

TEST SERIES CSIR-NET/JRF DEC. 2018

BOOKLET SERIES **B**

Paper Code **03**

Test Type: **TEST SERIES**

LIFE SCIENCES

Duration: 2:00 Hours

Date: 28-11-2018

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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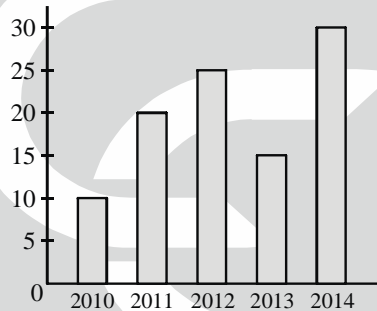


PART-A

1. Mohan is standing facing the North side. He goes 30 metres forward and then he turns left and goes for 5 metres. He then turns to his right and goes for 25 metres and finally turns to his right side and continues to walk. Which direction is he facing now ?
 (a) East (b) West (c) North (d) South
2. Find the missing number which would appear in place of question mark (?) based on the pattern followed in (I)?

1	8		2	?

- (a) 13 (b) 18 (c) 16 (d) 20
3. Introducing a man Aparna says, "He is the only son of the father of my sister's brother". How is the man related to Aparna ?
 (a) Cousin (b) Brother (c) Uncle (d) Father
4. The graph represents the production of rice of a rice mill in metric ton from year 2010 to year 2014. What is the percentage increase in production of rice in year 2014 as compared to previous year ?



- (a) 100 (b) 80 (c) 70 (d) 75
5. How many triangles are there in the figure given below ?
-
- (a) 21 (b) 27 (c) 25 (d) 23
6. A circular wire has a diameter of 14 cm. If it is cut and a square is made of the wire then what is the area of the square formed ?
 (a) 144 sq. cm (b) 49 sq. cm (c) 196 sq. cm (d) 121 sq. cm
7. Ram does $\frac{1}{4}$ th of a job in 6 days and Rahim does the remaining part in 12 days. In how many days Ram and Rahim working together can complete the whole work ?
 (a) $8\frac{2}{3}$ days (b) $9\frac{3}{5}$ days (c) 7 days (d) $8\frac{1}{5}$ days
8. If $1! + 2! + 3! + 4! + \dots + 100!$ is divided by 6 then what is the remainder ?
 (a) 2 (b) 3 (c) 4 (d) 7
9. In how many ways a committee of 5 members can be formed from 6 executives and 5 technicians consisting of 3 executives and 2 technicians ?
 (a) 120 (b) 200 (c) 150 (d) 300
10. A wall clock gains 5 seconds in 3 minutes. It was properly set at 7 O' clock in the morning, if in the same day the clock indicates a time of 4 : 15 pm, then what is the true time ?
 (a) 3 : 48 pm (b) 4 : 10 pm (c) 4 pm (d) 3 : 55 pm

PART-B

11. Given are the different forms of DNA. Which of the following are found in the dehydrated condition?
(a) A-DNA (b) B-DNA (c) C-DNA (d) Both (a) and (c)
12. Which of the following is TRUE about the bacterial DNA pol I enzyme?
(a) Prokaryotic family A polymerases and encoded by the *polB* gene.
(b) Only polymerase in prokaryotes that has 5' to 3' exonuclease activity.
(c) Does not performed 3' to 5' exonuclease activity.
(d) Polymerization in 3' to 5' direction.
13. Telomerase, a RNA-protein complex which completes the replication of telomeres during DNA synthesis, is a specialised
(a) RNA dependent RNA polymerase
(b) DNA dependent DNA polymerase
(c) DNA dependent RNA polymerase
(d) RNA dependent DNA polymerase
14. A gene X is genetically active in the genome. When certain heterochromatic regions are translocated to the site of the gene X, the expression of the gene X is suppressed. This is called
(a) Position effect (b) Genome imprinting
(c) Silencer effect (d) Dosage compensation
15. Which of the following sets of genes are responsible for the phage lambda to undergo lytic cycle?
(a) Cro, CI, N (b) CI, CII, N (c) CIII, CII, N (d) Cro, N, Q
16. Which of the given statements are TRUE about the bacterial translation?
(a) Initiator amino acid is methionine
(b) mRNA has Kozak sequences which is the binding site of Ribosomes.
(c) IRES is the ribosome binding site found in bacterial mRNA.
(d) None
17. Which of the following is TRUE about the Polycistronic genes?
(a) Genes having multiple exons
(b) Genes having multiple of introns
(c) Many genes having common promoter
(d) One gene one promoter, promoter cannot be shared between two genes.
18. A change in the nucleotide base in a DNA sequence of a gene may results in nonsense mutation. Which of the following is true for the mutated gene?
(a) premature termination of the transcripts.
(b) shorten the length of the protein encoded by the gene.
(c) have no effect on the transcript or protein made.
(d) cause a shift in reading frame.
19. A protein X is encoded by a Gene. A researcher wanted to detect the level of proteins found in the cellular system. Which of the following techniques will be best suited?
(a) Sothern blotting (b) DNA fingerprinting
(c) Western blotting (d) Northern blotting



20. Pyrosequencing is a method of DNA sequencing that determines the order of nucleotides in DNA. Pyrosequencing differs from Sanger sequencing, in that
- It is based on chain termination with dideoxynucleotides.
 - It is based on chemical modification of dNTPs bases.
 - It is based on detection of pyrophosphate release on nucleotide incorporation
 - It is based on the radiolabelling of 5' phosphate of the template.
21. A cage with male mosquitoes in it has a small earphone placed on top, through which the sound of a female mosquito is played. All the males immediately fly to the earphone and thrust their abdomens through the fabric of the cage. Which of the following best describes this?
- Copulation is a fixed action pattern, and the female flight sound is a sign stimulus that initiates it.
 - Through classical conditioning, the male mosquitoes have associated the inappropriate stimulus from the earphone with the normal response of copulation.
 - The reproductive drive is so strong that when males are deprived of females, they will attempt to mate with anything that has even the slightest female characteristic.
 - The males learn to associate the sound with a female and are thus attracted to it.
 - The sound from the earphone irritated the male mosquitoes, causing them to attempt to sting it.
22. The waggle dance helps bees
- Communicate when they are hungry
 - Perfect the avoidance response
 - Communicate the location of food
 - Sound the alarm to protect the hive when it is invaded
23. If the leader of a troop of baboons defends his family, or honeybees defend their hive "to the death", this apparent behavior of risking one's life for others is called
- Altruism
 - Sexual selection
 - Ritualization
 - Soft competition
24. Which of the following is a behavioral pattern that results from a proximate cause?
- A male sheep fights with another male because it helps it to improve its social position and find a mate.
 - A goose squats and freezes motionless because that helps it to escape a predator.
 - A female bird lays its eggs because the amount of daylight is decreasing slightly each day.
 - A cat kills a mouse to obtain food.
 - A cockroach runs into a crack in the wall and avoids being stepped on.
25. When the water reaches the endodermis in roots
- apoplastic movement is switched to symplastic movement of water
 - symplastic flow of water switches to apoplastic flow
 - Water stops flowing altogether
 - No change in water flow is observed
26. Which of the following is not a main hormone involved in plant defense signalling pathway ?
- Ethylene
 - Jasmonic acid
 - Salicylic acid
 - Gibberlic acid
27. In a salt tolerant plant, the excess salt is transported to vacuole by
- Na – H⁺ antiporter
 - Na – K⁺ pump
 - Na – Cl⁻ symporter
 - Na – H⁺ symporter
28. In which of the following stomata are equally distributed an upper and lower surface of leaves ?
- Apple
 - Maize
 - Potato
 - Tomato
29. Which of the following form of soil water is commonly available for plant growth ?
- Hygroscopic water
 - Gravitational water
 - Capillary water
 - Field water



30. Which of the following statements is correct regarding channel proteins?
I. They are selective with respect to pore size.
II. They are selective with respect to charge of ion.
III. Transport is passive.
IV. Transport is active.
(a) I, II and IV (b) I, III and IV (c) I, II and III (d) III and IV
31. Incorrect statement about T-cell epitopes is?
(a) T-cells need processing of Ag before they can identify epitopes
(b) T-cells recognize epitopes that are found buried in proteins
(c) T-cells epitopes can directly bind with TCRs
(d) T-cells epitopes may have hydrophobic & hydrophilic residues both
32. One of the following will be absent during V-(D)-J recombination of L-chain genes -
(a) P-nucleotide addition (b) N-nucleotide addition
(c) Recombination signal sequences (RSSs) (d) RAG-1 & RAG-2
33. A cell surface molecule NOT found on the CD4 T-cells is -
(a) CD3 (b) CD28 (c) B220 (d) LFA-1
34. Identify the feature NOT applicable to IL-2
(a) Its high affinity receptor is a dimeric molecule
(b) Its high affinity receptor is expressed only after activation
(c) IL-2 is mainly produced by activated T-cells
(d) α -chain of IL-2R is unique in high affinity IL-2R
35. The fusogenic molecule present on the surface of HIV viral envelope is
(a) gp41 (b) HA (c) P32 (d) gp120
36. Which of the following strategies is NOT used by viruses to evade host immune responses-
(a) Antigenic drift as in influenza virus
(b) Generalized immunobuppression such as those by measles virus & EBV
(c) Antigenic switching as in herpes simplex virus
(d) Inhibition of complement pathway such as that by vaccinia virus
37. Find incorrect statement about T-cell receptors (TCRs) :
(a) They show only VDJ recombination but fail to show VDDJ & VDDDJ recombination
(b) α & β - chains both have hypervariable regions (HVs)
(c) HV4 in β -chain does not contact antigen
(d) $\gamma\delta$ -TCRs are used in identification of phospholipids antigens
38. Hydrodynamic focussing is a method of focussing cells in line with lasers. This method is used in -
(a) Fluorescence microscopy (b) Surface Plasmon resonance
(c) Flow cytometry (d) Laser spectroscopy
39. During T-cell signalling, transcription factors NFAT & NF- κ B migrate to the nucleus. Which technique will be most suitable demonstrate this migration -
(a) Phase contrast microscopy (b) Mass spectrometry
(c) Electron microscopy (d) Fluorescence microscopy



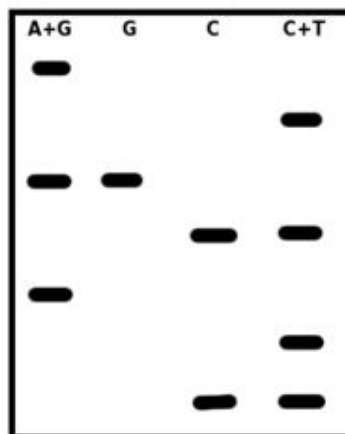
40. Which among the following is true for evolution of nucleus -
 (a) It evolved due to endosymbiosis
 (b) It evolved due to fusion of vesicles
 (c) It evolved due to inward protrusion & pinching of plasma membrane
 (d) It evolved due to high rate of division
41. Which among the following was likely present in earliest cell membranes ?
 (a) Simple fatty acids (b) Sterols
 (c) Transporters (d) Phospholipids
42. Which among the following is an example of atavism ?
 (a) Bird with beaks (b) Human baby with *nictating* membrane
 (c) Human with teeth (d) Whale with lungs
43. Synthetic theory refers to -
 (a) Combination of Lamarckism & molecular biology
 (b) Combination of Darwinism & comparative biochemistry
 (c) Combination of Darwinism & Mendelian genetics
 (d) Combination of Lamarckism & Mendelian genetics
44. Which among the following is NOT a limitation on Hardy-Weinberg equilibrium -
 (a) Large scale migration from population (b) A high mortality disease
 (c) High incidence of mutagenesis (d) Population being panmictic
45. In a sample population of 100 individuals 9 die due to a lethal disease. What is the frequency of recessive allele ?
 (a) 0.09 (b) 0.3 (c) 0.7 (d) 0.03

PART-C

46. In the transformation experiment of Avery, MacLeod, and McCarty established transforming principle of DNA in several strains of *Diplococcus pneumoniae*. IIS (virulent) forms culture was processed and heat killed, which is followed by homogenization. The soluble filtrate were prepared from this culture and treated with protease, ribonuclease, DNase enzyme separately and incubate with live IIR (non-virulent) culture separately to infect mice. Which is of the following is INCORRECT about the study
 (a) Live IIR + RNase treated IIS filtrate results in death of the mice
 (b) Live IIR + Protease treated IIS filtrate results in death of the mice
 (c) Live IIR + DNase treated IIS filtrate results in death of the mice
 (d) None of the above
47. Following are the characteristics of chromosomal DNA
 A) Short repeat nucleotide sequences 5'-TTAGGG-3' are found in the G-rich strand of telomeres in eukaryotes.
 B) G-quadruplex is characteristics of circular chromosome in prokaryotes.
 C) Telomere replication is possible by DNA polymerase enzyme.
 D) Telomere shortening is associated with bacterial chromosome.
 Which of the above statement are TRUE?
 (a) A only (b) A and B (c) A, B and C (d) A, B, C and D



48. Match the following molecular process and biological effect,
 A) Histones acetylation – activation of gene
 B) Heterochromatin– gene activation
 C) Methylation of CpG islands– Repression of genes
 D) Telomere– stability and integrity of the chromosome
 Identify the pair which is perfectly matched from the above?
 (a) A and B (b) B and C (c) A, C, D (d) B and D
49. Suppose a certain gene contains the double-stranded sequence:
 5'- ATGTTTAGCGCC -3'
 3'- TACAAATCGCGG -5'
 If the top strand is the sense strand and the genes codes for a mRNA whose sequence begins 'AUG', The template for the synthesis of the RNA transcript is
 (a) 5'-AUGUUUAGCGCC-3' (b) 5'- ATGTTTAGCGCC -3'
 (c) 3'- TACAAATCGCGG -5' (d) 5'-UACAAAUCGCGG-3'
50. Which of the following mechanisms accounts for the addition of a new amino acid residue into a partially completed peptide chain on the ribosome?
 (a) The amino acid at A-site is transferred to link via its -NH₂ group to the C-terminal end of the peptide at the P-site.
 (b) The peptide at the P-site is transferred to link via its C-terminal end to the -NH₂ of the amino acid at A-site
 (c) The amino acid is transferred to link via its -COOH group to the N-terminal end of the peptide at P-site.
 (d) The peptide is transferred to link via its N-terminal end to the -COOH of the amino acid at A-site.
51. A merodiploid strain of *E. coli* with the genotype I⁺O⁺ Z⁺Y⁺/ F' I⁻O⁺Z⁻Y⁻ was constructed. IPTG, a compound that mimic allolactose is used to induce protein expression where the gene is under the control of the lac operator. Which one are TRUE about the β-galactosidase enzyme and permease synthesis of the construct?
 A) Constitutive activity of β-galactosidase and permease
 B) Induction of β-galactosidase and permease with n moles of IPTG
 C) Induction of β-galactosidase and constitutive for lac permease with n moles of IPTG
 D) No activity of β-galactosidase and permease due to absence of Lac (I) in the construct.
 Which of the above statements are TRUE for the given construct?
 (a) A only (b) only B (c) only C (d) A and D
52. Given is the Urea-Gel profile of a segment of DNA from the Maxam and Gilbert chemical method of DNA sequencing.



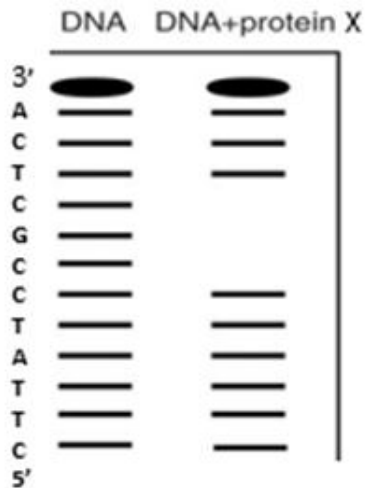
Sequencing Gel



Radioactive labeling at one 5' end of the DNA fragment to be sequenced, followed by base specific chemical modification and cleaved with hot piperidine to generate fragments of radiolabeled fragments. Each of the well is represented by the modified bases A+G, G, C, C+T. Identify the correct sequence of the DNA segment.

- (a) 5'-CTACGTA-3' (b) 3'-CTACGTA-5'
 (c) 5'-CCTAGCGTA-3' (d) 3'-CCTAGCGTA-5'

53. DNA footprinting is a method to study DNA –protein interaction mainly at the promoter regions. A researcher wanted to study the interaction of protein X and a segment of DNA. So two reaction tube are prepared: tube 1 (labelled DNA only) and tube 2 (labelled DNA + Protein X). Following the tubes are treated with DNase enzyme. The DNA foot printing profile of the two reaction tube is given below



Which of the following is true for the DNA-protein interaction?

- (a) The protein X do not interact to the DNA fragment.
 (b) The protein X interact to the DNA fragment at CGC, so it is protected from the DNase I.
 (c) The protein X interact to the DNA fragment but the sequence can not be determine.
 (d) The protein X interact to the DNA fragment at CTATTC.
54. The organization of group of animals in such a way that some members of the group have greater access to resources like food or mates than others is called:
 (a) agnostic (b) Territory (c) Hierarchy (d) Altruism
55. When, during a field trip, the instructor touched the body of a moth that was sitting on a tree trunk, the moth raised its forewings to reveal large eye-spots on its hind wings. The instructor asked the class why the moth lifted its wings. One student said that certain sensory receptors had fired and triggered a neuronal reflex culminating in the contraction of certain muscles. A second student responded that the behaviour might frighten would-be predators. What can you say about the explanations of these two students?
 (a) The first response is correct, while the second is incorrect.
 (b) Both explanations are reasonable and simply represent a difference of opinion.
 (c) The first response answers a proximate question, while the second answers an ultimate question.
 (d) The first response is biological, while the second is philosophical.

56. Salmon fish managers add a harmless chemical morpholine to a stream when they release young fish. When the fish mature, they swim back to the home stream by using this perfume still added by the wildlife managers. In nature, the fish smell the unique odors of soil and trees along the home stream. In effect, the biologist is using –
- The fish's genetic-grounded ability to relocate its own stream via chemotropism
 - A fish's ability at higher order reasoning
 - The fishes' ability to learn by trial-and-error
 - Sensitization
57. If a male white-crowned sparrow is hatched and reared in isolation but allowed during a critical period of imprinting (10 to 50 days after hatching) to hear the song of a male from another species, the bird most likely will
- Only learn the appropriate song of its own species
 - Sing the appropriate song of the other species
 - Try to modify the crude song it was "born with" with the other-species song and produce a unique song
 - Not sing at all
58. Cell A has $\psi_s = -0.75MPa$ and $\psi_p = 0.55MPa$. Cell B has $\psi_s = -0.65MPa$ and $\psi_p = 0.65MPa$. Based on the above information, which of the following is true ?
- Water will flow from cell A to cell B
 - Water will flow from cell B to cell A
 - Water will flow out from both cells
 - Both the cells are in equilibrium
59. Oxygenase activity of RuBisCO generates which of the following ?
- Two molecules of phosphoenolpyruvate.
 - Two molecules of phosphoglycolate.
 - One molecule each of PGA and phosphoglycolate.
 - Two molecules each of PGA and phosphoglycolate
- I and II
 - II only
 - III only
 - IV only
60. Which of the following statements given about plant hormones is correct ?
- Auxin is produced primarily at the root tips.
 - Cytokinins are a small group of related compounds which help in cell division.
 - Gibberellins are large group of related compounds carried by xylem and phloem.
 - Brassinosteroids are an important class of plant hormones which control a broad spectrum of developmental responses including pollen tube growth.
- I, II and III
 - II, III and IV
 - I and III
 - III and IV



Space for Rough Work





CSIR-UGC-NET/JRF LIFE SCIENCES TEST SERIES-2

(Part-A + Molecular Biology + Immunology + Plant Physiology + Evolution
and Animal Behaviour + Relevant Techniques)

Date : 28-11-2018

[ANSWER KEY]

PART-A

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

PART-B

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

PART-C

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

