DAY THIRTY TWO

Unit Test 7
(Genetics and Evolution)

1 Central dogma was proposed by
(a) Beadle and Tatum (b) Crick
(c) Klug (d) Temin

2 Triplet codon refers to the sequence of three bases on
(a) *r*RNA (b) *t*RNA (c) *m*RNA (d) All of these

3 Golden age of reptiles is
(a) Proterozoic (b) Cenozoic
(c) Palaeozoic (d) Mesozoic

4 The changes in horse teeth, the shape of the beaks of Darwin's finches and industrial melanism are examples of
(a) artificial selection (b) natural selection
(c) evolution (d) breeding

5 Evidence which proves that the birds evolved from reptiles is
(a) scales of birds and reptiles have disappeared
(b) bones of some reptiles are pneumatic like birds
(c) the presence of pygostyle in reptiles
(d) the presence of synapsid skull and the oviparous nature

6 An important factor in speciation is
(a) migration (b) reproductive isolation
(c) escesis (d) ecological isolation

7 Colloidal bodies arose in the seas during the primordial stage of the earth. These are referred as
(a) protobionts (b) coacervate droplets
(c) homunculus (d) organic molecules

8 What is the strongest evidence that protobionts may have formed spontaneously?
(a) The fossil record found in the stromatolites
(b) The discovery of ribozymes showing that prebiotic RNA molecules may have been autocatalytic
(c) The production of organic compounds within a laboratory apparatus simulating conditions on early earth
(d) The relative ease with which liposomes can be synthesised in laboratories

9 Current theories of prebiotic evolution are based on evidence for all of the following except the abiotic
(a) production of small organic molecules
(b) production of liposomes
(c) replication of oligopeptides
(d) origin of DNA-protein interactions

10 The first genetic material was most likely a
(a) DNA polymer (b) DNA enzymes
(c) DNA oligonucleotide (d) RNA polymer

11 Match the following columns.

Column I		Column II
A.	Chloramphenicol	1. Inhibits binding of aminoacyl *t*RNA to ribosome
B.	Erythromycin	2. Inhibits interaction between *t*RNA and *m*RNA
C.	Neomycin	3. Inhibits initiation of translation
D.	Streptomycin	4. Inhibits peptidyl transferase activity
E.	Tetracycline	5. Inhibits translocation of *m*RNA along ribosomes

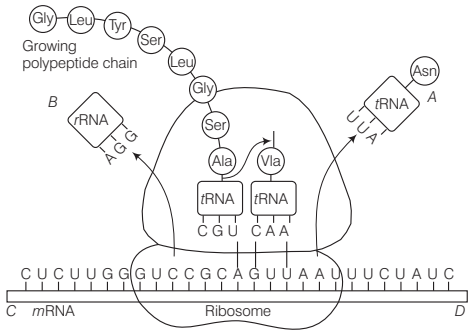
Codes

	A	B	C	D	E
(a)	1	2	3	5	4
(b)	3	1	5	4	2
(c)	2	3	4	1	5
(d)	4	5	2	3	1

12 Which of the following is the strongest evidence that prokaryotes evolved before eukaryotes?
(a) Meteorites that have struck the earth
(b) Abiotic experiments that constructed liposomes in the laboratory
(c) Liposomes look like prokaryotic cells
(d) The oldest fossilised cells resemble prokaryotes

13 Which of the following is an example for link species?
(a) Lobe fish (b) Dodo bird
(c) Sea weed (d) *Tyrannosaurus rex*

14 Choose the correct options for *A, B, C* and *D*.



(a) *A* – Uncharged *t*RNA, *B* – Charged *t*RNA, *C* – 5′ end, *D* – 3′ end
(b) *A* – Charged *t*RNA, *B* – Uncharged *t*RNA, *C* – 3′ end, *D* – 5′ end
(c) *A* – Charged *t*RNA, *B* – Uncharged *t*RNA, C – 5′ end, *D* – 3′ end
(d) *A* – Charged *t*RNA, *B* – Charged *t*RNA, *C* – 5′ end, *D* – 3′ end

15 Which of the following has not yet been synthesised in laboratory experiments studying the origin of life?
(a) Oligopeptides and other oligomers
(b) Protobionts that use DNA to program protein synthesis
(c) Liposomes with selectively permeable membranes
(d) Amino acids

16 What condition would have made the primitive atmosphere of earth more conductive to the origin of life than the modern atmosphere of earth?
(a) The primitive atmosphere had more oxygen than the modern atmosphere and thus, it successfully sustained the first living organisms
(b) The primitive atmosphere had a layer of ozone that shielded the first fragile cells
(c) The primitive atmosphere may have been a reducing one that facilitated the formation of complex substances from simple molecules
(d) The primitive atmosphere had less free energy than the modern atmosphere and thus, newly formed organisms were less likely to be destroyed

17 Viviparity is considered to be more evolved because
(a) the young ones are left on their own
(b) the young ones are protected by a thick shell
(c) the young ones are protected inside the mother's body and are looked after, they are born leading to more chances of survival
(d) the embryo takes a long time to develop

18 Which of the following evolutionary processes may occur randomly?
I. Synapses II. Mutation
III. Artificial selection IV. Speciation
V. Genetic drift
Choose the correct option.
(a) I and II (b) I, II and IV
(c) II, IV and V (d) II and V

19 How are genetic drift and changes due to natural selection different?
(a) Genetic drift does not require the presence of variation
(b) Genetic drift does not involve competition between members of a species
(c) Genetic drift never occurs in nature, natural selection does
(d) Genetic drift does not require migration whereas it is required in natural selection

20 Which of the following left the evidence of artistic ability in the form of drawings and paintings on the walls of caves?
(a) Cro-Magnon man (b) Ape man
(c) Neanderthal man (d) Java ape man

21 First birds appeared in which of the following geological periods?
(a) Carboniferous (b) Triassic
(c) Jurassic (d) Cretaceous

22 Reptiles were able to move completely on to land due to
(a) the presence of limbs (b) the amniotic egg
(c) their small size (d) the availability of food

23 The alternative forms of a gene are called
(a) unit pairs (b) crossovers
(c) alternatives (d) alleles

24 Mendel did not come across
(a) dominance (b) incomplete dominance
(c) linkage (d) Both (b) and (c)

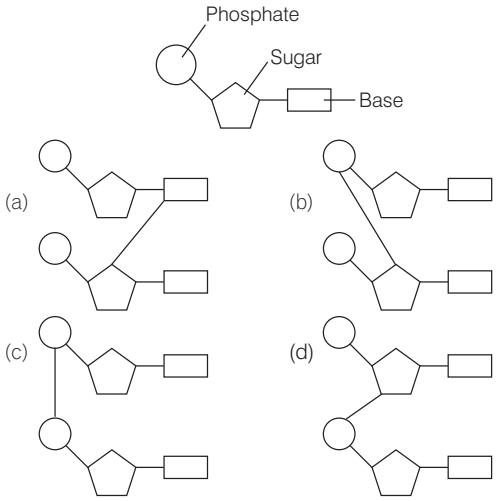
25 The tendency of population to remain in genetic equilibrium may be disturbed by
(a) random mating (b) lack of migration
(c) lack of mutations (d) lack of random mating

26 Abrupt hereditary changes (first described by Hugo de Vries) are called
(a) allele (b) variation
(c) mutation (d) evolution

27 In what way were conditions on early earth different from those on modern earth?
(a) The early earth was intensely bombarded by large space debris
(b) The early atmosphere had significant quantities of ozone
(c) Less ultraviolet radiation penetrated the early atmosphere
(d)The early earth had an oxidising atmosphere

28 Who introduced the idea of spontaneous generation?
(a) Anaximander (b) Oparin
(c) Pasteur (d) Redus

29 Given the structure of one nucleotide. If two nucleotides are joined together then the diagram would be



30 Arrange the following events of the replication of DNA.

I. Bonds between complementary bases break.
II. Bonds between complementary bases form.
III. DNA molecules uncoil.
IV. Opposite strands separate.
V. Sugar phosphate bond forms.
VI. Free nucleotides align with the complementary nucleotides on each strand.

Choose the correct option.

(a) VI I III IV V II (b) III VI I IV V II
(c) I III VI IV II V (d) III I IV VI II V

31 Who said that organisms develop from pre-existing organisms?

(a) Morgan (b) Louis Pasteur
(c) Aristotle (d) Oparin

32 Which of the following is not a stop codon?

(a) UAA (b) UGA (c) UAU (d) UAG

33 Spontaneous generation of flies from rotting meat was disproved by

(a) Francesco Redi (b) Louis Pasteur
(c) Oparin (d) Charles Darwin

34 Spontaneous generation of bacteria from decomposing broth was disproved firstly by

(a) Joseph Lister (b) Louis Pasteur
(c) Francesco Redi (d) Lazzaro Spallanzani

35 Which of the following amino acids was not found to be synthesised in Miller's experiments?

(a) Alanine (b) Glycine
(c) Aspartic acid (d) Glutamic acid

36 For the given DNA sequence

3′–TACATGGGTC CG–5′.

Choose the correct code of *t*RNA anticodon.

I. UAC II. AUG III. GGC IV. CCA

(a) I, II, III and IV
(b) II, III, IV and I
(c) I, III, II and IV
(d) II, I, IV and III

37 Those individuals with an advantage will survive to pass their genes on to the next generation. It is known as

(a) reproduction
(b) Darwinian theory
(c) parturition
(d) natural selection

38 Following can be the sequence for the biological evolution of life.

(a) Aerobic prokaryotes–Photosynthetic prokaryotes–Anaerobic prokaryotes–Eukaryotes
(b) Photosynthetic eukaryotes–Anaerobic prokaryotes–Aerobic prokaryotes–Eukaryotes
(c) Anaerobic prokaryotes–Photosynthetic prokaryotes–Aaerobic prokaryotes–Eukaryotes
(d) Aerobic prokaryotes–Eukaryote–sAnaerobic bacteria–Photosynthetic prokaryotes

39 Following is the sequence of appearance of the main groups of organisms during evolution.

(a) Autotrophic–Anaerobic heterotrophic–Aerobic autotrophic
(b) Aerobic heterotrophic–Anaerobic heterotrophic–Heterotrophic
(c) Anaerobic heterotrophic–Aerobic heterotrophic–Water oxidising autotrophic
(d) Anaerobic heterotrophic–Water oxidising autotrophic–Aerobic heterotrophic

40 The most abundant intracellular free nucleotide is

(a) ATP (b) $FADH_2$
(c) ADP (d) $NADP^+$

41 On hydrolysis a nucleoside will not give a

(a) purine
(b) pyrimidine
(c) pentose sugar
(d) phosphoric acid

42 Thymine is known by which chemical name?

(a) Thymidylic acid
(b) 2,4-dioxy–5–methylpyrimidine
(c) 2-dioxythymidine
(d) None of the above

43 N-glycosyl linkage joins 1st carbon of pentose sugar with

(a) N-9 of thymidine (b) N-9 of purine
(c) N-6 of pyrimidine (d) N-3 of guanine

44 In a nucleotide, deoxyribose is a/an

(a) alcohol (b) secondary alcohol
(c) acid (d) phosphate

45 Which one of following options gives one correct example each of convergent evolution and divergent evolution?

	Convergent Evolution	Divergent Evolution
(a)	Eyes of *Octopus* and mammals	Bones of forelimbs of vertebrates
(b)	Thorns of *Bougainvillea* and tendrils of *Cucurbita*	Wings of butterflies and birds
(c)	Bones of forelimbs of vertebrates	Wings of butterfly and birds
(d)	Thorns of *Bougainvillea* and tendrils of *Cucurbita*	Eyes of *Octopus* and mammals

46 What is the maximum number of alleles that can exist in a population for any given gene?
(a) None (b) 2
(c) 3 (d) Unlimited

47 Mendel's law of segregation as applied to the chromosomes during meiosis means that
(a) pairing of homologs will take place leading to segregation of the types
(b) alleles of a gene separate from each other when homologs separate in meiosis-I
(c) genes on the same chromosome will show 50% crossing over
(d) different alleles of a gene will be passed on together through mitosis

48 Independent assortment leads to
(a) expression of all the alleles of a gene
(b) unlinked transmission of genes in crosses resulting from being located on different chromosomes
(c) association of an RNA and a protein
(d) independent location of genes from each other in cell, during S-phase

49 Which of the following gametes will be produced by these individuals?
1. AA BB Cc 2. aa Bb Cc
(a) 1. ABC, ABc ; 2. aBC, aBc, abC, abc
(b) 1. AbC, ABc ; 2. ABC, aBc, abC, aBC
(c) 1. ABC, ABC ; 2. aBC, aBc, abc, aBC
(d) 1. ABC, ABc ; 2. aBC, ABc, abc, abC

50 Two individuals of genotype AaBbCc are intercrossed, the number of different genotypes that may occur in their progeny is
(a) 6 (b) 12
(c) 27 (d) 9

51 Natural selection may reduce or eliminate diversity. What process can restore genetic diversity to a population?
(a) Genetic drift
(b) Mutation
(c) Reproduction
(d) Parthenocarpy

52 Same data is given below regarding DNA and *m*RNA.

	A	G	C	T	U
DNA strand=1	19.1	26.0	31.0	23.9	0
DNA strand=2	24.2	30.8	25.7	19.3	0
*m*RNA	19.1	26.0	31.0	0	23.9

Which DNA serves as DNA template for *m*RNA?
(a) DNA strand 1
(b) DNA strand 1 and 2
(c) Neither strand 1 nor 2
(d) DNA strand 2

53 Name given to fossil hominid of Shivalik hills in India is
(a) *Ramapithecus* (b) *Australopithecus*
(c) *Pithecanthropus* (d) *Indratherium*

54 The continent, where maximum fossils of prehistoric man have been found is
(a) Asia (b) Africa
(c) Europe (d) America

55 Coacervates belong to the category of
(a) protozoans
(b) molecular aggregates
(c) molecular aggregates having nucleic acid
(d) cyanobacteria

56 Match the following columns.

Column I	Column II
A. *Homo sapiens*	1. *Homo sapiens fossilis*
B. Cro-Magnon man	2. Primitive life
C. Panspermia	3. Prebiotic chemical aggregates
D. Protobionts	4. Coacervates
	5. Wise man

Codes

	A	B	C	D
(a)	5	1	2	3
(c)	2	3	1	5

	A	B	C	D
(b)	4	5	1	2
(d)	5	4	2	1

57 Choose the correct statement.
(a) Nucleotides like ATPs are used in the *in vivo* synthesis of nucleic acids
(b) Nucleotides are composed of only a pentose sugar and a nitrogenous purine or pyrimidine base
(c) Nucleotides such as GTP are required in the synthesis of RNA molecules
(d) Nucleotides have a deoxyribose sugar if they form RNA molecules

58 The purine nucleotides are components of
(a) FAD^+ (b) NAD^+ (c) $NADP^+$ (d) All of these

59 The information in a nucleic acid is stored in the
(a) number of nucleotides (b) pyrimidines
(c) sequence of nucleotides (d) purines

60 Which of the following radioisotopes is used to label proteins?
(a) ^{32}P (b) ^{12}C (c) ^{35}S (d) ^{15}N

61 Which of the following properties stand true for sugar–phosphate backbone in nucleic acid?
I. Amphoteric in nature
II. Hydrophilic in nature
III. Negatively charged
IV. Show polarity
Choose the correct option.
(a) I and II (b) II and IV
(c) II, III and IV (d) I, III and IV

62 In a given nucleic acid, G + A is not equal to C + T content. This is because it is
(a) poor in AT bases (b) GC rich
(c) *ss*DNA (d) *ss*RNA

63 There is a probability that half of the human babies born may be males and the other half may be females
(a) because of the segregation of X and Y-chromosomes during male meiosis
(b) because of the separation of X-chromosome during female mitosis
(c) because all sperms contain a Y-chromosome
(d) because, half of all eggs produce only females

64 A couple has 8 children (4 boys and 4 girls), all of the girls have their father's disease, but none of the boys does. The mother has no disease. What kind of disease is being inherited?
(a) Genetic mutation (b) Autosomal
(c) Y-linked (d) X-linked

65 Consider the following statements with respect to sex-linked recessive inheritance.
I. Most affected individuals are male.
II. Affected females come from affected fathers and affected or carrier mothers.
III. The sons of affected females should be affected
IV. Males survive only for a few years.
Select the correct option with true statements.
(a) I and IV (b) I, II and III
(c) II, III and IV (d) I, II, III and IV

66 An individual with Klinefelter's syndrome is
(a) monosomic (b) tetrasomic
(c) trisomic (d) hexaploid

67 The condition where the number of chromosomes is either less than normal or more than that in normal situation is known as
(a) aneuploidy
(b) lampbrush
(c) polyploidy
(d) monosomic

68 Which of the following statements is correct?
(a) The ratio of C to T in double-stranded DNA is 1 : 1
(b) The ratio of T in *ds* DNA to U in *ss* RNA is 2 : 4
(c) The ratio of G to C in single-stranded RNA is 1 : 1
(d) The ratio of G to C in double-stranded DNA is 1 : 1

69 According to Chargaff's rule,
(a) in DNA, A=T and U=A (b) G=C in both RNA and DNA
(c) (G+C)/(T+A) = 1 (d) A + G/T+C=1

70 In a *ds*DNA molecule, which of the following is not true?
(a) A/T ratio is constant
(b) C = G
(c) G + C = A + T
(d) (A + G) / (C + T) ratio is constant

71 Melting temperature is the temperature at which
(a) DNA condenses completely
(b) 50 per cent of the DNA is denatured
(c) 100% of the DNA is denatured
(d) chromosomes disappear

72 Which of the following conditions can denature the DNA?
I. Heat II. Urea
III. Very high or low pH IV. Alcohol
(a) I and II (b) I, II and III
(c) I and III (d) All of these

73 Two individuals of genotype AaBbCc are intercrossed, the number of different phenotypes that may appear in their progeny is
(a) 16 (b) 8 (c) 6 (d) 9

74 In human blood groups, the alleles A and B are dominant to O. What is the number of different possible genotypes?
(a) 4 (b) 9 (c) 6 (d) 5

75 Which of the following is not correctly matched?
(a) Phneotypic F_2 ratio of 1 : 4 : 6 : 4 : 1 – Polygenic traits
(b) Phenotypic F_2 ratio of 9 : 3 : 4 – Recessive epistasis
(c) Phenotypic F_2 ratio of 1 : 2 : 1 – Codominance
(d) Phenotypic F_2 ratio of 3 : 1 – Partial dominance

76 With reference to autosomal dominant traits, which of the following statements is incorrect?
(a) Every affected person should have at least one affected parent
(b) Males and females should be often equally affected
(c) An affected person has a 50% chance of transmitting the dominant allele to each offspring
(d) All the daughters of an affected male will be affected but none of the sons

77 In addition to amniocentesis and cell culture, which of the following tools is also used to diagnose chromosome aneuploidy in the foetus?
(a) PCR (b) RFLP
(c) VNTR (d) Karyotyping

78 Which of the following is incorrect about DNA?
(a) A-DNA is a left-handed helix structure
(b) B-DNA is the most commonly found structure *in vivo*
(c) Z-DNA is found in pyrimidine repeat sequences
(d) RNA-DNA hybrids have A-DNA type structure

79 Which of the following is not true for *t*RNA?
(a) It contains a codon
(b) It contains an anticodon
(c) It can become attached covalently to methionine
(d) It interacts with ribosomal RNA during transcription

80 Which of the following is incorrect for *t*RNA?
(a) *t*RNA binds to an amino acid covalently
(b) *t*RNA has many modified base sequences
(c) *t*RNA is present only in eukaryotic cells
(d) *t*RNA carries anticodon loop

81 Which of the following statements is true w.r.t *t*RNA?
(a) It has the information required for the synthesis of specific protein
(b) It should exist in 20 different forms, one for each amino acid
(c) It is the largest of the RNA group
(d) It has no secondary structure

82 Reduction of ..... leads to the formation of deoxyribonucleotides.
(a) ribonucleosides
(b) ribonucleoside monophosphates
(c) ribonucleoside diphosphates
(d) ribonucleoside triphosphates

83 RNA can be radiolabelled with the help of radioactive
(a) cytosine (b) uracil (c) thymine (d) uridine

84 Industrial melanism as observed in peppered moth proves that the
(a) true black melanic forms raise by a recurring random mutation
(b) melanic form of the moth has no selective advantage over lighter form in industrial area
(c) lighter form moth has no selective advantage either in polluted industrial area or non-polluted area
(d) melanism is a pollution generated feature

85 DNA having greater number of GC-base pairs is more stable than AT-rich DNA as
(a) fewer Na^+ ions bind to AT bp
(b) GC base pairs have two H-bonds
(c) GC base pairs interwined the double helix more easily
(d) stacking interactions are stronger in GC bp

86 Helical structure of DNA was determined through
(a) electron diffraction
(b) neutron diffraction measurement
(c) X-ray diffraction studies
(d) diffraction of visible light

87 The findings which first proved that DNA was the genetic material, is
(a) RNA synthesis depends on a DNA
(b) DNA is present in cytoplasm of all eukaryotic cells
(c) viral nucleic acid is RNA
(d) transforming activity is due to DNA

88 Which of the following is false?
(a) DNA is the genetic material
(b) RNA is the genetic material
(c) RNA acts as genetic material when DNA is absent
(d) RNA may act as genetic material even when DNA is present

89 DNA is the genetic material, this is evident by studies that show
(a) chromosomes are made up of DNA
(b) RNA is not present in cytoplasm
(c) transformation and transduction in bacteria are caused by DNA only
(d) DNA is concentrated in the chromosomes

90 DNA
(a) is more sensitive than RNA to degradation at high pH
(b) has catalytic activity
(c) can mix with DNA but not with RNA
(d) has fewer hydroxyl group than RNA

ANSWERS

1 (b)	**2** (c)	**3** (d)	**4** (b)	**5** (b)	**6** (b)	**7** (b)	**8** (d)	**9** (d)	**10** (d)
11 (d)	**12** (d)	**13** (a)	**14** (c)	**15** (b)	**16** (c)	**17** (c)	**18** (d)	**19** (b)	**20** (a)
21 (c)	**22** (b)	**23** (d)	**24** (d)	**25** (d)	**26** (c)	**27** (a)	**28** (a)	**29** (d)	**30** (d)
31 (b)	**32** (c)	**33** (a)	**34** (c)	**35** (d)	**36** (d)	**37** (d)	**38** (c)	**39** (d)	**40** (a)
41 (d)	**42** (b)	**43** (b)	**44** (b)	**45** (a)	**46** (d)	**47** (b)	**48** (b)	**49** (a)	**50** (c)
51 (b)	**52** (a)	**53** (a)	**54** (b)	**55** (b)	**56** (a)	**57** (a)	**58** (d)	**59** (c)	**60** (c)
61 (c)	**62** (c)	**63** (a)	**64** (d)	**65** (b)	**66** (c)	**67** (a)	**68** (d)	**69** (d)	**70** (c)
71 (b)	**72** (d)	**73** (b)	**74** (c)	**75** (d)	**76** (d)	**77** (d)	**78** (a)	**79** (a)	**80** (c)
81 (b)	**82** (c)	**83** (d)	**84** (a)	**85** (d)	**86** (c)	**87** (d)	**88** (d)	**89** (c)	**90** (d)