Board Paper of Class 12 Science Term-I 2021
Biology Delhi(Set 4)

Total Time: 90

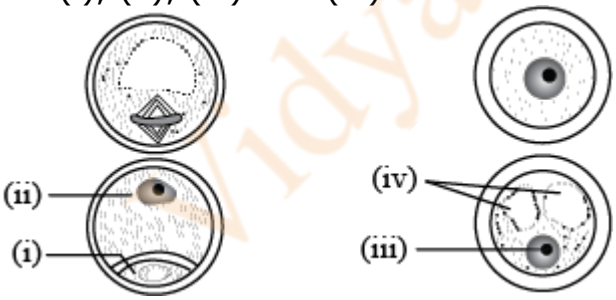
Total Marks: 35.0

Section A

Q.No.1: A group of compactly arranged homogenous mass of cells occupying the centre of a typical microsporangium in an anther is:
(A) Sporogenous tissue
(B) Pollen sacs
(C) Microspore tetrads
(D) Spores

Marks:[1.00]

Q.No.2: The figures of the developmental stage of a microspore into a mature pollen grain are given below. Choose the option showing the correct labellings for (i), (ii), (iii) and (iv).



	(i)	(ii)	(iii)	(iv)
(A)	Generative cell	Vegetative cell	Male gamete	Vacuole
(B)	Vegetative cell	Generative cell	Vacuole	Male gamete
(C)	Generative cell	Vegetative cell	Nucleus	Vacuole
(D)	Vegetative cell	Generative cell	Vacuole	Nucleus

Marks:[1.00]

Q.No.3: The floral part that develops into a fruit in strawberry is:
(A) Pedicel
(B) Calyx
(C) Thalamus
(D) Bracts **Marks:[1.00]**

Q.No.4: Seeds of an orange when taken out and squeezed, show many embryos of different sizes and shapes. The reason for this is as many embryos have developed from:
(A) Egg cells fusing with different male gametes forming embryos.
(B) PEN fusing with different male gametes forming embryos.
(C) Nucellar cells dividing and developing into embryos.
(D) Synergids dividing and developing into embryos. **Marks:[1.00]**

Q.No.5: Figure (i) and Figure (ii) given below are showing two stages of megasporogenesis in a typical angiosperm plant.

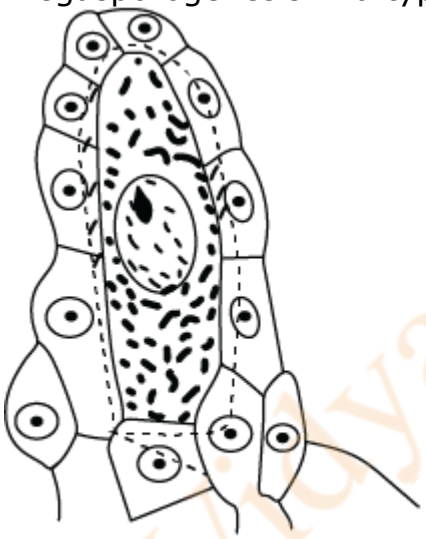


Fig. (i)

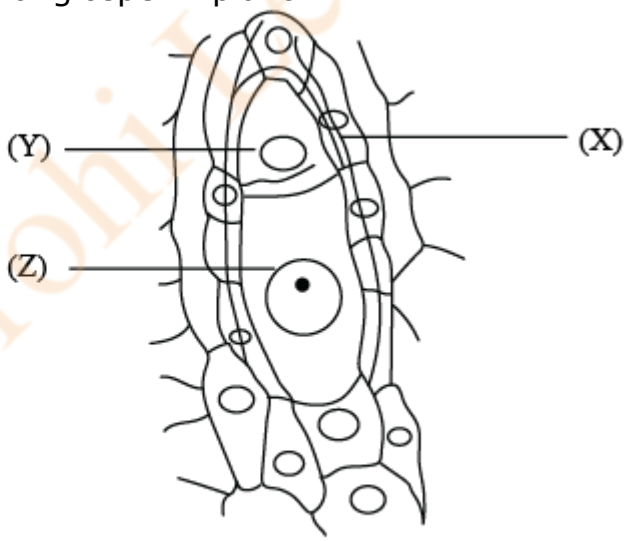


Fig. (ii)

Choose the option showing the correct ploidy of X, Y and Z in the table given below:

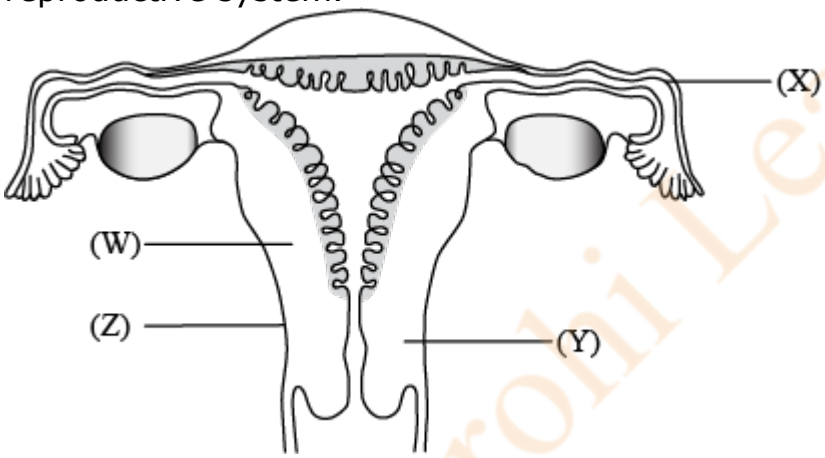
	X	Y	Z
(A)	2n	n	2n
(B)	2n	n	n
(C)	2n	3n	n
(D)	3n	2n	n

Marks:[1.00]

Q.No.6: Select the correct statements with respect to the development of an endosperm in a typical angiosperm plant.
(i) Embryo development precedes endosperm development.
(ii) Endosperm cells divide repeatedly to form a triploid endosperm.
(iii) Endosperm tissue has scanty reserves of food materials.
(iv) PEN undergoes successive division to form free-nuclear endosperm.
Choose the correct option:
(A) (i) and (iii)
(B) (ii) and (iii)
(C) (i) and (iv)
(D) (ii) and (iv)

Marks:[1.00]

Q.No.7: The figure given below shows the sectional view of the human female reproductive system.



Identify the option that shows correct labelling for W, X, Y and Z in the table below:

	W	X	Y	Z
(A)	Endometrium	Infundibulum	Vagina	Perimetrium
(B)	Myometrium	Ampulla	Cervix	Perimetrium
(C)	Perimetrium	Ampulla	Vagina	Endometrium
(D)	Endometrium	Isthmus	Cervix	Myometrium

Marks:[1.00]

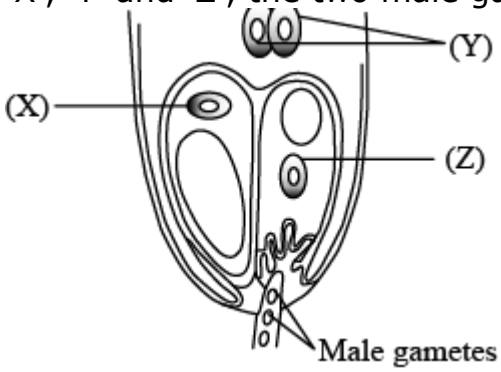
Q.No.8: During embryonic development the limbs and digits are formed in the human foetus by the end of-
(A) 15 days of pregnancy.
(B) 30 days of pregnancy.
(C) 45 days of pregnancy
(D) 60 days of pregnancy.

Marks:[1.00]

Q.No.9: In the human sperm numerous mitochondria are present in the region known as-
(A) Head
(B) Neck
(C) Middle piece
(D) Tail

Marks:[1.00]

Q.No.10: The given figure of an egg apparatus of an angiosperm shows the entry of pollen tube for releasing the two male gametes. Which of the two from 'X', 'Y' and 'Z', the two male gametes fuse with:



(A) X and Z
(B) X and Y
(C) Y and Z
(D) Z and Z

Marks:[1.00]

Q.No.11: In which of the following combinations of seeds/grains of different plants, residual endosperm will be present at maturity?
(A) Groundnut, Barley, Beans.
(B) Castor, Groundnut, Maize.
(C) Wheat, Maize, Barley.
(D) Pea, Groundnut, Beans.

Marks:[1.00]

Q.No.12: The cause for Klinefelter's syndrome in humans is because of:
(A) An extra copy of autosome.
(B) An extra copy of X Chromosome.
(C) Absence of one X Chromosome.
(D) Absence of one Y Chromosome.

Marks:[1.00]

Q.No.13: In which of the following organisms is male heterogamety observed?

(i) Grasshopper
(ii) Honey bee
(iii) Fowl
(iv) Fruit fly
Choose the correct option:
(A) (i) and (ii)
(B) (ii) and (iii)
(C) (i) and (iv)
(D) (iii) and (iv) **Marks:[1.00]**

Q.No.14: Select the pair – that is **not** correct:
(A) Pleiotropy: Sickle cell anaemia
(B) Linkage: *Drosophila*
(C) Incomplete dominance: *Antirrhirnum*
(D) Co-dominance: ABO blood group **Marks:[1.00]**

Q.No.15: An example of a genetic trait in human which is not distinct in its Phenotypic expression and is spread across a gradient in the population is–
(A) Presence of an extra finger.
(B) Variation in haemoglobin.
(C) Different range of skin colour.
(D) Red-green colour blindness. **Marks:[1.00]**

Q.No.16: The chromosomal theory of inheritance was put forth by–
(A) Gregor Mendel and Tschermak
(B) Walter Sutton and Theodore Boveri
(C) Thomas Hunt Morgan and Alfred Sturtevant
(D) De Vries and Correns **Marks:[1.00]**

Q.No.17: Failure of segregation of sister chromatids during cell cycle results in–
(A) Polyploidy
(B) Autopolyploidy
(C) Allopolyploidy
(D) Aneuploidy **Marks:[1.00]**

Q.No.18: Which one of the following technique is used in DNA fingerprinting for the detection of DNA?
(A) Northern blotting

(B) Western blotting
(C) Southern blotting
(D) In-situ hybridisation **Marks:[1.00]**

Q.No.19: When an amino acid is coded by more than one codon, the genetic code is said to be:
(A) Universal
(B) Punctuated
(C) Commaless
(D) Degenerate **Marks:[1.00]**

Q.No.20: The different types of RNA transcribed by RNA polymerase III in eukaryotes are-
(A) tRNA, hnRNA, 28S rRNA
(B) 28S rRNA, 18S rRNA, 5-8S rRNA
(C) tRNA, 5S rRNA, SnRNAs
(D) hnRNA, 18S rRNA, 28S rRNA **Marks:[1.00]**

Q.No.21: What would be the effect on histone proteins in the nucleus, on neutralisation of their positive charge?
(A) They would bind the DNA tighter
(B) They would separate from DNA
(C) They would no longer attract each other
(D) They would cause super coiling of DNA **Marks:[1.00]**

Q.No.22: Which one of the following statement describe the function of the promoter in a transcription unit?
(A) Signals the termination of polypeptide chain.
(B) Serves a sequence where transcription will initiate.
(C) Serves as DNA template for transcription to take place.
(D) Determines the first nucleotide to be transcribed into RNA. **Marks:[1.00]**

Q.No.23: During elongation process of translation, the peptide bond formation between amino acids is catalysed by:
(A) Ribosomal RNA
(B) Transfer RNA
(C) Messenger RNA
(D) Small nuclear RNA **Marks:[1.00]**

Q.No.24: A failure of cell division after DNA replication in cell cycle results in-
(A) Aneuploidy
(B) Linkage
(C) Recombination
(D) Polyploidy **Marks:[1.00]**

Section B

Q.No.25: Consists of two statements- **Assertion (A)** and **Reason (R).** Answer the questions by selecting the appropriate option given below:
Assertion: Reproductive and Child Health Care (RCH) program was initiated in India in 1951 to attain total reproductive health as a social goal.
Reason: Audio-visual and print media awareness was created among the people about reproduction related aspects under the program.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true and R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true. **Marks:[1.00]**

Q.No.26: Consists of two statements- **Assertion (A)** and **Reason (R).** Answer the questions by selecting the appropriate option given below:
Assertion: Tubectomy is a sterilisation procedure advised for females as a terminal method.
Reason: In tubectomy, a small part of the fallopian tube is removed or tied up blocking gamete transport thereby preventing conception.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true and R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true. **Marks:[1.00]**

Q.No.27: Consists of two statements- **Assertion (A)** and **Reason (R).** Answer the questions by selecting the appropriate option given below:

Assertion : The perimetrium of uterus exhibits strong contractions during child birth.
Reason : Oxytocin released from maternal pituitary causes strong uterine contractions.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true and R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true. **Marks:[1.00]**

Q.No.28: Consists of two statements- **Assertion (A)** and **Reason (R).** Answer the questions by selecting the appropriate option given below:
Assertion: Substitution of Glutamine by Valine at the sixth position of the Beta globin chain of haemoglobin leads to sickle-cell anaemia in humans.
Reason: Deletions and insertions of base pairs in DNA cause frame-shift mutations.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true and R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true. **Marks:[1.00]**

Q.No.29: Which of the following are true in respect of chorionic villi in humans?
(i) It appears after implantation of human embryo in the uterus.
(ii) It becomes interdigitated with cervical tissue of the female reproductive tract.
(iii) It increases the surface area for exchange of materials.
(iv) It develops from the inner cell mass of the blastocyst.
Choose the correct option:
(A) (i) and (ii)
(B) (ii) and (iii)
(C) (i) and (iv)
(D) (i) and (iii) **Marks:[1.00]**

Q.No.30: Select the plant species, where emasculation is not required for artificial hybridisation experiment?
(A) Castor
(B) Maize
(C) Papaya
(D) Wheat **Marks:[1.00]**

Q.No.31: Which of the given statements are correct with respect to pollination in *Vallisneria*?

(i) Pollen grains are light and non-sticky.
(ii) Female flowers reach the surface of water by long stalks.
(iii) Pollen grains are carried passively by water currents.
(iv) Female flowers remain submerged in water.
Choose the correct option :
(A) (i) and (iv)
(B) (ii) and (iv)
(C) (i) and (ii)
(D) (ii) and (iii) **Marks:[1.00]**

Q.No.32: The source organ and function of hormone FSH are –
(A) Anterior pituitary, corpus luteum formation.
(B) Posterior pituitary, Graafian follicle formation.
(C) Anterior pituitary, follicular formation.
(D) Hypothalamus, Primary oocyte formation. **Marks:[1.00]**

Q.No.33: An IUD that is recommended to suppress sperm motility and the fertilising capacity of sperm is –
(A) Lippe's loop
(B) LNG - 20
(C) Progestasert
(D) Multiload 375 **Marks:[1.00]**

Q.No.34: Listed below are all venereal diseases except :
(A) Genital Warts
(B) Ascariasis
(C) Trichomoniasis
(D) Hepatitis-B **Marks:[1.00]**

Q.No.35: Endosperm is completely consumed by the developing embryo in :
(A) Castor and Coconut
(B) Coconut and Groundnut
(C) Groundnut and Pea
(D) Castor and Pea **Marks:[1.00]**

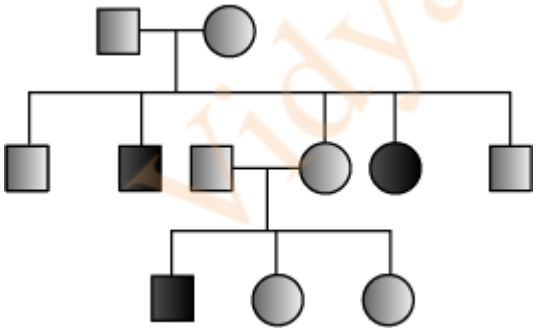
Q.No.36: The number of different types of gametes that would develop in an organism with genotype AABBCCDd :
(A) 1
(B) 2

(C) 3
(D) 4 **Marks:[1.00]**

Q.No.37: In *Pisum sativum*, the pod colour may be green (G) or yellow (g). What percentage of offsprings with green pod colour trait would be obtained in a cross of Gg × Gg?
(A) 25%
(B) 50%
(C) 75%
(D) 90% **Marks:[1.00]**

Q.No.38: In chick pea assume that there is no linkage and allele of large seed (L) is dominant over small seed (l) and green colour seed (G) is dominant over yellow colour seed (g).
Two chick pea parent plants when crossed resulted in progeny having seeds with phenotypes small seeds and green colour, and large seeds with yellow colour besides other phenotypic progenies. Select the genotype of these two parents plants.
(A) LLGG × llgg
(B) llgg × LLgg
(C) llGG × llGg
(D) llGg × Llgg **Marks:[1.00]**

Q.No.39: Study the pedigree given below and select the probable mode of inheritance and a human trait that follows this pattern of inheritance.



(A) Autosomal recessive, sickle cell anaemia
(B) Sex linked recessive, Haemophilia
(C) Autosomal dominant, Myotonic dystrophy
(D) Sex linked dominant, colour blindness **Marks:[1.00]**

Q.No.40: A child with blood group O has father with blood group A and mother with blood group B. What would be the possible genotypes of parents and the

child? Choose the correct option :

	Father	Mother	Child
(A)	I^Bi	I^Ai	I^Ai
(B)	I^Ai	I^Bi	ii
(C)	I^AI^A	I^BI^B	ii
(D)	I^BI^B	I^AI^A	I^Bi

Marks:[1.00]

Q.No.41: In a dihybrid Mendelian cross, garden pea plants heterozygous for yellow 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 **Marks:[1.00]**

Q.No.42: A region of coding strand of DNA has the following nucleotide sequence 5' – ATGCGGC – 3'
The sequence of bases on mRNA transcribed by this would be :
(A) 5' – AUGCGGC – 3'
(B) 3' – AUGCGGC – 3'
(C) 5' – TACGCCG – 3'
(D) 3' – TACGCCG – 5' **Marks:[1.00]**

Q.No.43: A DNA molecule is 160 base pairs long. It has 30% Guanine. How many adenine bases are present in this DNA molecule?
(A) 48
(B) 64
(C) 96
(D) 192 **Marks:[1.00]**

Q.No.44: A template strand in a bacterial DNA has the given base sequence 5' – GGTTTAACGA – 3'
What would be the RNA sequence transcribed from this template DNA?
(A) 5' – UCGUUAAACC – 3'
(B) 3' – UCGUUAAACC – 3'
(C) 5' – CCAAATTGCT – 3'
(D) 3' – CCAAATTGCT – 5' **Marks:[1.00]**

Q.No.45: Polydactyly (six-fingered hands) is a genetic condition due to a dominant allele (P) over recessive allele (p). If a six-fingered woman and a five-fingered man have a normal child, the genotype of the parents and the child would be :

	Mother	Father	Child
(A)	PP	pp	Pp
(B)	Pp	pp	pp
(C)	Pp	Pp	pp
(D)	pp	PP	Pp

Marks:[1.00]

Q.No.46: In a transcription unit in DNA the **'I'** is located towards 3'end of the **'II'** strand and it usually defines the end of the process of transcription. Choose the correct **I** and **II** from the options given below:
(A) Terminator, coding
(B) Promoter, template
(C) rho factor, template
(D) sigma factor, coding **Marks:[1.00]**

Q.No.47: In prokaryotes like *E. coli* the DNA in the nucleoid region is organised as:
(A) negatively charged DNA wrapped around histone.
(B) densely packed chromatin with NHC proteins.
(C) large loops held by the proteins.
(D) many repeating units of nucleosomes. **Marks:[1.00]**

Q.No.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 colour	Violet	White
(B)	Pod shape	Inflated	Constricted
(C)	Stem height	Tall	Dwarf
(D)	Flower position	Terminal	Axial

Marks:[1.00]

Section C

Q.No.49: CASE :
The so-called test tube babies are produced by the technique of "in vitro fertilisation". It is a form of assisted reproductive technologies (ART). The steps of ART include :
(i) Administration of gonadotropins or Clomiphene Citrate to the woman.
(ii) Aspiration of several ova (sec oocytes) by laparoscopy.
(iii) Collection of the sperm from the husband/donor semen.
(iv) Incubation of ovum and the sperm together in special media and environment.
(v) Fertilisation and early development of the embryo in the culture plate.
(vi) Implantation of the 8-celled embryos (or more) in the uterine cavity.
Answer the given questions (Q.No. 49-54) on the basis of understanding of the above given case.
The reason for using the above technique is–
(i) There may be inadequate motility of spermatozoa.
(ii) There may be obstruction of the uterine tube.
(iii) There may be under developed ovaries.
(iv) There may be plug in the cervical canal.
Choose the correct option :
(A) (i) and (iii)
(B) (iii) and (iv)
(C) (i) and (ii)
(D) (ii) and (iv) **Marks:[1.00]**

Q.No.50: CASE :
The so-called test tube babies are produced by the technique of "in vitro fertilisation". It is a form of assisted reproductive technologies (ART). The steps of ART include :
(i) Administration of gonadotropins or Clomiphene Citrate to the woman.
(ii) Aspiration of several ova (sec oocytes) by laparoscopy.
(iii) Collection of the sperm from the husband/donor semen.
(iv) Incubation of ovum and the sperm together in special media and environment.
(v) Fertilisation and early development of the embryo in the culture plate.
(vi) Implantation of the 8-celled embryos (or more) in the uterine cavity.
Answer the given questions (Q.No. 49-54) on the basis of understanding of the above given case.
Gonadotropins in the above technique are administered to the woman to stimulate :
(A) Formation of ovarian follicles.
(B) Growth of ovarian follicles.
(C) Formation of corpus luteum.
(D) Growth of corpus luteum. **Marks:[1.00]**

Q.No.51: CASE :
The so-called test tube babies are produced by the technique of "in vitro fertilisation". It is a form of assisted reproductive technologies (ART). The steps of ART include :
(i) Administration of gonadotropins or Clomiphene Citrate to the woman.
(ii) Aspiration of several ova (sec oocytes) by laparoscopy.
(iii) Collection of the sperm from the husband/donor semen.
(iv) Incubation of ovum and the sperm together in special media and environment.
(v) Fertilisation and early development of the embryo in the culture plate.
(vi) Implantation of the 8-celled embryos (or more) in the uterine cavity.
Answer the given questions (Q.No. 49-54) on the basis of understanding of the above given case.
The ovum (sec oocytes) are aspirated using laparoscopy from :
(A) Primary Follicle
(B) Secondary Follicle
(C) Graafian Follicle
(D) Corpus luteum **Marks:[1.00]**

Q.No.52: CASE :
The so-called test tube babies are produced by the technique of "in vitro fertilisation". It is a form of assisted reproductive technologies (ART). The steps of ART include :
(i) Administration of gonadotropins or Clomiphene Citrate to the woman.
(ii) Aspiration of several ova (sec oocytes) by laparoscopy.
(iii) Collection of the sperm from the husband/donor semen.
(iv) Incubation of ovum and the sperm together in special media and environment.
(v) Fertilisation and early development of the embryo in the culture plate.
(vi) Implantation of the 8-celled embryos (or more) in the uterine cavity.
Answer the given questions (Q.No. 49-54) on the basis of understanding of the above given case.
In the above case if the sperm count in each milliliter of husband (X) is less than 20 million/mL and of husband (Y) is found to be 300 million/mL, the ART recommended to husband (X) and husband (Y) respectively by the medical practitioner will be :
(A) ICSI and ZIFT
(B) ZIFT and ICSI
(C) IUT and IUI
(D) GIFT and ZIFT

Marks:[1.00]

Q.No.53: CASE :

The so-called test tube babies are produced by the technique of "in vitro fertilisation". It is a form of assisted reproductive technologies (ART). The steps of ART include :
(i) Administration of gonadotropins or Clomiphene Citrate to the woman.
(ii) Aspiration of several ova (sec oocytes) by laparoscopy.
(iii) Collection of the sperm from the husband/donor semen.
(iv) Incubation of ovum and the sperm together in special media and environment.
(v) Fertilisation and early development of the embryo in the culture plate.
(vi) Implantation of the 8-celled embryos (or more) in the uterine cavity.

Answer the given questions (Q.No. 49-54) on the basis of understanding of the above given case.

Generally before the implantation of the embryo the woman is administered progesterone in the procedure to make the :
(A) Endometrium of the uterus receptive.
(B) Ampulla of the oviduct receptive.
(C) Infundibulum of the oviduct receptive.
(D) Myometrium of the uterus receptive. **Marks:[1.00]**

Q.No.54: CASE :

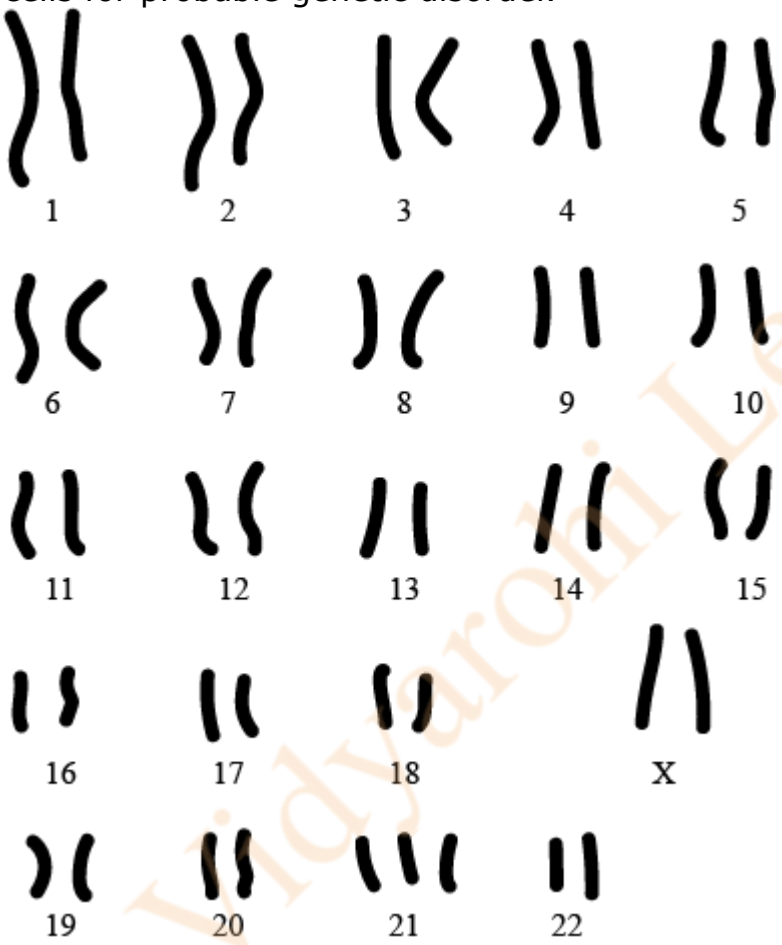
The so-called test tube babies are produced by the technique of "in vitro fertilisation". It is a form of assisted reproductive technologies (ART). The steps of ART include :
(i) Administration of gonadotropins or Clomiphene Citrate to the woman.
(ii) Aspiration of several ova (sec oocytes) by laparoscopy.
(iii) Collection of the sperm from the husband/donor semen.
(iv) Incubation of ovum and the sperm together in special media and environment.
(v) Fertilisation and early development of the embryo in the culture plate.
(vi) Implantation of the 8-celled embryos (or more) in the uterine cavity.

Answer the given questions (Q. No. 49-54) on the basis of understanding of the above given case.

The technique that would be used to implant the embryo, in case the oviducts of the woman are blocked by an obstruction -
(A) GIFT
(B) IUT
(C) IUI
(D) ICSI **Marks:[1.00]**

Q.No.55: How many types of gametes can be produced in a diploid organism which is heterozygous for 3 loci?
(A) 4
(B) 8
(C) 16
(D) 32 **Marks:[1.00]**

Q.No.56: Given diagram depicts a karyotype obtained after analysis of foetal cells for probable genetic disorder.



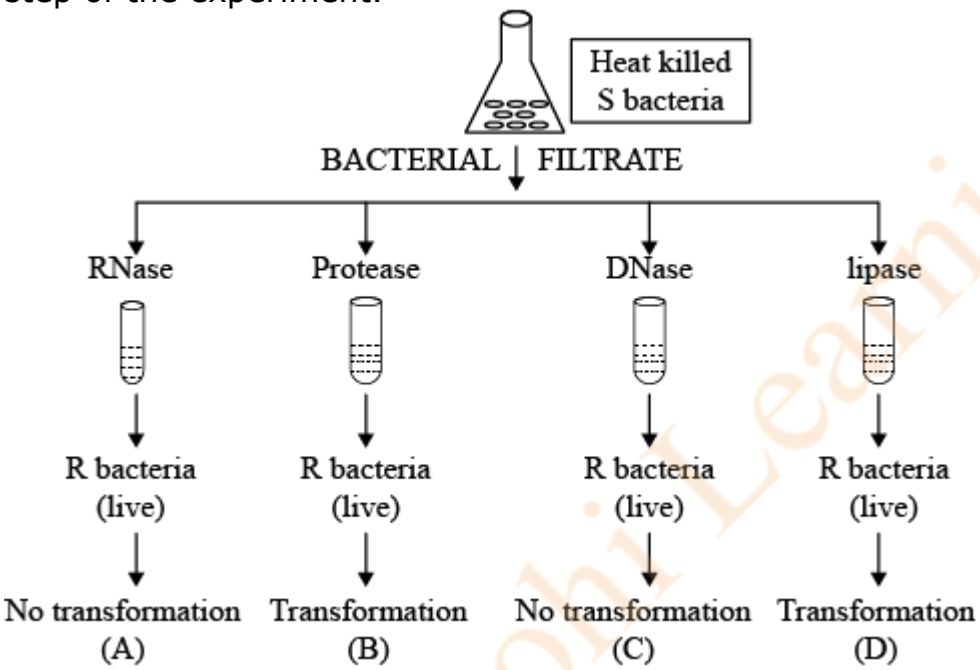
Based on the karyotype, the chromosomal disorder detected in unborn foetus and the consequent symptoms the child may suffer from are:
(A) Down's syndrome: Gynaecomastia, overall masculine development.
(B) Down's syndrome: Furrowed tongue, short stature.
(C) Turner's syndrome: Rudimentary ovaries, sterile individual.
(D) Turner's syndrome: Gynaecomastia, masculine development. **Marks:[1.00]**

Q.No.57: Morgan hybridised *Drosophila* white eyed and yellow bodied female with red eyed and brown bodied male (wild type) and intercrossed their F_1 progeny. He observed that the two genes:

(A) Did not segregate independent of each other.
(B) May be located on two different chromosomes.
(C) Segregated independently of each other.
(D) Showed very high percentage of recombinants. **Marks:[1.00]**

Q.No.58: Given below are the illustration of the different steps of experiments conducted by Macleod, Mccarty and Avery to find the chemical nature of the 'transforming principle' as DNA. Select the option that incorrectly depicts the step of the experiment.

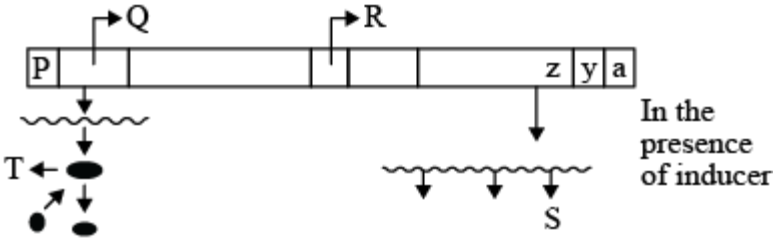
Marks:[1.00]



Q.No.59: Given below is a heterogeneous RNA formed during eukaryotic transcription.

How many introns and exons respectively are formed in this hnRNA.
(A) 7, 7
(B) 8, 7
(C) 8, 8
(D) 7, 8 **Marks:[1.00]**

Q.No.60: Identify the correct labellings for Q, R, S and T for the lac operon in *E. Coli* as given below:



Choose the correct option from the given table:

	Q	R	S	T
(A)	Structural gene	Operator	$\beta-$ Galactosidase	Inducer
(B)	Regulatory gene	Promoter	Transacetylase	Repressor protein
(C)	Structural gene	Operator	Permease	Inducer
(D)	Regulatory gene	Promoter	$\beta-$ Galactosidase	Repressor

Marks:[1.00]