

Version No.			

ROLL NUMBER						



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1	1	1	1
2	2	2	2
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6	6	6	6	6	6	6
7	7	7	7	7	7	7
8	8	8	8	8	8	8
9	9	9	9	9	9	9

Answer Sheet No. \_\_\_\_\_

Sign. of Candidate \_\_\_\_\_

Sign. Of Invigilator \_\_\_\_\_

**BIOLOGY HSSC–II**  
**SECTION–A (Marks17)**  
**Time allowed: 25 Minutes**

Section–A is compulsory. All parts of this section are to be done on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. **Do not use lead pencil.**

**Q.1 Fill the relevant bubble for each part. All parts carry one mark.**

- They are in lungs where blood vessels and airways pass in and out is called:
 

A. Pelvis	<input type="radio"/>	B. Hilum	<input type="radio"/>
C. Mediastinum	<input type="radio"/>	D. Fissure	<input type="radio"/>
- Antidiuretic hormone promotes the retention of water by stimulating the:
 

A. Active transport of water	<input type="radio"/>
B. Active transport of chloride	<input type="radio"/>
C. Active transport of sodium	<input type="radio"/>
D. Permeability of collecting duct to water	<input type="radio"/>
- Vasa recta is the cluster of capillaries present in the nephron of human beings. It is derived from “X” and surrounds “Y”, where “X” are arterioles and “Y” are tubelike structures. Which one of the following correctly identifies “X” and “Y”?
 

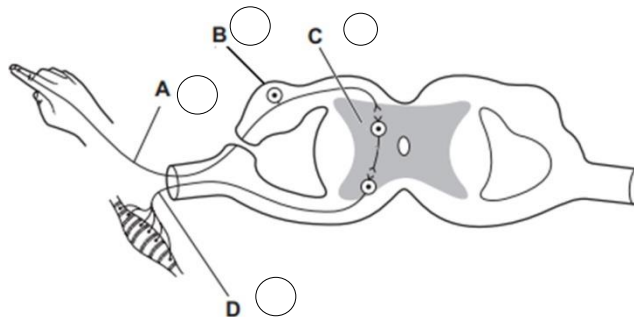
	X	Y	
A	Efferent arterioles	Proximal convoluted tubule	<input type="radio"/>
B	Afferent arterioles	Proximal convoluted tubule	<input type="radio"/>
C	Efferent arterioles	Loop of Henle	<input type="radio"/>
D	Afferent arterioles	Loop of Henle	<input type="radio"/>
- During human embryonic development, first site of RBC formation is:
 

A. Yolk sac	<input type="radio"/>	B. Allantois	<input type="radio"/>
C. Notochord	<input type="radio"/>	D. Blastocyst	<input type="radio"/>
- Some animals like fiddler crab, busiest during the time of either dawn or dusk or both are called:
 

A. Diurnal animals	<input type="radio"/>	B. Nocturnal animals	<input type="radio"/>
C. Crepuscular animals	<input type="radio"/>	D. Circadian animals	<input type="radio"/>
- The best way to prevent tetanus is to take:
 

A. Antibiotic	<input type="radio"/>	B. Painkillers	<input type="radio"/>
C. Vaccine	<input type="radio"/>	D. Sedatives	<input type="radio"/>

7. The ability to remove wrong nucleotides if it is added mistakenly is called:  
 A. Degeneracy  B. Splicing   
 C. Proofreading  D. Primo some
8. Secondary sewage treatment is mainly due to:  
 A. Mechanical processes  B. Biological processes   
 C. Physical processes  D. Chemical processes
9. Autonomic functions of body such as heartbeat, blood pressure and respiration are controlled by:  
 A. Cerebellum  B. Pons   
 C. Medulla  D. Thalamus
10. Which tRNA can bind at mRNA codon UGA?  
 A. tRNA with anticodon ACU  B. tRNA with anticodon ACT   
 B. tRNA with anticodon TGA  D. tRNA with anticodon TCU
11. The given diagram shows a simple reflex arc. Which labelled part has neuron cell bodies and non-myelinated parts of nerve fibre?

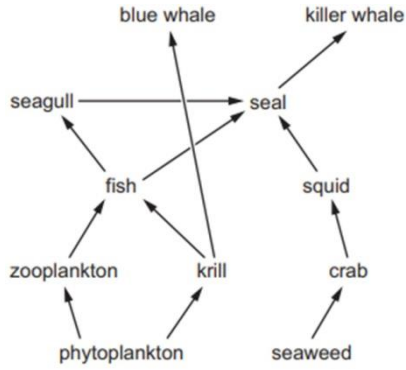


12. Which one is **NOT** related to insulin?  
 A. It promotes glycogenesis.   
 B. It inhibits gluconeogenesis.   
 C. It's under secretion causes glycosuria.   
 D. It's under secretion causes hypoglycemia.
13. I. Globular proteins  
 II. Thin thread-like structures  
 III. Wound around actin filaments  
 The feature(s) which describes tropomyosin is/are:  
 A. I only  B. III only   
 C. II and III  D. I and III
14. Which one of the following recombinant DNA technology tool is incorrectly paired with its use?  
 A. Restriction endonuclease----- production of RFLP   
 B. DNA ligase----- production of sticky ends in restriction fragments   
 C. Reverse transcriptase ----- production of cDNA   
 D. PCR ----- gene amplification
15. What are phenotypes of parents of a colour blind son and non-carrier daughter with normal colour vision?

	Father	Mother	
A.	Carrier	Normal	<input type="radio"/>
B.	Colour blind	Carrier	<input type="radio"/>
C.	Normal	Carrier	<input type="radio"/>
D.	Normal	Colour blind	<input type="radio"/>

16. Which one of the following is the palindromic sequence?
- A. GATC  B. GGTT
- C. CGAT  D. TTCC

17. The diagram shows an aquatic food web.



Which one of the following statement is correct?

- A. There are two producer sand three herbivores.
- B. There are two primary consumers and two secondary consumers.
- C. There are three producers and two primary consumers.
- D. There are two herbivores and two tertiary consumers.

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**Federal Board HSSC-II**  
**Examination Biology Model**  
**Question Paper (Curriculum 2006)**

Time allowed: 2:35hours

Total Marks: 68

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Note: Answer all parts from Section 'B' and all questions from Section 'C' on the **E-sheet**.  
Write your answers on the allotted/given spaces.

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**SECTION – B (Marks 42)**

**Q.2 Attempt all parts from the following. All parts carry equal marks. (14x3=42)**

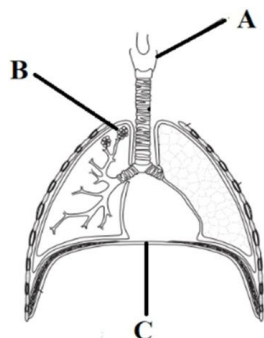
- i. What are osmo regulators? How do they adapt in fresh water? Give example. (1+1.5+0.5)
- OR**
- Name cranial and facial bones with paired and unpaired classification. (1.5+1.5)
- ii. Name any three types of mechanoreceptors in skin with their specific stimuli. (1+1+1)
- OR**
- Briefly explain the structure of intervertebral disc. (3)
- iii. Name any three types of hormones on the basis of their chemical nature with one example of each. (1+1+1)
- OR**
- What are the characteristics(symptoms) of different types of hypothyroidism? (1.5+1.5)
- iv. Define latent learning and explain with example. (1+2)
- OR**
- Define inhibitory and excitatory neurotransmitters with example. (1.5+1.5)
- v. Define miscarriage? What are the possible causes of miscarriage? (1+2)
- OR**
- Outline the different steps of PCR. (3)
- vi. What are the drawbacks of Lamarckism that lead to rejection of this theory of evolution? (3)
- OR**
- Elaborate the role of microbes with energy production. (3)
- vii. Differentiate between convergent and divergent evolution with example. (2+1)
- OR**
- Describe Hamburger phenomenon. (3)
- viii. Draw a flow sheet showing the hormonal control of male reproductive system.(3)
- OR**
- Discuss the role of parathyroid gland in regulating calcium level in body. (3)
- ix. Why is Sanger's method of gene sequencing called chain termination method? (3)
- OR**
- How initiation of polypeptide chain occurs during protein synthesis? (1+1+1)
- x. How does dominance differ from epistasis? Clarify by giving example. (1+2)
- OR**
- Write about XX-XY mechanism of sex determination. Give two example (2+1)
- xi. Explain erythroblastosis foetalis. Give its prevention and management. (1+1+1)
- OR**
- Gene expression is a strictly regulated process. How is gene expression regulated positively or negatively? (1.5+1.5)

- xii. Nuclear power is one of the important sources of energy especially in developed countries. How nuclear power generation and management may be disadvantageous? (3)

OR

How positive and negative feedback interlinked with each other. Give one example. (2+1)

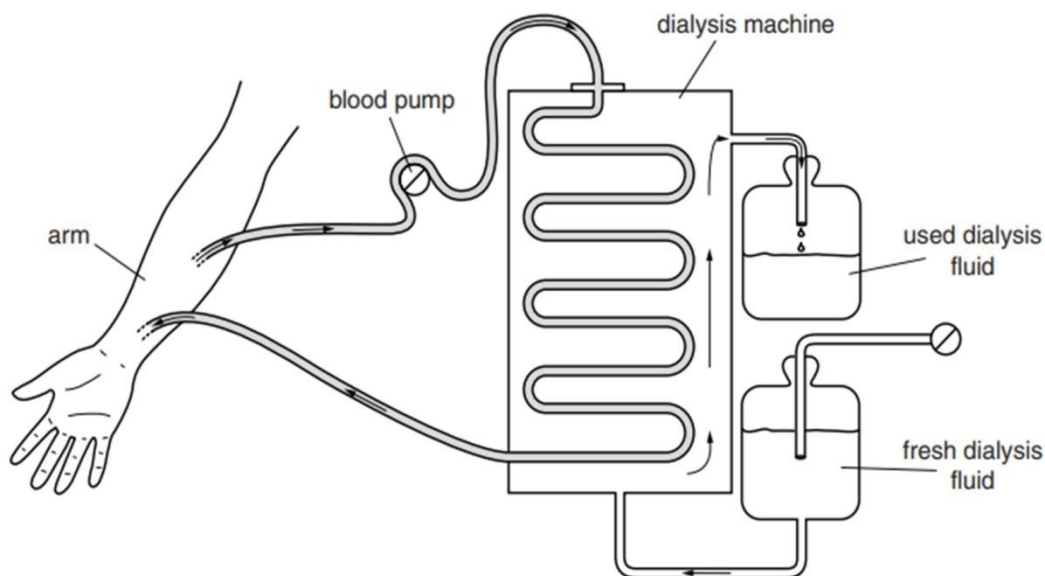
- xiii. Given figure shows structures in human thorax. Identify parts labelled A, B and C and describe their roles. (1x3)



OR

How concentration of urine is regulated by counter current multiplier? (03)

- xiv. After kidney failure, dialysis is performed. The given figure shows how blood, fresh and used dialysis fluid move through a dialysis machine. The composition of the dialysis fluid changes as it passes through the dialysis machine.



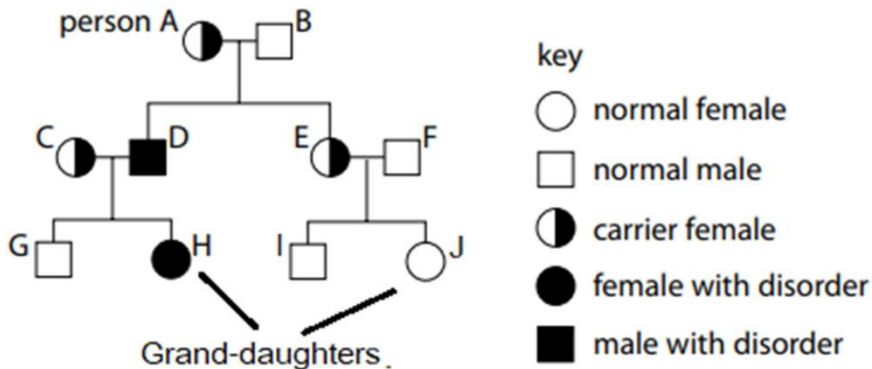
- a. Redraw and complete the table using words “low”, “high”, “same” or “none” to show how concentration of each substance changes in the dialysis fluid and blood. (2)

Substance	Concentration of substance in			
	Blood before Dialysis	Fresh dialysis fluid	Used Dialysis fluid	Blood After Dialysis
Glucose	Low			
Salts	High			
Urea	High			
Toxin	High			

b. Why is the blood pump used during dialysis? (1)

OR

The given figure shows the inheritance of Duchene muscular dystrophy, which is X-linked recessive disorder.



Describe why grand-daughter "H" of person "A" is affected with this disorder whereas grand-daughter "J" of the same person "A" is normal? (3)

### SECTION – C (Marks 26)

Note: Attempt all questions. Marks of each question are given within brackets.

Q.3 Describe and sketch sliding filament model of a skeletal muscle fibre. (4+2)

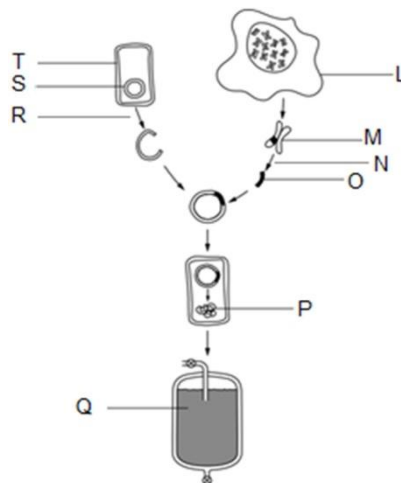
OR

What are the factors involved in the establishment and maintenance of resting membrane potential in a neuron? Show diagrammatically as well. (4+2)

Q.4 Draw and describe different steps of Nitrogen Cycle in detail. (3+4)

OR

Given figure is a flow diagram showing how insulin is produced using genetic engineering.



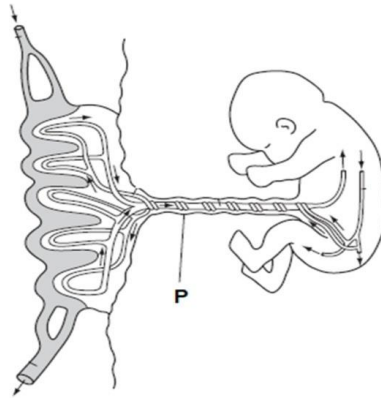
- i. Define and describe the steps involved in recombinant DNA technology. (3)
- ii. At which step/s restriction endonuclease enzyme was used in this process? Why is this enzyme named so? (1.5)
- iii. Complete Table as completed in first row. (2.5)

Letter from figure	Name	Description
M	chromosomes	Threads of DNA found in the nucleus
		Section of DNA removed from human cell
	Plasmid	
		Type of cell that is genetically engineered
		specific chain of amino acids coded by the section of DNA removed from the human cell
	Fermenter	

**Q.5** Discuss Hershey and Chase experiments. What was concluded from these experiments? Draw labelled diagram. (3+1+2)

**OR**

The given figure shows placenta connecting foetus uterine wall.



- i. Describe the structure, purpose and development of placenta along with its hormonal role during pregnancy. (2+2+1)
- ii. Name the structure labelled as “P”. What is its role and what happens to it after birth of baby? (1)

**Q.6** Explain proliferative and secretory phases of menstrual cycle in human female emphasizing role of hormones involved. Also draw the diagram of cycle. (3+2+2)

**OR**

Discuss DNA replication. Explain with the help of diagram the difference between lagging and leading strand. (3+2+2)

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**BIOLOGYHSSC-II**  
**Model Question Paper SLOs**  
**(Curriculum2006)**

**SECTION-A**

**Q.1** Fill the relevant bubble for each part. All parts carry one mark.

1. Describe the structural features and functions of the components of human respiratory system.
2. Explain that concentration of urine is regulated by counter current and hormonal mechanisms.
3. Explain detailed structure of nephron.
4. Describe the events of development in human in terms of first, second and third trimesters.
5. Explain through examples, the biological rhythms.
6. Describe the role of vaccines in preventing polio, measles, hepatitis and tetanus.
7. Describe the events of the process of DNA replication.
8. Explain the role of microbes in household food processing, industrial production, sewage treatment and energy generation.
9. Explain the structure, types and functions of autonomic nervous system.
10. Differentiate between the terms genetic code and codon.
11. Differentiate between myelinated and non-myelinated neurons.
12. Locate the following endocrine glands in human body; pituitary, thyroid, parathyroid, pancreas, adrenal, gonads.
13. Explain the ultrastructure of the skeletal muscles.
14. Describe the techniques of gene cloning through recombinant DNA technology.
15. Critically analyze the inheritance of Haemophilia, colour blindness and muscular dystrophy.
16. Explain the role of restriction endonucleases and DNA ligases in gene cloning.
17. Explain the flow of energy in successive trophic levels.

**SECTION-B**

**Q.2** Attempt **ALL** parts from the following. All parts carry equal marks. (14×3=42)

- i. Differentiate between osmoconformers and osmoregulators.

**OR**

List the bones of appendicular and axial skeleton of man.

- ii. Explain the structure and functioning of the receptors for smell, taste and touch / pain.

**OR**

Describe the disorders of human skeleton (disc slip, spondylosis, sciatica, arthritis) and their causes.

- iii. Describe the chemical nature of hormones and correlate it with important hormones.

**OR**

Outline the major functions of the hormone so above-mentioned glands and also relate the problems associated with the imbalance of these hormones.

- iv. Describe instrumental conditioning (trial and error learning) by narrating the work of skinner on rats learning. Describe latent learning, through the example of a rat in a maze with no reward.

**OR**

Classify neurotransmitters as inhibitory and excitatory and list some common examples.



- v. Define miscarriage and state its causes. Relate miscarriage with abortion.  
**OR**  
Describe the steps involved in gene amplification through polymerase chain reactions.
- vi. State the drawbacks in Lamarckism.  
**OR**  
Explain the role of microbes in household food processing, industrial production, sewage treatment and energy generation.
- vii. Differentiate between convergent and divergent evolution on the basis of inheritance of the homologous and analogous structures.  
**OR**  
Describe the transport of oxygen and carbon dioxide through blood.
- viii. Explain the principal reproductive hormones of human male and explain their role in the maintenance and functioning of reproductive system.  
**OR**  
Outline the major functions of the hormones of above mentioned glands and also relate the problems associated with the imbalance of these hormones.
- ix. Explain the Maxam / Gilbert procedure and the Sanger-Coulson method of DNA sequencing.  
**OR**  
Describe the mechanism of protein synthesis.
- x. Explain the terms; polygenic and epistasis.  
**OR**  
Explain XX-XY mechanism of sex determination in Drosophila and mammals
- xi. Explain Erythroblastosis foetalis in the light of antigen-antibody reaction. Suggest measures to counter the problem of Erythroblastosis foetalis before it occurs.  
**OR**  
Describe the negative control of gene expression by repressor proteins. Describe the positive control of gene expression by activator proteins.
- xii. State the problems of using nuclear power.  
**OR**  
Outline the concept of feedback mechanism of hormone.
- xiii. Describe the structural features and functions of the components of human respiratory system.  
**OR**  
Explain that concentration of urine is regulated by counter current and hormonal mechanisms.
- xv. Explain in detail the mechanism and problems related to dialysis.  
**OR**  
Critically analyze the inheritance of Haemophilia, colour blindness and muscular dystrophy.

### **SECTION – C** (Marks 26)

**Note:** Attempt **All** questions.

- Q.3** Explain the sliding filaments model of muscle contraction.  
**OR**  
Name the factors responsible for the resting membrane potential of neuron.
- Q.4** Describe nitrogen cycle in detail. Define the terms of nitrogen-fixation, nitrification, de-nitrification and ammonification.  
**OR**

Define gene cloning and state the steps in gene cloning. The techniques of gene cloning through recombinant DNA technology. Explain the role of restriction endonucleases and DNA ligases in gene cloning. Describe the selection and isolation of the gene of interest. Explain the properties and the role of vectors in recombinant technology. State the steps for the integration of DNA insert into the vectors. Briefly state the technique applied for these selection of the vectors that take up the DNA of interest.

**Q.5** Narrate the experimental work of Griffith and Hershey-Chase, which proved that DNA is the hereditary material.

**OR**

Describe the structural details of placenta and umbilical cord.

**Q.6** Describe menstrual cycle emphasizing role of hormones.

**OR**

Describe the events of the process of DNA replication.

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**BIOLOGY HSSC II**  
**Table of Specifications**

Assessment Objectives	Unit 14: Respiration	Unit 15: Homeostasis	Unit 16: Support and Movement	Unit 17: Nervous Coordination	Unit 18: Chemical Coordination	Unit 19: Behaviour	Unit 20: Reproduction	Unit 21: Development and aging	Unit 22: Inheritance	Unit 23: Chromosome and DNA	Unit 24: Evolution	Unit 25: Man and his Environment	Unit 26: Biotechnology	Unit 27: Biology and Human Welfare	Total Marks	%age
<b>K (Knowledge)</b>	Q1(1)1	Q1(2)1 Q2(i)3	Q2(i)3 Q2(ii)3	Q1(3) 1 Q2(ii)3 Q2(iv)3	Q2(iii)3 Q2(iii)3	Q1(5)1 Q2(iv)3	Q2(v)3	Q1(4)1		Q1(7)1	Q2(vi)3 Q2(vii)3		Q2(v)3	Q1(6) 1 Q1(8)1 Q2(vi)3	47	30.7%
<b>U (Understanding)</b>	Q2(vii)3	Q1(9)1	Q3(6)	Q1(11)1 Q3(6)	Q1(12)1 Q2(xii)3		Q6(7)	Q5(6)	Q2(x)3 Q2 (x) 3 Q2(xi)3	Q1(10)1 Q2(ix)3 Q5(6), Q2(xi)3 Q6(7)		Q2(xii)3 Q4(7)	Q2(ix)3 Q4(7)		83	54.2%
<b>A (Application)</b>	Q2(xiii)3	Q2(xiv)3 Q2(xiii)3	Q1(13)1		Q2(viii)3		Q2(viii)3		Q1(15)1 Q2(xiv)3			Q1(17)1	Q1(14)1 Q1(16)1		23	15%
<b>Total Marks</b>	7	11	13	14	13	4	13	7	13	21	6	11	15	5	153	100

**KEY:**

1 (1): 1

Question No (Part No.): Allocated Marks

**Note:** (i) The policy of FBISE for knowledge based questions, understanding based questions and application based questions is approximately as follows:

- a) 30% knowledge based.
- b) 50% understanding based.
- c) 20% application based.

(ii) The total marks specified for each unit/content in the table of specification is only related to this model question paper.

(iii) The level of difficulty of the paper is approximately as follows:

- a) 40% easy
- b) 40% moderate
- c) 20% difficult

Section A: 12

Section B: 22x3= 66

Section C: 40

Total = 118