

General Instructions:

1. The Question Paper contains three sections.
2. Section A has 24 questions. Attempt any 20 questions.
3. Section B has 24 questions. Attempt any 20 questions.
4. Section C has 10 questions. Attempt all 10 questions.
5. All questions carry equal marks.
6. There is no 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 How many meiotic divisions are needed for forming 100 grains of wheat?
(a) 125 (b) 25 (c) 50 (d) 20
- 2 Embryo sac of an angiosperm is homologous to:
(a) Megaspore (b) Female gametophyte (c) Sporangium (d) None of the above.
- 3 Milky water in green coconut is:
(a) Free nuclear Liquid endosperm (b) Liquid female gametophyte
(c) Liquid nucleus (d) Liquid chalaza
- 4 Autogamy can occur in a chasmogamous flower if:
(a) Pollen matures before maturity of ovule (b) Ovule matures before maturity of pollen
(c) Both pollen and ovules mature simultaneously (d) Both anther and stigma are of equal lengths
- 5 If an endosperm cell of an angiosperm has 24 chromosomes, the root cell of megaspore mother cell should have-
(a) 8 (b) 16 (c) 4 (d) 24
- 6 In the human female normally during the menstrual cycle ovulation takes place :
(a) At the mid secretory phase (b) Just before the end of the secretory phase
(c) At the beginning of the proliferative phase (d) At the end of the proliferative phase.
- 7 Immediately after ovulation, the mammalian egg is covered by a membrane known as
(a) Chorion (b) Zona pellucida (c) Corona radiata (d) Vitelline membrane.
- 8 Acrosomal reaction of the sperm occurs due to
(a) Its contact with zona pellucida of the oval (b) Reactions within the uterine environment of the female
(c) Reactions within the epididymal environment of the male (d) Androgens produced in the uterus

- 9 Which of the following is correct about mammalian testes?
 (a) Graafian follicles, Sertoli cells, Leydig's cells (b) Graafian follicles, Sertoli cells, Seminiferous tubules (c) Sertoli cells, Seminiferous tubules, Leydig's cells (d) Graafian follicle, Leydig's cells, Seminiferous tubule
- 10 Sporopollenin is secreted by:
 (a) Cytoplasm of the pollen (b) Cytoplasm of the pollen mother cell (c) Cytoplasm of the tapetum (d) Cytoplasm of the endothecium
- 11 Which one of these tissues is not produced from the embryonic mass of a dicotyledonous seeds?
 (a) Root tip (b) Plumule (c) Hypocotyl (d) Cotyledon
- 12 How many types of gametes would be produced if the genotype of a parent is AaBB?
 (a) 1 (b) 2 (c) 3 (d) 4
- 13 Pleiotropy, can be defined as:-
 (a). When one gene control one trait (b). When one gene exhibits multiple traits (c). When multiple genes control one trait (d). When multiple genes control multiple traits.
- 14 Polygenic inheritance can be observed in:-
 (a). In the eye colour of human being (b). In the skin colour of human being (c). In the hair colour pattern (d). All of the above
- 15 Who has given the concept of gene mapping:-
 (a). Morgan (b). Gregor John Mendel (c). Alfred Sturtevant (d). Henking
- 16 If the diploid number of chromosomes are 32 in honey bees, then how many chromosomes are found in the male honey bees or drones:-
 (a). 16 (b) 32 (c) 48 (d) 16 & 32 both
- 17 An individual human being has 45 chromosomes, which type of chromosomal disorders likely to occur:-
 (a). Down's syndrome (b). Turner's syndrome (c). Klinefelter syndrome (d). None of the above
- 18 Mother's blood group is A and father's blood group is B and the daughter's blood group is O. What will be the blood group of other children:-
 (a). A (b). B (c). AB (d). All of the above
- 19 Nucleotide contains:
 (a) Pentose sugar, nitrogenous base, phosphate group (b) Pentose sugar, nitrogenous base (c) Nitrogenous base, phosphate group (d) None
- 20 Which of the following is not true or DNA double helix structure?
 (a) Two nucleotides have anti-parallel polarity (b) Bases in two strands are linked by Hydrogen bonds (c) Two chains are coiled in a left handed fashion (d) Pitch of the helix is 3.4 nm

- 21 Biochemical characterisation of transforming principle is done by:
 (a) Avery, McLeod & McCarty (b) Frederick Griffith (c) Avery & McCarty (d) None
22. Identify the incorrect statement regarding Hershey & Chase experiment
 (a) Experiment proves that DNA is the genetic material. (b) They used bacteriophage
 (c) Protein labelled with ^{32}P & DNA with ^{35}S (d) Bacteriophage is a virus.
- 23 Choose Stop codons among the following:
 (a) UAA (b) UCA (c) UCC (d) UAC
- 24 If a person has VNTR of 10 nucleotides in his satellite DNA of chromosome number 8, then what will be the VNTR of his son and daughter of that chromosome?
 (a) Both son and daughter will have the same. (b) Son will have 8 but daughter will have 4.
 (c) It can't be determined. (d) None of the above

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 consist 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 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

25 **Assertion:** Breast feeding during initial period of infant growth is recommended.
Reason: Colostrum contains several antibodies, essential to render immunity in newborns.

26 **Assertion:** CDRI Lucknow has developed Saheli which is non-steroidal, once a week pill.
Reason: Hormonal contraceptives help to balance the hormonal level in body for proper functioning of gonads

27 **Assertion** :- There are triple alleles, I^A , I^B , i responsible to control the blood group of human being. **Reason** :- The controlling of one trait by number of alleles is called as multiple allelism.

28 **Assertion:** The DNA strand having polarity $3'$ - $5'$ replicated continuously whereas the strand with polarity $5'$ - $3'$; replicated discontinuously.
Reason: The DNA polymerase catalyses the polymerisation only in one direction.

29. What is the difference between implants and oral contraceptives?
 (a) Implants are effective for longer duration. (b) Implants are inserted under the skin; need not be remembered and taken daily (c) Both A and B (d) None of the above

30 From among the situations given below, choose the one that prevents both autogamy and geitonogamy:
 (a) Monoecious plant bearing unisexual flowers (b) Dioecious plant bearing only male or female flowers (c) Monoecious plant with bisexual flowers (d) Dioecious plant with bisexual flowers.

- 31 In a fertilized embryo sac, the haploid, diploid and triploid structures are-
(a) Synergid, zygote and primary endosperm nucleus (b) Synergid, antipodal and polar nuclei
(c) Antipodal, synergid and primary endosperm nucleus (d) Synergid, polar nuclei and zygote
- 32 During parturition, a pregnant woman is having prolonged labour pains and child birth has to be fastened. It is advisable to administer a hormone that can:
(a).Increase the metabolic rate. (b) Release glucose in the blood.
(c).Stimulate the ovary. (d) Activate smooth muscles:
- 33 The solid mass of 8-16 cells formed from zygote after successive mitotic divisions is called
(a) Blastula (b) Gastrula (c) Morula (d) None of these
- 34 Urine test during pregnancy determines the presence of:
(a) Human chorionic gonadotropin hormone (b) Estrogen
(c) Progesterone (d) Luteinising hormone.
- 35 Which method of contraceptive is widely accepted among the females in India :-
(a).Oral contraceptives (b). Hormonal implants (c.) IUDs (d) Diaphragm
- 36 If the sequence of nitrogen bases of the coding strand of DNA in a transcription unit is: 5' – ATGAATG – 3', the sequence of bases in its RNA transcript would be:
(a) 5' – AUG A AUG – 3' (b) 5' – UACUU AC – 3' (c) 5' – CAUUCAU – 3' (d) 5' – GUAAGUA – 3'.
- 37 How many types of genotypes are found to make the human blood group :-
(a). 4 (b). 5 (c). 6 (d). 7
- 38 If one strand of DNA has the nitrogenous base sequence ATCTG, the complementary RNA strand would be
(a) TTAAGU (b) UAGAC (c) AACTG (d) ATCGU
- 39 With regard to mature mRNA in eukaryotes, which of the following is true?
(a) Exons and introns do not appear in the mature RNA (b) Exons appear but introns do not appear in the mature mRNA (c) Introns appear but exons do not appear in the mature mRNA
(d) Both exons and introns appear in the mature mRNA
- 40 If the number of base pairs in a double stranded DNA are 200. The number of ADENINE is 60 then what will the numbers of GUANINE.
(a)60 (b)40 (c)80 (d)100
- 41 Which of the following play a role in protein synthesis?
(a) Introns (b) Exons (c) Both (a) and (b) (d) None of the above
- 42 RNA polymerase II is responsible for the transcription of:
(a) tRNA (b) r RNA (c). hnRNA (d). snRNA
- 43 Haemophilia falls in the category of :-
(a) Autosomal recessive disorder (b) autosomal dominant disorder
(c) x- linked recessive disorders (d) x- linked dominant disorder

- 44 RNA is unstable due to presence of:
 (a) Hydrogen at 2' C in Ribose sugar (b) OH at 2' C in Ribose sugar
 (c) OH at 2' C in Deoxyribose sugar (d) None of the above
- 45 Identify the incorrect statement:
 (a) Purines are Adenine & Guanine (b) Pyrimidines are Cytosine, Thymine, Adenine
 (c) Adenine pairs with thymine by 2 Hydrogen bond (d) Guanine pairs with cytosine by 3 hydrogen bond.
- 46 Find the correct statement from below:
 (a) In prokaryotes, DNA being positively charged is held by some negatively charged proteins to form nucleoid (b) In Eukaryotes, there is a set of negatively charged proteins called histones
 (c) Histones are rich in lysine and Arginine residues (d) 6 molecules of histones with DNA form nucleosome
- 47 What are minisatellites?
 (a) 10-40 bp sized small sequences within the genes (b) Short coding repetitive region on the eukaryotic genome (c) Short non-coding repetitive sequence forming large portion of eukaryotic genome (d) Regions of coding strands of the DNA
- 48 Adenine pairs with thymine with:
 (a) 1 hydrogen bond (b) 2 hydrogen bond (c) 3 hydrogen bond (d) 4 hydrogen bond

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 all 10 questions in this section.

Case:-- After implantation, finger like projections appear on the trophoblastic called chorionic villi. Which are surrounded by the uterine tissue and maternal blood? The chorionic villi and uterine tissue become interdigitated with each other and jointly form a structural and functional unit between developing embryo (foetus) and maternal body called placenta. Placentas not only supply nutrients and oxygen to the foetus but it also act as endocrine gland. Several hormones called human chorionic gonadotropin, human placental lactogen, estrogens, progesterone etc. are produced by placenta to support the pregnancy.

- 49 Which of the following structure is responsible to make the placenta :-
 (a) Trophoblast (b) inner cell mass (c) stem cells (d) Amnion
- 50 Relaxin is secreted by:
 (a) Placenta (b) Pituitary (c) Ovary (d) Chorionic villi
- 51 Which hormone is produced by the placenta :-
 (a) Progesterone (b) HPL (c) HCG (d). All of the above
- 52 Assertion: - chorionic villi, produced by the trophoblast.
 Reason: - chorionic villi help to make placenta with uterine tissue.
- 53 Assertion : - vigorous contraction of the uterus at the end of pregnancy causes expulsion.
 Reason: - the signals for parturition, origination from the foetus, trigger release of oxytocin which stimulate uterine contraction.

P.T.O.

- (a) Assertion and Reason, both are correct and reason is the correct explanation of the assertion.
(b) Assertion and reason, both are correct but the reason is not correct explanation of the assertion.
(c.) Assertion is correct and reason is incorrect.
(d) Assertion is incorrect and reason is correct.
- 54 Parturition is under control of:
(a) LH (b) GnRH (c) oxytocin (d) relaxin
55. The dark staining region in a chromosome is called:
(a) Euchromatin (b) Heterochromatin (c) Plectonemic (d) Paranemic
- 56 Which gene produces permease in lac operon?
(a) Z-gene (b) A-gene (c) Y-gene (d) P-gene
- 57 According to Chargaff's rules:
(a) $A+C=G+T$ (b) $A+T=G+C$ (c) $A+T=T+C$ (d) $A+G=C+T$
- 58 Where does tailing of hn RNA takes place?
(a) 5'-bond (b) 3'-bond (c) Both (a) and (b) (d) Along with length of hn RNA
