

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

Ph. D. ENTRANCE TEST (PET) – 27th January 2019

Signature of Invigilators

Life Sciences
(19/24)

Roll No.

--	--	--	--	--	--

(in figures as in Hall Ticket)

Roll No. _____

(in words)

Maximum Marks: 50

No. Of Printed Pages : 8

Instruction for the Candidate:

1. Write your Roll Number in the space provided on the top of this page.
2. This paper consists of **FIFTY (50)** multiple choice type questions. Each Question carries **ONE (1)** mark.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below:
 - a. To have access to the Question Booklet, tear off the paper seal on the edge of this cover page, Do not accept a booklet without sticker seal and do not accept an open booklet.
 - b. Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faculty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.
 - c. After this verification is over, the Test Booklet Number should be entered on the OMR Answer Sheet and the OMR Answer Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.

Example: (A) ● (C) (D) where (B) is correct response.
5. Your responses to the items are to be indicated on the OMR Answer Sheet under Paper – II only. If you mark your response at any place other than in the circle in the OMR Answer Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your Name, Roll Number, Phone Number or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
9. You have to return the original OMR Answer Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are however, allowed to carry original question booklet and duplicate copy of OMR Answer Sheet on conclusion of examination
10. Use only Blue/ Black Ball point pen.
11. Use of any calculator or log table etc., is prohibited.
12. There shall be no negative marking.

Life Sciences

(19/24)

Note: This paper contains **FIFTY (50)** multiple-choice questions. Each Question carries **ONE (1)** mark.

- 01) Which of the following ions is present at highest concentration in the cytoplasm?
A) Na^+
B) H^+
C) Mg^+
D) K^+
- 02) Which one of the following amino acids is a precursor for thyroxine ?
A) Tryptophan
B) Tyrosine
C) Phenylalanine
D) Histidine
- 03) Which one of the following is a neutral detergent?
A) Sodium cholate
B) Triton X-20
C) SDS
D) CTAB
- 04) Which amino acid is a major neurotransmitter in the brain?
A) Tyrosine
B) Glutamate
C) Tryptophan
D) Serine
- 05) Resolving power is the ability of a microscope to
A) estimate cell size.
B) magnify an image.
C) see two close objects as separate.
D) keep objects in focus.
- 06) The domain *Archaea* includes all the following groups *except* the
A) Mycoplasmas.
B) Extreme halophiles.
C) Crenarchaeota.
D) Euryarchaeota.
- 07) Which one of the following statements does NOT apply to pili?
A) Pili are made of protein.
B) Pili allow for attachment to surfaces.
C) Pili facilitate nutrient transport.
D) Pili contain adhesins.
- 08) A bacterial species generation time would be determined during the _____ phase.
A) decline
B) lag
C) log
D) stationary
- 09) Which one of the following is NOT produced during glycolysis?
A) ATP
B) NADH
C) Pyruvate
D) Citrate
- 10) All the following are produced during the citric acid cycle *except*:
A) CO_2
B) NADPH
C) ATP
D) NADH
- 11) _____ has/have the ability to cause thymine dimer formation.
A) X rays
B) Ultraviolet light
C) Gamma rays
D) Microwaves
- 12) The first completely sequenced genome from a free-living organism was from
A) *Drosophila*
B) *E. coli*.
C) *Haemophilus*.
D) *Mycoplasma*

- 13) Which complementary sequence would NOT be recognized by a restriction endonuclease?
- A) GAATTC
CTTAAG
- B) AAGCTT
TTCGAA
- C) GTCGAC
CAGCTG
- D) AATTCC
TTAAGG
- 14) Sickle cell disease results in abnormal hemoglobin because of _____ mutation in β -globin gene.
- A) Missense
- B) Nonsense
- C) Frame shift
- D) Deletion
- 15) NADPH oxidase is involved in the generation reactive oxygen species in
- A) ER
- B) Lysosome
- C) Phagosome
- D) Peroxisome
- 16) Which one of the following describes the mechanism of action of steroids?
- A) Steroid molecules get transported by membrane receptors in the target cells
- B) Target cells have cytosolic receptors
- C) Steroids induce phosphorylation and dephosphorylation of signaling proteins.
- D) Steroids activate ion channels for increase in cytosolic Ca^{+2} levels.
- 17) Determination involves a change in
- A) Competence
- B) Division
- C) Development
- D) None

- 18) Plants are sessile organisms and use development as a strategy to _____ to environment.
- A) adapt
- B) resist
- C) control
- D) avoid
- 19) The egg type of Prototheria (Monotremata) is:
- A) Polylecithal and telolecithal
- B) Alecithal and centrolecithal
- C) Microlecithal and isolecithal
- D) Mesolecithal and homolecithal
- 20) One of the following is a larval form of Phylum Echinodermata?
- A) Trochophore
- B) Veliger
- C) Branchiollaria
- D) Planula
- 21) Match list-1 with list-2 and select the correct answer using the codes given below the lists:

List 1	List 2
P. Richmond Lang Effect	1. Reversal of red-drop
Q. Emerson effect	2. Inhibition of glycolysis by oxygen
R. Pasteur effect	3. Inhibition of photosynthesis by oxygen
S. Warburg effect	4. Senescence retardation in detached leaves

- A) P-1, Q-4, R-2, S-3
- B) P-4, Q-1, R-3, S-2
- C) P-1, Q-4, R-3, S-2
- D) P-4, Q-1, R-2, S-3

- 22) Those proteins required especially for the formation of nodules, and which are synthesized by the host plant in the course of nodule formation, are called nodulins, which of the following is not nodulin?
- Leghaemoglobin
 - Sucrose synthase
 - Uriede synthase
 - Lipo-chito-oligosachharide
- 23) Which of the following statement is correct regarding activation of phytochromes?
- Red light converts Pr to active form Pfr
 - Red light represses activity of Pr
 - When red light and far red light are in equal fluence rate Pr is activated
 - When red light and far red light are in different fluence rate Pr is activated
- 24) What would be effect on photosynthesis in C₃ and C₄ plants on elevating the concentration of CO₂ under light saturated condition?
- No effect on both type of plants
 - High in C₃ plants and unaffected in C₄ plants
 - High in C₄ plants and low in C₃ plants
 - High in both the types of plants
- 25) One of the following is considered to be the rarest blood group:
- A +ve
 - B -ve
 - O + ve
 - AB -ve
- 26) The cardiac cycle comprises a complete relaxation and contraction of both the atria and ventricles in normal human being, and lasts for:
- Approximately 0.8 seconds
 - Approximately 16 seconds
 - Approximately 2 seconds
 - Approximately 20 seconds
- 27) The prolongation of inhalation, and interruption, which contributes to exhalation, is controlled by:
- apneustic center
 - pneumotaxic center
 - hypothalamic center
 - cerebral center
- 28) Refractive error that results due to age, resulting in a blurred image formation on retina is termed as:
- Myopia
 - Hyperopia
 - Presbiopia
 - Astigmatism
- 29) Which one of the following is used in somatic hybridization ?
- Conjugation
 - Grafting
 - CRISPR-Cas9
 - Protoplast Fusion
- 30) Which one of the following method resulted in Triticale development?
- Interspecies cross
 - Intraspecies cross
 - Intergeneric cross
 - Intrageneric cross
- 31) Chromosomal disorder due to 'Trisomy 18' is termed as:
- Edward's Syndrome
 - Patau's Syndrome
 - Angelman Syndrome
 - Down Syndrome
- 32) Cytoplasmic inheritance was discovered by Sonneborn as kappa particles in:
- Paramecium
 - Bonellia
 - Verticella
 - Amphioxus

- 33) Which one of the following has maximum genetic diversity in India?
 A) Tea
 B) Teak
 C) Mango
 D) Wheat
- 34) The success of Green Revolution depends on the availability of
 A) High Yielding Variety of seeds
 B) Adequate irrigation facilities
 C) Chemical fertilizers and pesticides
 D) All of these
- 35) One of the following represents forms having pseudo segmentation with Proglottids:
 A) Cestoda
 B) Trematoda
 C) Nematoda
 D) Chaetognatha
- 36) The only Ape found in India is:
 A) Hoolock gibbon
 B) Red panda
 C) Hanuman langur
 D) Bonnet macaque
- 37) Species with wide geographical ranges which develop locally adapted populations are known as
 A) Ecological species
 B) Ecotypes
 C) Ecophenes
 D) Sub species
- 38) In a pond ecosystem, the bottom area where the production is lesser than the respiration ($P/R < 1$), is termed as,
 A) Limnetic zone
 B) Profundal zone
 C) Benthic zone
 D) Tidal zone
- 39) The Western Ghats and the Eastern Ghats mark the western and eastern edges of the _____.
 A) Deccan Plateau
 B) Malwa Plateau
 C) Chotanagpur Plateau
 D) Bundelkhand
- 40) Which one of the following vertebrate parasite is not a sanguivorous?
 A) Vampire fish
 B) Vampire bat
 C) Echeneis
 D) Lamprey
- 41) "Continuity of germplasm" theory was given by
 A) De Vries
 B) Weismann
 C) Darwin
 D) Lamarck
- 42) Which was absent in the atmosphere at the time of origin of life?
 A) NH_3
 B) H_2
 C) O_2
 D) CH_4
- 43) Which one of the following is a contribution of Charles Darwin?
 A) Inheritance of acquired characters
 B) Survival of the fittest
 C) Theory of recapitulation
 D) Origin of life
- 44) Which one of the following is recently discovered from caves of South Africa, fossil like humans?
 A) *Homoergatus*
 B) *Homoerectus*
 C) *Homo floresiensis*
 D) *Homonaledi*

45) Which one of the following is not used in genome editing?

- A) TALEN
- B) CRISPR-CAS9
- C) CRE-LOX
- D) Zinc Finger Nuclease

46) Which of the following next generation sequencers is based on single molecule real time sequencing (SMRT) technology?

- A) Illumina
- B) PacBio
- C) Ion torrent
- D) Pyrosequencing

47) In which of the following mass spectrometric techniques sample is introduced as a solution which is nebulized under an applied electrical potential?

- A) Electrospray ionization (ESI)
- B) Matrix assisted laser desorption ionization (MALDI)
- C) Electron ionization (EI)
- D) Fast atom bombardment (FAB)

48) Which of the following PCR method will amplify unknown DNA based on encoded amino acid sequence ?

- A) Degenerate PCR
- B) Multiplex PCR
- C) Hotstart PCR
- D) Inverse PCR

49) One of the following techniques is used for ecology as well as ecologic pest control:

- A) Transect
- B) Line transects
- C) Quadrates
- D) Pitfall traps

50) Values of Degrees of Freedom is calculated as

- A) N-2
- B) N-3
- C) N-1
- D) N-19

Rough Work: