BUDDHA SERIES

(Unit Wise Solved Question & Answers)

Course – B.Sc. Zoology 1st year 1st semester

College – Buddha Degree College
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Department: Science
Subject: Cytology, Genetics & Immunology

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Unit 1

1□□ The longest phase of the cell cycle is:

A) M phase
B) G1 phase
C) S phase
D) G2 phase
Answer: B) G1 phase

2□□ DNA replication occurs during:

A) G1 phase
B) G2 phase
C) S phase
D) M phase
Answer: C) S phase

3□□ Checkpoint that ensures DNA replication is complete before mitosis:

A) G1/S checkpoint
B) G2/M checkpoint
C) Metaphase checkpoint
D) Cytokinesis checkpoint
Answer: B) G2/M checkpoint

4□□ Programmed cell death is called:

A) Necrosis
B) Autophagy
C) Apoptosis
D) Lysis
Answer: C) Apoptosis

5□□ Mitosis results in:

A) Four haploid cells
B) Two diploid cells identical to parent
C) Two haploid cells
D) One diploid and one haploid cell
Answer: B) Two diploid cells identical to parent

6□□ Chromosomes align at the equator during:

A) Prophase
B) Metaphase
C) Anaphase
D) Telophase
Answer: B) Metaphase

7□□ Crossing over occurs during:

A) Prophase I of meiosis
B) Metaphase I of meiosis
C) Anaphase II of meiosis
D) Telophase I of meiosis
Answer: A) Prophase I of meiosis

8□□ Synapsis of homologous chromosomes occurs in:

A) Mitosis only
B) Meiosis I only
C) Meiosis II only
D) Both mitosis and meiosis II
Answer: B) Meiosis I only

9□□ Cytokinesis in animal cells involves:

A) Cell plate formation
B) Furrow formation
C) No division
D) Phragmoplast formation
Answer: B) Furrow formation

Number of daughter cells produced in meiosis:

A) 2
B) 4
C) 8
D) 1
Answer: B) 4

1□□1□□ Ploidy level of gametes after meiosis:

A) Diploid
B) Haploid
C) Triploid
D) Tetraploid
Answer: B) Haploid

1□□2□□ Centrosomes duplicate during:

A) G1 phase
B) S phase
C) M phase
D) G2 phase
Answer: B) S phase

1□□3□□ The mitotic spindle is made of:

A) Microfilaments
B) Microtubules
C) Intermediate filaments
D) Actin only
Answer: B) Microtubules

1□□4□□ Which cyclins regulate G2 to M phase transition?

A) Cyclin A
B) Cyclin D
C) Cyclin B
D) Cyclin E
Answer: C) Cyclin B

1□□5□□ Role of p53 protein is to:

A) Promote uncontrolled cell division
B) Check DNA damage and induce arrest or apoptosis
C) Inhibit apoptosis
D) Activate telomerase
Answer: B) Check DNA damage and induce arrest or apoptosis

1□□6□□ G-protein coupled receptors (GPCRs) are also called:

A) Ion channel receptors
B) Enzyme-linked receptors
C) Seven transmembrane receptors
D) Tyrosine kinase receptors
Answer: C) Seven transmembrane receptors

1□□7□□ Second messenger involved in GPCR signalling:

A) cAMP
B) DNA
C) mRNA

D) tRNA
Answer: A) cAMP

1□□8□□ Enzyme activated by Gαs subunit:

A) Phospholipase C
B) Adenylyl cyclase
C) Protein kinase C
D) Guanylyl cyclase
Answer: B) Adenylyl cyclase

1□□9□□ Phospholipase C cleaves PIP2 to form:

A) cAMP and ADP
B) IP3 and DAG
C) ATP and GTP
D) FAD and NADH
Answer: B) IP3 and DAG

2□□0□□ IP3 causes release of:

A) Potassium ions
B) Calcium ions
C) Sodium ions
D) Chloride ions
Answer: B) Calcium ions

2□□1□□ Ras protein is a:

A) Transcription factor
B) GTPase
C) Protein kinase
D) Ion channel
Answer: B) GTPase

2□□2□□ Which receptor has intrinsic kinase activity?

A) GPCR
B) Cytokine receptor
C) Receptor tyrosine kinase (RTK)
D) Ionotropic receptor
Answer: C) Receptor tyrosine kinase (RTK)

2□□3□□ Apoptosis involves activation of:

A) Cyclins
B) Caspases
C) Kinases only
D) Phosphatases only
Answer: B) Caspases

2□□4□□ Which protein family controls mitochondrial pathway of apoptosis?

A) Bcl-2 family
B) Integrins
C) Actin family
D) Cyclins
Answer: A) Bcl-2 family

2□□5□□ Cell surface receptors that form dimers upon ligand binding are:

A) GPCRs
B) RTKs
C) Gated ion channels only
D) Notch receptors only
Answer: B) RTKs

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26. Calcium-calmodulin complex activates:

A) Adenylyl cyclase
B) Myosin light chain kinase
C) Protein kinase A
D) Tyrosine kinase
Answer: B) Myosin light chain kinase

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27. In G-protein signalling, GTP-bound α subunit is:

A) Inactive
B) Active and dissociated
C) Always bound to βγ
D) Degraded immediately
Answer: B) Active and dissociated

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28. Intracellular steroid hormone receptors are located mainly in:

A) Plasma membrane
B) Cytoplasm and nucleus
C) Lysosomes
D) Golgi bodies
Answer: B) Cytoplasm and nucleus

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29. What terminates GPCR signalling?

A) Continuous GTP binding
B) GTP hydrolysis to GDP on Gα
C) Permanent activation of βγ
D) Irreversible ligand binding
Answer: B) GTP hydrolysis to GDP on Gα

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30. Example of a ligand-gated ion channel:

A) Acetylcholine receptor (nicotinic type)
B) Insulin receptor
C) β-adrenergic receptor
D) Estrogen receptor
Answer: A) Acetylcholine receptor (nicotinic type)

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31. Which molecule acts as both a second messenger and a cofactor for PKC?

A) IP3
B) DAG
C) cGMP
D) cAMP
Answer: B) DAG

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32. The "death receptor" involved in extrinsic apoptosis is:

A) p53
B) Fas receptor (CD95)
C) GPCR
D) RTK
Answer: B) Fas receptor (CD95)

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33. Which protein prevents apoptosis and is anti-apoptotic?

A) Bax
B) Bak
C) Bcl-2
D) Caspase-3
Answer: C) Bcl-2

3□□4□□ Activated MAP kinase pathway primarily affects:

A) Translation only
B) Transcription and gene expression
C) Lipid synthesis only
D) ATP synthesis directly
Answer: B) Transcription and gene expression

3□□5□□ Which phase of cell cycle is called the "decision point"?

A) G1 phase (restriction point)
B) S phase
C) G2 phase
D) M phase
Answer: A) G1 phase (restriction point)

3□□6□□ p21 protein is an inhibitor of:

A) G-proteins
B) Cyclin-CDK complexes
C) Caspases
D) MAP kinases
Answer: B) Cyclin-CDK complexes

3□□7□□ Main difference between mitosis and meiosis:

A) Meiosis does not involve chromosome pairing
B) Mitosis produces haploid cells
C) Meiosis involves two successive divisions
D) Mitosis has genetic recombination
Answer: C) Meiosis involves two successive divisions

3□□8□□ Cyclins are degraded via:

A) Lysosomal digestion
B) Ubiquitin-proteasome pathway
C) Passive lysis
D) Autophagy alone
Answer: B) Ubiquitin-proteasome pathway

3□□9□□ G0 phase refers to:

A) Active division phase
B) DNA replication phase
C) Resting or quiescent phase
D) Apoptotic phase
Answer: C) Resting or quiescent phase

4□□0□□ The phase of mitosis where sister chromatids separate:

A) Prophase
B) Metaphase
C) Anaphase
D) Telophase
Answer: C) Anaphase

Unit 2

1□□ Who is known as the father of genetics?

A) Charles Darwin
B) Gregor Mendel
C) Watson and Crick
D) Hugo de Vries
Answer: B) Gregor Mendel

2□□ Mendel's law of segregation states:

A) Two alleles of a gene separate during gamete formation
B) Genes are linked and inherited together
C) Dominant traits are always expressed
D) Alleles blend to form intermediate traits
Answer: A) Two alleles of a gene separate during gamete formation

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3□□ The expected phenotypic ratio of a monohybrid cross in F2 generation is:

A) 1:1
B) 3:1
C) 9:3:3:1
D) 1:2:1
Answer: B) 3:1

4□□ The phenotypic ratio of a dihybrid cross in F2 generation is:

A) 1:2:1
B) 9:3:3:1
C) 3:1
D) 1:1:1:1
Answer: B) 9:3:3:1

5□□ Independent assortment occurs when:

A) Genes are on the same chromosome and tightly linked
B) Genes are on different chromosomes or far apart
C) Alleles blend during inheritance
D) Crossing over is absent
Answer: B) Genes are on different chromosomes or far apart

6□□ Mendel worked primarily on:

A) Maize
B) Pea plant (Pisum sativum)
C) Drosophila
D) Tomato
Answer: B) Pea plant (Pisum sativum)

7□□ When heterozygote shows an intermediate phenotype, it is:

A) Complete dominance
B) Incomplete dominance
C) Codominance
D) Overdominance
Answer: B) Incomplete dominance

8□□ Example of incomplete dominance in plants:

A) Pea seed shape
B) Flower color in snapdragon
C) Blood group AB in humans
D) Sickle cell anemia
Answer: B) Flower color in snapdragon

9□□ In codominance, the heterozygote shows:

A) Only dominant phenotype
B) Intermediate phenotype
C) Both parental phenotypes simultaneously
D) Neither parental phenotype
Answer: C) Both parental phenotypes simultaneously

AB blood group in humans is an example of:

A) Incomplete dominance
B) Codominance
C) Complete dominance
D) Epistasis
Answer: B) Codominance

1□□1□□ Penetrance refers to:

A) Intensity of a trait expression
B) Proportion of individuals showing a trait among those with genotype
C) Number of alleles involved
D) Environmental effect on a trait
Answer: B) Proportion of individuals showing a trait among those with genotype

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1□□2□□ Expressivity refers to:

A) Frequency of a trait in a population
B) Variation in severity or degree of expression among individuals
C) Number of loci involved
D) Ratio of dominant to recessive traits
Answer: B) Variation in severity or degree of expression among individuals

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1□□3□□ XX-XY system is found in:

A) Birds
B) Grasshoppers
C) Humans
D) Honeybees
Answer: C) Humans

1□□4□□ ZZ-ZW system of sex determination is seen in:

A) Humans
B) Birds
C) Drosophila
D) Fishes only
Answer: B) Birds

1□□5□□ Genic balance theory of sex determination was proposed for:

A) Humans
B) Drosophila

C) Grasshoppers
D) Birds
Answer: B) Drosophila

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16. In Drosophila, sex is determined by:

A) Presence of Y chromosome
B) X to autosome ratio
C) Number of Z chromosomes
D) Haplodiploidy
Answer: B) X to autosome ratio

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17. Environmental sex determination is seen in:

A) Humans
B) Birds
C) Some reptiles and fish
D) Pea plants
Answer: C) Some reptiles and fish

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18. In humans, Y chromosome determines:

A) Femaleness
B) Maleness
C) Intersex condition
D) Sterility only
Answer: B) Maleness

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19. In honeybees, unfertilized eggs develop into:

A) Females only
B) Diploid males
C) Haploid males (drones)
D) Intersex individuals
Answer: C) Haploid males (drones)

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20. In some turtles, higher incubation temperature produces:

A) Only males
B) Only females
C) Sterile individuals
D) No effect on sex
Answer: B) Only females

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21. SRY gene responsible for male development is present on:

A) X chromosome
B) Y chromosome
C) Autosomes
D) Mitochondrial DNA
Answer: B) Y chromosome

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22. XO sex determination system is found in:

A) Humans
B) Grasshoppers
C) Birds
D) Drosophila
Answer: B) Grasshoppers

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23. Red-green color blindness is an example of:

A) Autosomal dominant
B) Autosomal recessive
C) X-linked recessive
D) Y-linked
Answer: C) X-linked recessive

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24. Hemophilia is caused by:

A) Y-linked gene
B) Autosomal dominant gene
C) X-linked recessive gene
D) Mitochondrial gene
Answer: C) X-linked recessive gene

2□□5□□ Dosage compensation in mammals occurs by:

A) Inactivation of both X chromosomes in females
B) Hyperactivation of X chromosome in males
C) Inactivation of one X chromosome in females (Barr body formation)
D) No adjustment
Answer: C) Inactivation of one X chromosome in females (Barr body formation)

2□□6□□ Barr body is seen in:

A) Male somatic cells
B) Female somatic cells
C) All cells equally
D) Only germ cells
Answer: B) Female somatic cells

2□□7□□ Lyonization refers to:

A) Y chromosome duplication
B) Random X inactivation in females
C) Activation of autosomal genes
D) Inactivation of mitochondria
Answer: B) Random X inactivation in females

2□□8□□Color blind daughter can only be born if:

A) Father is color blind and mother is carrier or color blind
B) Father is normal
C) Only mother is color blind
D) Only father is carrier
Answer: A) Father is color blind and mother is carrier or color blind

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2□□9□□ Holandric inheritance is seen in:

A) Traits on X chromosome
B) Traits on Y chromosome
C) Autosomal dominant traits
D) Mitochondrial inheritance
Answer: B) Traits on Y chromosome

3□□0□□ Which condition is not possible in humans?

A) XXY
B) XO
C) OY
D) XXX
Answer: C) OY

3□□1□□ Individuals with Turner syndrome have genotype:

A) XXY
B) XO
C) XXX
D) XYY
Answer: B) XO

3□□2□□ Dominant lethal alleles are mostly eliminated because:

A) They do not affect survival
B) They cause death before reproduction
C) They enhance fitness
D) They cause sterility only
Answer: B) They cause death before reproduction

3□□3□□ Reciprocal cross helps determine:

A) Linkage
B) Number of chromosomes
C) If a trait is sex-linked or not
D) Mutation rate
Answer: C) If a trait is sex-linked or not

3□□4□□ Which human chromosome determines the presence of testes?

A) X chromosome
B) Y chromosome
C) Chromosome 21
D) Chromosome 18
Answer: B) Y chromosome

3□□5□□Non-disjunction during meiosis results in:

A) Aneuploidy
B) Polyploidy only
C) Synapsis failure
D) Linkage
Answer: A) Aneuploidy

3□□6□□ In dihybrid cross, two genes assort independently only if they are:

A) Linked closely
B) On different chromosomes
C) On same chromosome without recombination
D) Non-functional
Answer: B) On different chromosomes

3□□7□□ A trait expressed only in one sex is called:

A) Sex-limited trait
B) Sex-influenced trait
C) Codominant trait
D) Multiple alleles
Answer: A) Sex-limited trait

3□□8□□ Gene that affects multiple traits is called:

A) Polygenic gene
B) Pleiotropic gene
C) Codominant gene
D) Epistatic gene
Answer: B) Pleiotropic gene

3□□9□□ AB blood group is an example of:

A) Epistasis
B) Codominance
C) Incomplete dominance
D) Multiple alleles only
Answer: B) Codominance

4□□0□□ Incomplete penetrance explains why:

A) All individuals with a genotype always express the trait
B) Not all individuals with a genotype express the trait
C) Traits are always dominant
D) All traits are sex-linked
Answer: B) Not all individuals with a genotype express the trait