TEST SERIES CSIR-NET/JRF DEC. 2018

BOOKLET SERIES A

Paper Code 03 **Test Type: TEST SERIES**

LIFE SCIENCES

Duration: 2:00 Hours **Date: 25-11-2018**

Maximum Marks: 150

Read the following instructions carefully:

* Single Paper Test is divided into **THREE** Parts.

Part - A: This part shall carry **10** questions. Each question shall be of **2 marks.**

Part - B: This part shall carry **35** questions. Each question shall be of **2 marks.**

Part - C: This part shall contain **15** questions. Each question shall be of **4 marks**.

* Darken the appropriate bubbles with HB pencil/Ball Pen to write your answer.

* There will be negative marking @25% for each wrong answer.

* The candidates shall be allowed to carry the Question Paper Booklet after completion of the exam.

* For rough work, blank sheet is attached at the end of test booklet.

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PART-A

1. Find unit digit of
$(4928)^{121} - (2129)^{122} - (2^4)^{162} = ?$
(a) 2 (b) 1 (c) 5 (d) 7

2. In a class of 180 students where number, of boys are half of the number of girls, Arun is Ranked 134th from the top. If there are 18 girls after Arun, then number of boys after Arun is
(a) 30 (b) 28 (c) 25 (d) 24

3. An advertisement in 'The Hindu' says'- 'learn a foreign language course to get a high paid job'
based on this statement conclude which one is true.
(i) Those who learn foreign language course get high paid job.
(ii) Only foreign language course can provide a high paid job
(a) only (i) follows (b) Only (ii) follows (c) both follows (d) None follows

4. Water stored in a reservoir of rectangular shape having a dimension, of 80 m, 60 m and 6.5 m. In how much time the reservior can be emptied by a pipe having a square cross section whose side is 20 cm if water flows at a speed 15 km/h through the pipe.
(a) 52 (b) 60 (c) 45 (d) 40

5. If in a certain code
'do' is coded as '35'
'her' is coded as '50'
What will be the code for 'him' ?
(a) 62 (b) 51 (c) 45 (d) 55

6. An Aeroplane flying horizontally at a height of 3 km above the ground at a certain time it subtends an angle of 60° at a point on ground and after 15 sec it produces a angle of 30°. What is the velocity of the aeroplane in m/sec. $(\sqrt{3} = 1.732)$ (approx)
(a) 252 m/sec (b) 260 m/sec (c) 145 m/sec (d) 231 m/sec

7. A criminal noticed by a police inspector from a distance of 200 m. After seeing the police the thief starts running at a speed of 10 km/hour and the police starts chasing at a speed of 11 km/hr. What is the total distance covered by the inspector when he catches the thief.
(a) 1.5 km (b) 3 km (c) 2.2 km (d) 2.5 km

8. The calender for the year 1990 would be exactly same with the which calender year.
(a) 2000 (b) 1996 (c) 2001 (d) 1995

9. How many times hour and minute hand of a clock makes right angle in a full rotation of a clock.
(a) 22 (b) 24 (c) 44 (d) 12

10. If two unbiased dices are thrown together then what is the probability of coming a sum of 8 from two dices
(a) $\frac{1}{9}$ (b) $\frac{5}{36}$ (c) $\frac{1}{6}$ (d) $\frac{1}{12}$

PART-B

11. Which of the following combinations of amino acids is likely to form ionic bond between them in proteins?
(a) R and V (b) H and A
(c) R and E (d) E and C

12. Which one of the following amino acids in proteins does NOT undergo phosphorylation?
(a) Phe (b) Thr (c) Ser (d) Tyr

13. Animal cells are labeled with radioactive amino acids. In which of the following would you detect radio activity:
I. Proteins II. RNA III. Ribosome IV. Glycolipids
(a) I and III (b) I and II (c) I only (d) I and IV

14. Lactose
(a) has a free anomeric carbon on the glucose residue
(b) has a free anomeric carbon on the galactose residue
(c) has free anomeric carbons on glucose and galactose residues
(d) has no free anomeric carbons

15. The important role of carotenoids in the human diet is their ability to serve as precursors of.
(a) Vitamin C (b) Vitamin D (c) Vitamin A (d) Vitamin K

16. Advantage(s) of *cis* double bonds (as opposed to *trans* double bonds) in fatty acids is that they-
(a) Maintain membrane symmetry (b) Increase membrane rigidity.
(c) Decrease membrane fluidity (d) Increase membrane fluidity

17. Which among the following is not known to have any role in protein folding?
(a) Hsp 70 (b) Prolyl cis-trans isomerase
(c) Protein disulphide isomerase (d) Topoisomerase

18. All aminotransferases have which one of the following prosthetic group?
(a) Thiamine pyrophosphate (b) Lipoate
(c) Pyridoxal phosphate (d) Coenzyme A

19. Glucose-1-P is converted to Fructose-6-P in two successive reactions
Glucose-1-P $\rightarrow$ Glucose-6-P (d$G^{o\prime}$ = –1.7 kcal/mol)
Glucose-6-P $\rightarrow$ Fructose-6-P (d$G^{o\prime}$ = –.4 kcal/mol)
What is d$G^{o\prime}$ for the overall reactions?
(a) 1.3 kcal/mol (b) 6.8 kcal/mol (c) 2.1 kcal/mol (d) –2.1 kcal/mol

20. The acrosome of the sperm is formed from the
(a) Mitochondria (b) Centrosome
(c) Lysosome (d) Golgi bodies

21. Nucleus is absent in
(a) Sieve tube (b) Cambium
(c) Phloem parenchyma (d) None of these

22. Hemidesmosomes are structures found between
(a) two adjacent plant cells (b) two adjacent animal cells
(c) between cell and extracellular matrix (d) within a bacteria

23. Cytoplasmic streaming results into mobility of substances and organelles involves interaction of
(a) Tubulin and kinesin (b) Tubulin and myosin
(c) Actin and kinesin (d) Actin and myosin

24. RER is found abundantly in goblet cells, pancreatic cells and liver cells is mainly engaged in
(a) glycosylation of protein (b) folding and secondary structure formation
(c) production of secretory and cytosolic protein (d) production and excretion of protein

25. Lysosomes are abundant in
(a) WBCs and osteoblasts (b) RBCs and spleen
(c) Liver and spleen (d) WBCs and spleen

26. Which is the primary thermodynamic factor that favors the formation of a lipid bilayer in aqueous surrounding?
(a) Van der waals force (b) Hydrophobic force
(c) Ionic interaction (d) Electrostatic interaction

27. Which one of the following coat protein/s is required for receptor mediated endocytosis from plasma membrane?
(a) Clathrin (b) SNARE protein
(c) Clathrin A protein (d) Both a and b

28. Cell fractionation is the most appropriate procedure for preparing _____ for study.
(a) isolated cells which are normally found tightly attached to neighbouring cells
(b) cells without a functional cytoskeleton
(c) isolated organelles
(d) the basic macromolecules

29. How many different kinds of F2 genotypes are possible from AABBCC × aabbcc?
(a) 9 (b) 8 (c) 36 (d) 27

30. If the first seven children born to a particular pair of parents are all male, what is the probability that the eighth will also be a male?
(a) 1/16 (b) 1/64 (c) 1/2 (d) 1/8

31. In four-o'clock, true breed of red-flowered plant is crossed with a white-flowered plant, the offspring have pink flowers in F1. Further selfing the F1, the offsprings appear in 1:2:1 phenotypic ratio of Red, Pink and white. This is the condition of
(a) Epistasis (b) Co-dominant
(c) Incomplete dominance (d) Multiple allelism

32. Which of the following phenomenon of inheritance is not a modification of mendelian dihybrid ratio?
(a) Complementary gene interaction (9:7) (b) Recessive epistasis (9:3:4)
(c) Dominant epistasis (12:3:1) (d) Additive gene interaction (10:6)

33. A yellow-bodied *Drosophila* female was crossed to a white-eyed male. Both the parental phenotypes are caused by X-linked recessive mutations. The dominant alleles encode brown body colour and red eyes. What would be the phenotypes of the offsprings ?
(a) Daughters yellow-bodied and sons red-eyed
(b) Daughters red-eyed and sons yellow-bodied
(c) Daughters and sons white-eyed and yellow-bodied
(d) Daughters and sons red-eyed and brown-bodied

34. Shell coiling is a maternal effect phenotype controlled by S gene, where S (right handed coiling) is dominant over s (left handed coiling). If a snail has left handed coiled shell, which of the following statement is true?
(a) The genotype of the snail must be s/s
(b) The genotype of the mother of the snail must be s/s
(c) The genotype of the father of the snail must be s/s
(d) The genotype of the grandmother of the snail must be s/s

35. Of a population of cells undergoing meiosis, 1% of the cells undergo recombination between genes A and B. What is the distance between the two genes?
(a) 0.5 Kb (b) 1.0 kb (c) 0.5 kb (d) 1.0 cM

36. Which of the following is true about the term Phenocopy?
(a) Variation in phenotype caused by Mutations.
(b) Variation in phenotype caused by environmental conditions, but it is non-hereditary.
(c) The condition that multiple allele control a trait.
(d) The condition that multiple character is control by pair of alleles.

37. Which of the following is not a second messenger in the case of eukaryotes?
(a) 1,2-diacyl glycerol
(b) Cyclins
(c) Inositol 1,4,5-triphosphate
(d) All of the above are second messenger in eukaryotes

38. Which of the following protein is functionally different from the other three?
(a) Ras (b) ERK (c) Akt (d) JNK

39. Which of the following is an incorrect match?
(a) erbB-EGF receptor (b) fos-PDGF receptor
(c) erbA-Thyroid receptor (d) Ras-GTPase activity

40. The protein P53 is associated with all of the following except
(a) Tumor suppression (b) Programmed cell death
(c) Transcription (d) Post-transcription modification

41. Which of the following statements is incorrect for an oncogene?
(a) They cause cellular transformation. (b) They are always localized in the nucleus.
(c) They are growth regulatory proteins. (d) Both b and c.

42. Proto-oncogenes are_____
(a) Oncogenes of transformed RNA viruses.
(b) Oncogenes present in living organism.
(c) Genes encoding oncoprotiens.
(d) Cellular genes encoding proteins related to viral oncogenes.

43. Ras oncogene transforms viral encoded normal mammalian cells into cancer cells. How do viral Ras protein differs from its normal counterpart?
(a) It diminished GTPase activity. (b) It increased GTPase activity.
(c) It diminished ATPase activity. (d) It increased ATPase activity.

44. How tumor cells are destroyed?
(a) By the action of natural killer cells. (b) By the action of T cells
(c) By the action of B cells (d) All of the above

45. In _____, colchicine treated cells get arrested.
(a) S phase (b) Anaphase (c) G0 phase (d) Metaphase

PART-C

46. The composition of proteins P1 to P4 are shown below:

Protein	**Composition**
P1	Rich in polar residues; poor in apolar residues
P2	Rich in apolar residues; poor in polar residues
P3	Has comparable number of polar and apolar residues
P4	Rich in glycine and proline

Which one of the following options CORRECTLY relates the propensities of these proteins to be folded, aggregated or disordered in an aqueous buffered solution?

(a) P1, P2 and P4 are disordered and P3 is folded
(b) P1 and P3 are folded, P2 is aggregated and P4 is disordered
(c) P1 and P3 are folded, and P2 and P4 are disordered
(d) P1 and P4 are disordered, P2 aggregated and P3 is folded

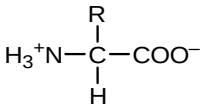
47. Which of the following covalent bond types are found in the structure of ATP?

(a) N-glycoside, thioester, phosphomonoester
(b) phosphoanhydride, phosphomonoester, N-glycoside
(c) ester, ether, phosphoanhydride
(d) ether, thioester, phosphomonoester

48. An amino acid has a non-ionizable R group. The pKa for the NH_2 group is 9.4 and for the COOH group is 2.8. Consider the following statements:

P) At a pH of 6.1, 50% of the amino acid molecules which migrate towards the cathode when placed between two electrodes

Q) At a pH of 2.8, 50% of the amino acid molecules in solution are of the form



R) The pI of the amino acid is 6.1

S) On titration of the amino acid solution with NaOH, the amino group is deprotonated before the carboxylic group

Which pair of the above statement is *correct*?

(a) Q, R (b) P, S (c) P, R (d) Q, S

49. In an experiment conducted in dark, isolated chloroplasts are kept in buffer (pH 4.0) until their internal pH is equal to 4.0. then, they are transferred to a buffer of pH 8.0 for short duration and ADP & Pi were added at the same time chloroplast were exposed to sunlight. Which of the following will happen?

(a) Chloroplasts will be destroyed
(b) Chlorophyll in the chloroplast will release bound Magnesium
(c) Chloroplasts will be intact but no ATP will be produced
(d) Chloroplasts will be intact and ATP will be produced

50. Proteins are transported around the cell in membranous vesicles. These vesicles

I. form when a section of membrane protrudes and buds off.
II. Gave a layer of coat protein around the inside of the vesicle.
III. Use their protein coat to find their target membrane.
IV. Are uncoated after they reach their target.

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

51. The fluidity of membranes in a plant in cold weather may be maintained by

(a) Increasing the number of phospholipids with saturated hydrocarbon tails.
(b) Activating a H^+ pump.
(c) Increasing the concentration of cholesterol in the membrane.
(d) Increasing the number of phospholipids with unsaturated hydrocarbon tails.

52. Match List-I (mitochondrial enzymes) with List-II (location of enzymes) and select the correct answer using the codes given below the lists.

List-I (Mitochondrial enzyme)	List-II (Location of enzyme)
A. Cytochrome oxidase	1. Outer chamber of mitochondria
B. Fatty acid Co-A ligase	2. Inner membrane of mitochondria
C. Adenylate kinase	3. Mitochondrial matrix
D. Malate dehydrogenase	4. Outer membrane of mitochondria
	5. Polyribosomes attached to mitochondria

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

53. Match List-I (distinguishing feature based on chromosomal appearance) with List-II (stage of meiosis) and select the correct answer using the codes given below the lists.

List-I	List-II
A. Terminalized chiasmata	1. Pachytene
B. Exchange of segments of chromatids	2. Zygotene
C. Synapsis of homologous chromosomes	3. Diakinesis
D. Appearance of chiasmata	4. Leptotene
	5. Diplotene

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

54. In bacterial cell division

P. MreB, (similar to actin) helps in chromosome movement.

Q. FtsZ, (a tubulin homologue), helps in cytokinesis.

R. ATP provides energy.

S. Microtubules make cell plate.

(a) P and R (b) P and Q

(c) P, Q and R (d) P, Q, R and S

55. Which of the following statement is false for both TEM and SEM?

(a) Using electromagnetic lenses, the microscope is focused.

(b) In TEM and SEM, the source of illumination is an electron beam.

(c) The specimen must be sectioned prior to viewing.

(d) All of the above statements are true.

56. Two plants of genotypes A/a ; b/b ; C/c ; D/d ; E/e and A/a ; B/b ; C/c ; d/d ; E/e in which each gene pair assort independently was crossed. Among the progeny a progeny has to recover to act as tester strain in a test cross. What is the probability of obtaining this tester strain among the progeny?

(a) 1/64 (b) 1/32 (c) 1/256 (d) 5/256

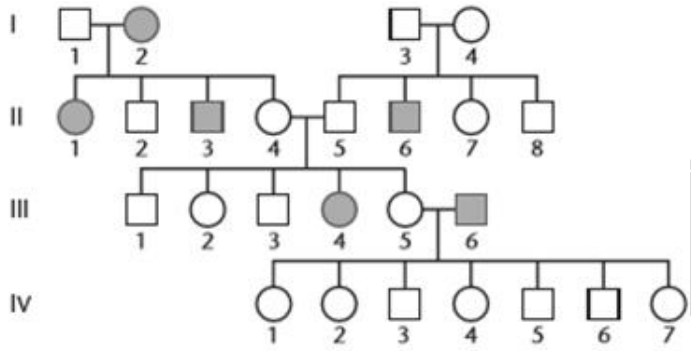
57. In a genetic screen three different mutant lines showing similar phenotype were isolated independently. When genetic crosses among these mutants were carried out, the first mutant was found to complement the second, third. However, the second has failed to complement the third mutant. How many complementation group do the three mutant lines belong to?

(a) One (b) Two (c) Three (d) Four

58. MN blood group in human is controlled by the M and N allele which are co-dominant to one another. In a population of 400 individuals, individuals of the type MM is 100 and MN is 200. What is the expected frequency of the N allele in the population?

(a) 0.95 (b) 0.05 (c) 0.5 (d) 0.005

59. Consider the following pedigree in a family having albinism, an autosomal recessive disorder.



If the allele A and a control the expression of the trait, identify the confirmed carrier individuals in this pedigree.

(a) I-1, I-3, I-4, II-4, II-5, III-5 (b) I-1, I-3, I-4, II-4, II-5

(c) I-1, I-3, II-4, II-5, III-5 (d) I-1, I-3, I-4, II-4, II-5, III-5, III-6

60. Somatic cell hybridization is used to assign a gene to a particular chromosome. When two cell lines from two different species are fused, they form a heterokaryon which tends to lose chromosomes as they divide, preferentially from one species. A panel of cell lines was created from mouse-monkey somatic cell fusions. Each line was examined for the presence of monkey chromosomes and for the production of a given enzyme. The following results were obtained:

Cell line	Presence of Enzyme	Presence of Monkey chromosomes									
		1	2	3	4	5	6	7	8	9	10
A	+	+	+	+	+	+	–	+	–	+	+
B	+	–	+	+	–	+	+	+	–	+	–
C	–	–	+	–	–	–	–	–	+	+	+
D	+	+	+	+	–	–	+	+	+	+	–
E	–	–	–	–	+	+	–	–	–	+	+
F	+	+	+	–	+	+	+	+	–	+	–

On the basis of these result, which chromosome has the gene that codes for the given enzyme?

(a) Chromosome 10 (b) Chromosome 7

(c) Chromosome 1 (d) Chromosome 5

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Date : 25-11-2018

[ANSWER KEY]

PART-A

1. (b)	**2.** (b)	**3.** (d)	**4.** (a)	**5.** (b)
6. (d)	**7.** (c)	**8.** (c)	**9.** (c)	**10.** (b)

PART-B

11. (c)	**12.** (a)	**13.** (a)	**14.** (a)	**15.** (c)
16. (d)	**17.** (d)	**18.** (c)	**19.** (d)	**20.** (d)
21. (a)	**22.** (c)	**23.** (d)	**24.** (d)	**25.** (d)
26. (b)	**27.** (b)	**28.** (c)	**29.** (d)	**30.** (c)
31. (c)	**32.** (d)	**33.** (b)	**34.** (b)	**35.** (d)
36. (b)	**37.** (b)	**38.** (a)	**39.** (b)	**40.** (d)
41. (b)	**42.** (d)	**43.** (a)	**44.** (a)	**45.** (d)

PART-C

46. (b)	**47.** (b)	**48.** (a)	**49.** (d)	**50.** (c)
51. (d)	**52.** (b)	**53.** (b)	**54.** (c)	**55.** (c)
56. (c)	**57.** (b)	**58.** (c)	**59.** (b)	**60.** (b)