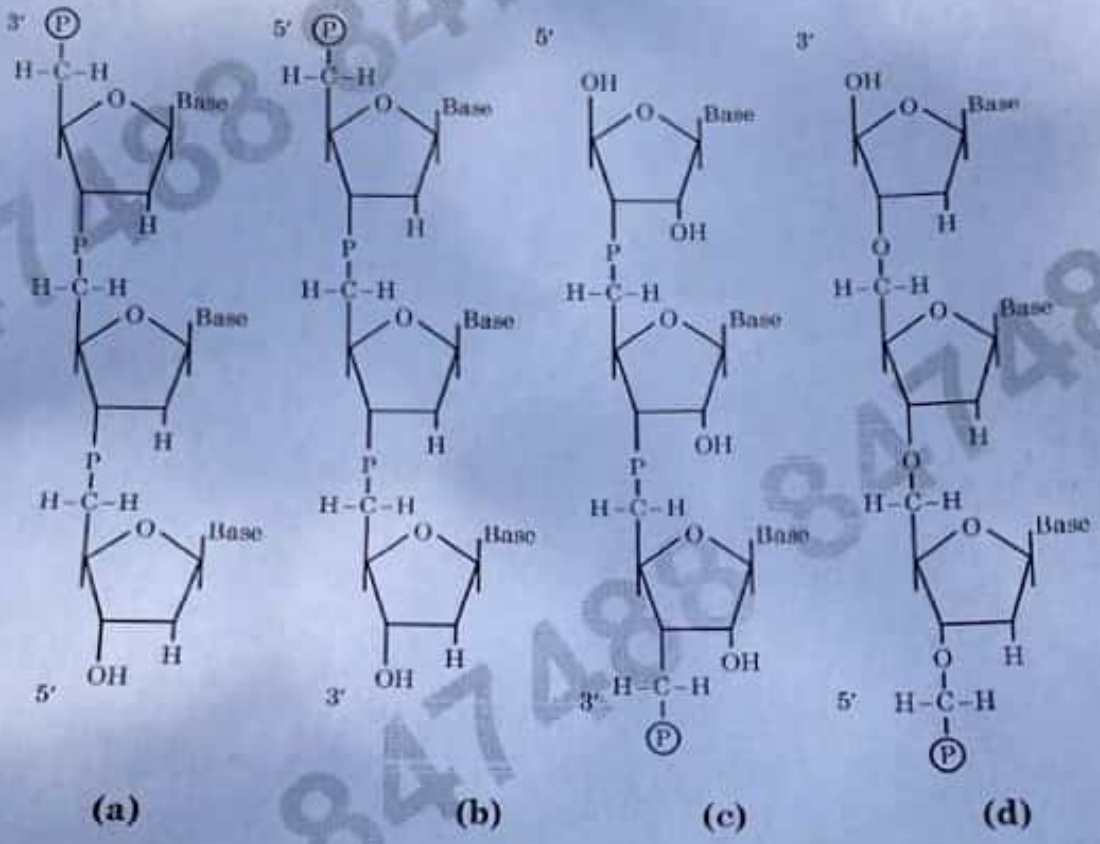
Select the option that shows the correct order of the position of W, X, Y and Z genes on the chromosome :

(a) Y – X – Z – W
(b) Y – W – Z – X
(c) X – Y – Z – W
(d) Z – X – Y – W

58. The figure given below has labellings (i), (ii) and (iii), which two labellings in the given figure are components of a nucleosome ? Select the correct option :

(a) (i) – HI histone, (ii) – DNA
(b) (i) – DNA, (ii) – Histone Octamer
(c) (ii) – DNA, (iii) – HI Histone
(d) (ii) – Histone octamer, (iii) – DNA

59. Which one of the following diagram is a correct depiction of a polynucleotide chain to DNA ?



60. In molecular biology who proposed that genetic information flows in one direction ?

(a) Hargobind Khorana

(b) Francis Crick

(c) Watson and Crick

(d) Marshall Nirenberg