COMMON PRE-BOARD EXAMINATION 2022-23

Subject: BIOLOGY (044)

Date: 19/01/2023

Duration:3 HOURS

TOTAL MARKS: 70

General Instructions:

(i) All questions are compulsory.

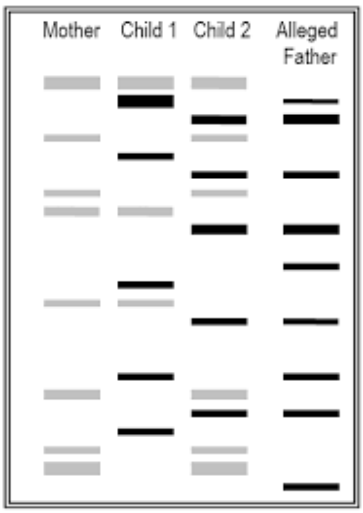
(ii) The question paper has five sections and 33 questions. All questions are compulsory.

(iii) Section–A has 16 questions of 1 mark each;
Section–B has 5 questions of 2 marks each;
Section– C has 7 questions of 3 marks each;
Section– D has 2 case-based questions of 4 marks each; and
Section–E has 3 questions of 5 marks each.

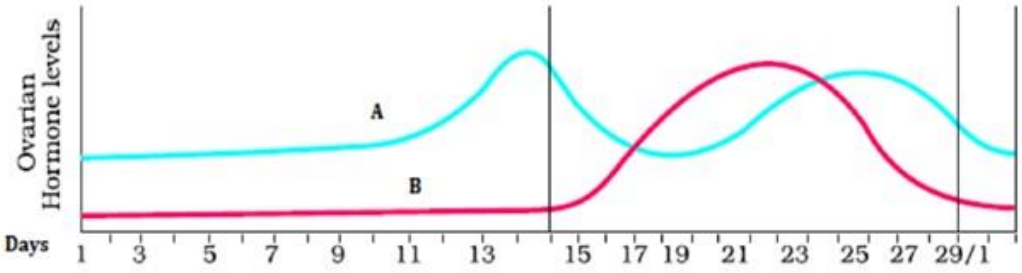
(iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

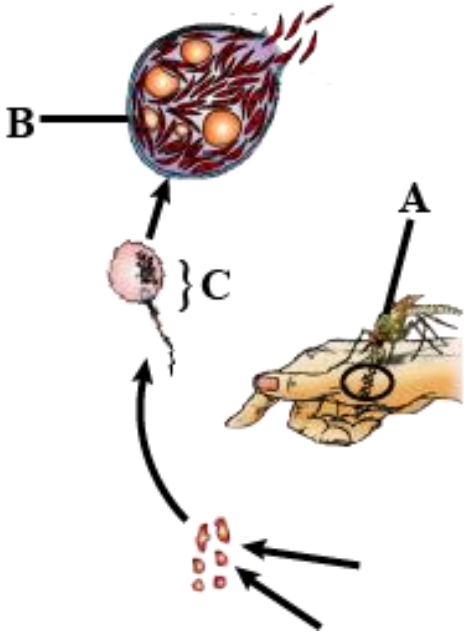
(v) Wherever necessary, neat and properly labeled diagrams should be drawn.

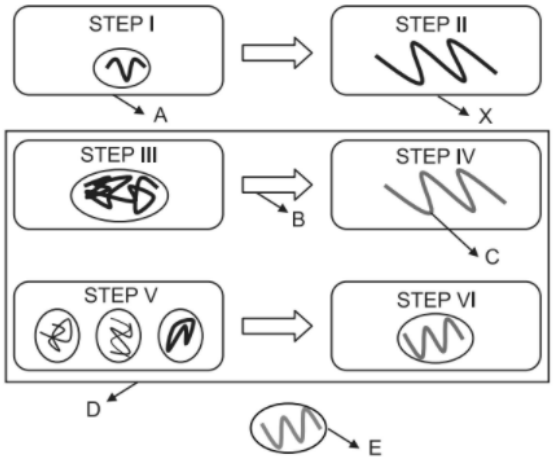
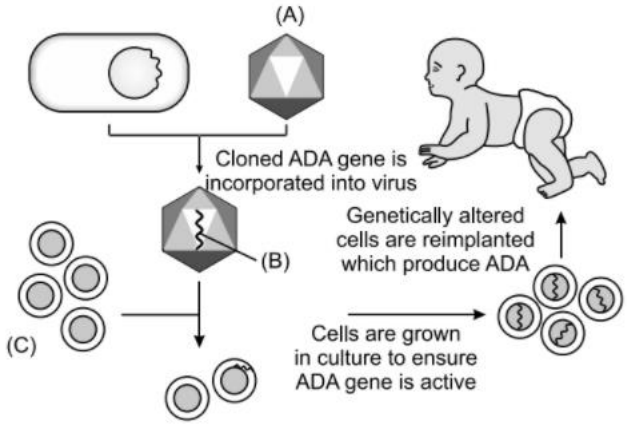
	SECTION -A	
Q No	Question	Marks
1	Diaphragms are contraceptive devices used by the females. Choose the correct option from the statements given below: (i) They are introduced into the uterus (ii) They are placed to cover the cervical region (iii) They act as physical barriers for sperm entry (iv) They act as spermicidal agents *Choose the correct option:* a) (i) and (ii) b) (i) and (iii) c) (ii) and (iii) d) (iii) and (iv)	1
2	A childless couple underwent a procedure called ZIFT. Choose the correct statement regarding the ZIFT procedure. a) Ova collected from a female donor are transferred to the fallopian tube to facilitate zygote formation. b) Zygote is collected from a female donor and transferred to the fallopian tube c) Zygote is collected from a female donor and transferred to the uterus d) Ova collected from a female donor and transferred to the uterus	1
3	The promoter site and the terminator site for transcription are located at: a) 3’ (downstream) end and 5’ (upstream) end, respectively of the transcription unit b) 5’ (upstream) end and 3’ (downstream) end, respectively of the transcription unit c) the 5’ (upstream) end d)the 3’ (downstream) end	1
4	The bones of forelimbs of whale, bat, cheetah and man are similar in structure, because a) one organism has given rise to another b) they share a common ancestor c) they perform the same function d) they have biochemical similarities	1
5	The base pairs of DNA double helix are given below. Select the suitable mRNA strand that derived from transcription is 3’-ATTTCC-5’ 5’-TAAAGG-3’	1

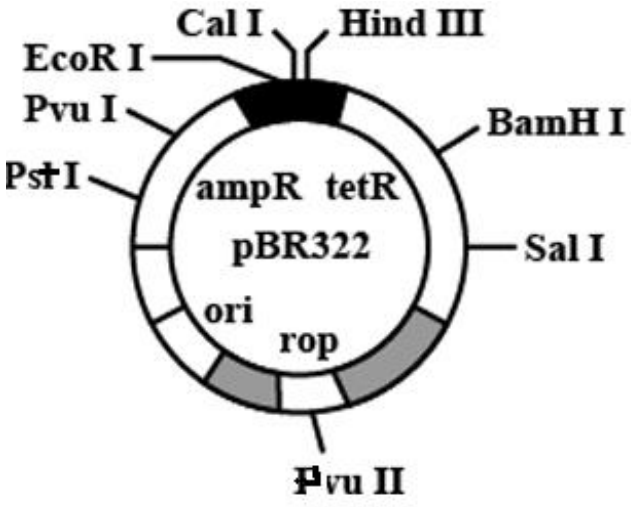
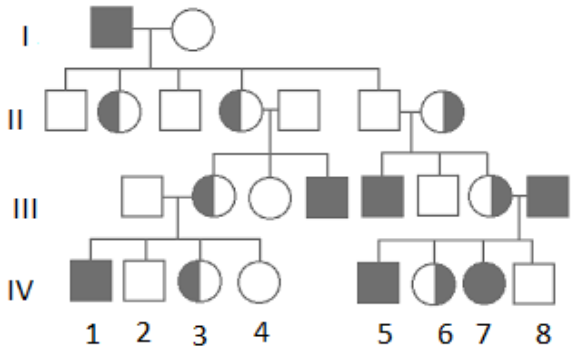
	a) UAAAGG b) CUUUCC c) GAAAGG d) CCUUUC	
6	Many diseases can be diagnosed by observing the symptoms in the patient. Which group of symptoms are indicative of typhoid? a) Difficulty in respiration, fever, chills, cough, headache b) Constipation, abdominal pain, cramps, blood clots c) Nasal congestion and discharge, cough, sore-throat, headache d) High fever, weakness, stomach pain, loss of appetite and constipation	1
7	The microorganism that is used in alcohol production and bread making is a) Escherichia coli b) Saccharomyces cerevisiae c) bacillus subtilis d) Pseudomonas putida	1
8	Study the following diagram and answer the following questions A mother claims that the alleged person is the father of her children. Which of these children belongs to the alleged father?  a) Child 1 b) Child 2 c) Child 1 and 2 d) Neither child 1 nor 2	1

9	In a pond there were 50 Paramecium, through reproduction 120 new Paramecium were added. What would be the birth rate per individual per hour? a) 4.3 b) 4.2 c) 2.4 d) 3.4	1
10	People who have migrated from plains to an area adjoining Rohtang Pass about six months back a) have more WBC and were healthy b) have the usual RBC count but their hemoglobin has high binding affinity to O2 c) have more RBCs and their hemoglobin has a lower binding affinity to O2. d) Suffer from altitude sickness with symptoms like nausea and fatigue etc .	1
11	Choose incorrect option with respect to amount of living material present in different trophic levels at a given time: a) Can be measured as number b) Is equivalent to standing crop c) Is always represented as dry weight only d) Expressed both as biomass and number	1
12	Endemism refers to a) Species confined to a region and not found anywhere else b) Species confined to a region and also found anywhere else c) Species of all varieties d) Species facing extinction	1
	Question No. 13 to 16 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.	
13	Assertion: Pollen bank can be formed for crop breeding programmes. Reason: Pollen grain of many species can be stored for year in liquid nitrogen (–196°C)	1

14	Assertion: It is not possible for human parents heterozygous for skin colour to have children darker or lighter than themselves. Reason: Human skin colour is controlled by a single pair of alleles.	1
15	Assertion: Alpha - 1 – antitrypsin is used to treat emphysema. Reason: Transgenic mice are being used to test the safety of the polio vaccine.	1
16	Assertion: The relationship between sucker fish and shark is considered to be an example of parasitism. Reason: - Sucker fish gets food and shelter from shark	1
	SECTION -B	
17	The graph given below shows the variation in the levels of ovarian hormones during various phases of menstrual cycle:  (a) Compare the role of A and B. (b) Under which condition will the level of B continue to remain high on the 28thday?	2
18	A cross was carried out between a pea plant heterozygous for round and yellow seeds with a pea plant having wrinkled and green seeds. a) Write the genotype of the parents b) What is this cross known as? State the purpose of conducting such a cross.	2
19	Study a part of the life cycle of malarial parasite given below. Answer the questions that follows: a) Mention the roles of 'A' in the life cycle of malarial parasite. b) Name the event 'C' and the organ where this event occurs. c) Identify the organ 'B' and name the cells being released from it.	2

		
20	With reference to the process of transcription, explain the following: a) Name the DNA strand on which mRNA is transcribed. b) Explain the role of 'sigma' and 'Rho' factor. c) Why hnRNA is subjected to splicing?	2
21	The pyramid of biomass and number in sea is inverted. Why? OR The pyramid of energy is always upright. Explain.	2
	SECTION -C	
22	Explain the hormonal regulation of spermatogenesis in humans.	3
23	The embryo sac in female gametophyte is seven celled and eight nucleated structure. Justify the statement with the help of a labelled diagram.	3
24	a) Draw a labelled schematic diagram of a replication fork showing continuous and discontinuous replication of DNA strands. b) State a reason why is the replication continuous and discontinuous in the diagram drawn.	3
25	Evolution is a change in the gene frequencies in a population in response to changes in the environment in a time scale of years and not centuries. Justify this statement with reference to DDT. How does the theory of Hugo de Vries support this?	3

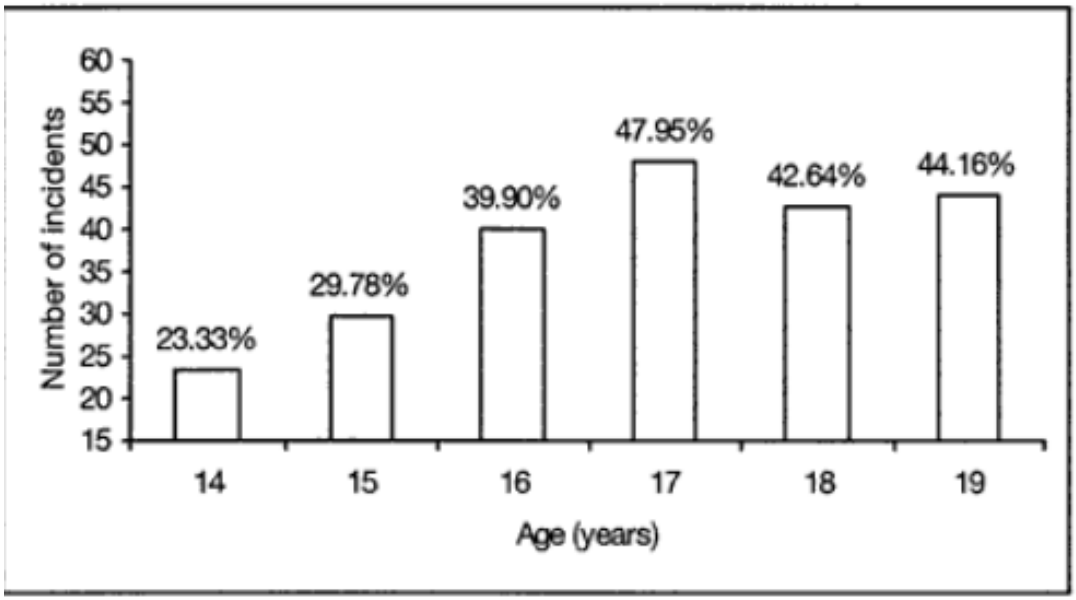
26	Study the diagram showing the replication of HIV in humans and answer the following questions accordingly: (i) Write the chemical nature of coat 'A'. (ii) Name the enzyme 'B' acting on 'X' to produce molecule 'C'. Name 'C'. (iii) Mention the name of the host cell 'D' the HIV attacks first when it enters into the human body. (iv) Name the two different cells where the new virus 'E' subsequently attack.  OR In gene therapy for the ADA deficient patients the type of vector ``A'' is used here to incorporate ``B'' into ``C'' type of cells. i) Identify A, B ii) Mention the cause and the body system affected by ADA deficiency in humans. iii) Name the vectors used for transferring ADA-DNA into the recipient cell in humans. Name the recipient cell.  	3

27	Study the following diagram and answer the questions  a) Name the organism in which the vector shown is inserted to get the copies of the desired gene b) Mention the area labelled in the vector responsible for controlling the copy number of the inserted gene. c) How is the coding sequence of B galactosidase considered a better marker than the ones identified by you in the diagram?	3
28	Co-extinction and introduction of alien species too are responsible for the loss of biodiversity. Explain	3
	SECTION-D	
29	Study the pedigree chart and answer the following questions. (Half shaded -carrier of disease)  The pedigree chart shows a family's pedigree for colorblindness. a) Which sex can be carriers of colorblindness and not have it? b) what kind of trait is colorblindness ? c) Why does individual IV-7 have colorblindness? d) Why do all the daughters in generation II carry the colorblind gene?	4

30		4

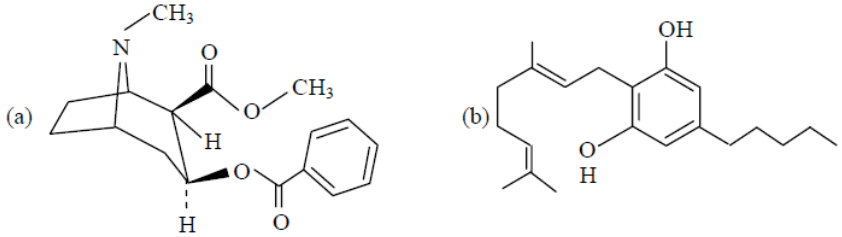
The data given below shows drug abuse and age in years. Study the graph and answer the questions.

Drug abuse : age profile



a) With reference to the graph compare the age profile of the maximum and minimum number of incidences of drug abuse happened.

b) Identify the drug whose chemical structures are given below

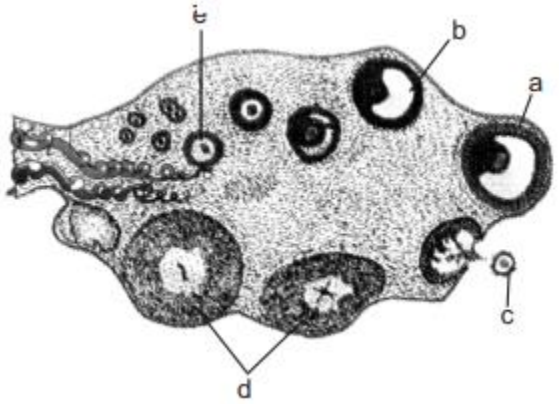
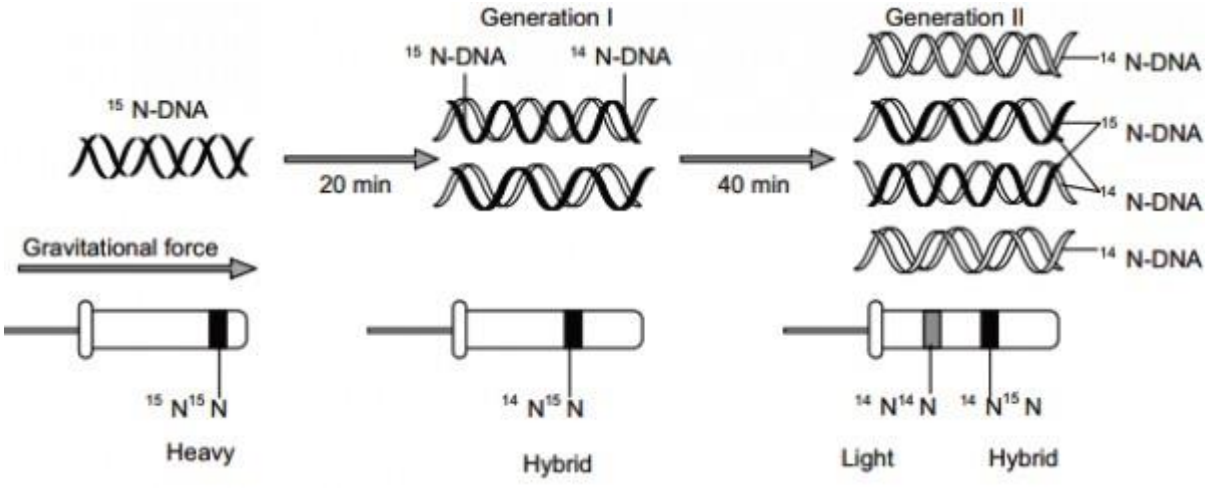


c) Name two plants that have hallucinogenic properties.

d) List down any for measures useful for prevention and control of drug /alcohol abuse.

OR

What is addiction with reference to drugs?

	SECTION-E	
31	Study the given figure and answer the question that follows.  a) Identify the figure that illustrates ovulation and explain the phenomenon that is the cause of ovulation. b) Identify the figure that illustrates corpus luteum and name the phase of menstrual cycle during which it is produced. Mention the endocrine function of corpus luteum. c) Explain the events that occur in ''a'' at the time of ovulation and thereafter. d) Draw a well labeled diagram of part ''c'' **OR** (a)Draw labeled diagrams of the sectional views of the stages of a maturing pollen grain in angiosperm. b) Explain the function of different parts.	5
32	Study the figure answer the following questions:  	5

	a) Name and define the property of DNA which is proved by this experiment. b) Name the scientist who performed this experiment. c) Name the organism that the scientist used in this experiment. d) What was source of 15N isotope? e) How the heavy DNA is separated from normal DNA in this experiment? OR Study the schematic representation of the genes involved in the lac operon given below and answer the questions that follow. **p** **i** **p** **o** **z** **y** **a** a) Identify and name the regulatory gene in this operon. Explain its role in 'switching off the operon. b) Why is operon's regulation referred to as negative regulation? c) Name the inducer molecule and the products of the gene 'y' and of the operon. Write the function of these gene products.	
33	a) Draw a schematic representation only of the maturation of a pro-insulin into mature insulin. b) Draw a flowchart and explain the steps involved in gene transfer for the production of human insulin by rDNA technology. c) Why is this insulin considered better than the ones used earlier by diabetic person? OR i) The bacterium Bacillus thuringiensis produces a toxic protein called "cry protein". That protein is lethal to certain insects, but not to bacteria. a) Why does not this toxin kill bacteria? b) After consuming this protein, what type of changes occur in the gut of insects? c) How did humans use this protein for their benefit? ii) How did the process of RNA interference help to control the nematode from infecting roots of tobacco plants? Explain.	5