

# TEST SERIES CSIR-NET/JRF JUNE 2018

BOOKLET SERIES **B**

Paper Code **03**

Test Type: **TEST SERIES**

## LIFE SCIENCES

Duration: 2:00 Hours

Date: 27-05-2018

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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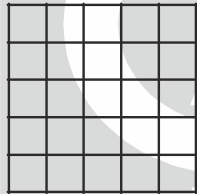


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## PART-A

- Two stations A and B are 110 km apart on a straight line. One train starts from A at 07:00 AM and travels towards B at 20 km per hour. Other train starts from B at 08:00 AM and travels towards A at a speed of 25 km per hour. At what time will they meet?  
(a) 09:00 AM (b) 10:00 AM (c) 10:30 AM (d) 11:00 m
- Two dice are thrown simultaneously. What is the probability of getting two numbers whose product is even?  
(a)  $\frac{1}{2}$  (b)  $\frac{3}{4}$  (c)  $\frac{3}{8}$  (d)  $\frac{5}{16}$
- The H.C.F. of two numbers is 23 and the other two factors of their L.C.M. are 13 and 14. The larger of the two numbers is  
(a) 276 (b) 299 (c) 322 (d) 345
- The perimeter of a circle, a square and an equilateral triangle are equal. Which one of the following statements is true?  
(a) The circle has the largest area (b) The square has the largest area  
(c) The equilateral triangle has the largest area (d) All the three shapes have the same area
- How many rectangles (which are not squares) are there in the following figure?



- (a) 180 (b) 170 (c) 100 (d) 225
- Air is an  
(a) compound (b) element (c) electrolyte (d) mixture
  - Choose the box that is similar to the box formed from the given sheet of paper (X)



(X)



(1)



(2)

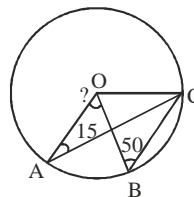


(3)



(4)

- (a) 1 and 4 only (b) 3 and 4 only (c) 1 and 2 only (d) 2 and 3 only
- If Neena says, "Anita's father Raman is the only son of my father-in-law Mahipal". Then how is Bindu, who is the sister of Anita, related to Mahipal?  
(a) Niece (b) Daughter (c) Daughter-in-law (d) None of these
  - In the given figure O is the centre  $\angle OBC = 50$  and  $\angle OAC = 15$ . Then the value of the  $\angle AOB$  is



- (a) 30 (b) 40 (c) 20 (d) 70

10. Find the missing number in the series 29, 40, 44, 52, 59, 73, \_\_\_\_\_  
(a) 97 (b) 83 (c) 95 (d) 67

**PART-B**

11. Telomerase, a RNA-protein complex which completes the replication of telomeres during DNA synthesis, is a specialised  
(a) RNA dependent DNA polymerase (b) DNA dependent DNA polymerase  
(c) DNA dependent RNA polymerase (d) RNA dependent RNA polymerase
12. Which of the following is true about the DNA polymerase I?  
(a) Polymerization of DNA synthesis in 5'-3' direction.  
(b) Possesses both 5'-3' and 3'-5' exonuclease activity.  
(c) It is also called as Kornberg enzyme  
(d) All of the above
13. RNA is susceptible to base hydrolysis whereas DNA is not. This is because  
(a) presence of uracil in RNA  
(b) absence of thymine in RNA  
(c) the presence of 2' OH group in the ribose sugar  
(d) the presence of 3' OH group in the ribose sugar
14. During DNA replication the lagging strand is synthesized in a series of short fragments known as Okazaki fragments. Okazaki fragments is the characteristics of  
(a) Only bacteria (b) Only Eukaryotes  
(c) Only vertebrates (d) Both Prokaryote and eukaryotes
15. Acetylation of histone is the hallmarks of active transcription in eukaryotic chromosome. Histone deacetylase (HDAC) catalyses the removal of acetyl group from N-terminal of histones and silence the genes. Which amino acid of histone is involved in this process?  
(a) Lysine (b) Arginine (c) Asparagine (d) Histidine
16. *E.coli* is being grown in a medium containing both glucose and lactose. On depletion of glucose, expression of  $\beta$ -galactosidase will  
(a) remain unchanged (b) increase  
(c) decrease (d) initially decrease and then increase
17. RNA mediated gene silencing is a mechanism of gene regulation in eukaryotes, is mediated by both siRNA and miRNA. Which of the following is NOT true about miRNA?  
(a) miRNA is processed by DICER.  
(b) miRNA usually guide silencing of the same genetic loci from which they originate.  
(c) miRNA is either natural or a synthetic one.  
(d) miRNA is encoded by nuclear gene.
18.  $\alpha$ -Amanitin is a fungal toxin which inhibits eukaryotic RNA polymerases. The three eukaryotic RNA polymerases show differential sensitivity to this toxin. Which one of the following order (higher to lower) is correct in respect of sensitivity towards  $\alpha$ -amanitin?  
(a) RNA POL III > RNA POL II > RNA POL I  
(b) RNA POL II > RNA POL III > RNA POL I  
(c) RNA POL I > RNA POL III > RNA POL II  
(d) RNA POL II > RNA POL I > RNA POL III



19. The specificity of tRNA recognition by an aminoacyl tRNA synthetase that is intrinsic to the tRNA molecule lies on  
(a) acceptor stem (b) acceptor stem and anticodon loop  
(c) anticodon loop (d) D-arm
20. During the initiation of translation of protein synthesis, the charged tRNA first binds to the  
(a) A site of small ribosome subunit (b) P site of small ribosome subunit  
(c) P site of large ribosome subunit (d) A site of large ribosome subunit
21. The binding of HIV to the CD4 surface molecules of the host cell membrane is brought via  
(a) p53 (b) p33  
(c) gp41 (d) gp120
22. \_\_\_\_\_ act as the co-receptor of HIV.  
(a) CD54 (b) CXCR4  
(c) CXCR4 (d) Both b and c
23. Where do class switching takes place ?  
(a) In pro-B cells (b) In pre-B cells  
(c) In activated B cells (d) In immature B cells
24. What is the order of various antibodies in the serum, in a normal human being ?  
(a) IgA > IgM > IgD > IgE (b) IgG > IgA > IgM > IgE  
(c) IgG > IgM > IgA > IgD (d) IgG > IgM > IgE > IgA
25. On which cell the CD40 ligand is seen ?  
(a) B cells (b) Cytotoxic T cells  
(c) Helper T cells (d) Natural Killer cells
26. Which among the following inhibit viral replication within the cells ?  
(a) IL-2 (b) IL-3  
(c) IFN  $\alpha$  (d) Both a and b
27. What do the MHC class III molecules encode ?  
(a) All the complement components (b) Tumor necrosis factor  
(c) IL-2 (d) None of the above
28. DNA vaccines  
(a) may have distinct advantages when preparing subunit vaccines against viruses which frequently alter their antigens.  
(b) are only effective if followed by a protein boost.  
(c) must be administered on gold particles if they are to be effective.  
(d) None of the above
29. Which one of the following is NOT related to immediate hypersensitivity reactions ?  
(a) Mast cell degranulation results in histamine-mediated allergic reaction.  
(b) Reaginic antibodies trigger allergic reactions.  
(c) Granulomatous reaction is a key to contain infection.  
(d) Anaphylactic reaction is triggered primarily by IgE.



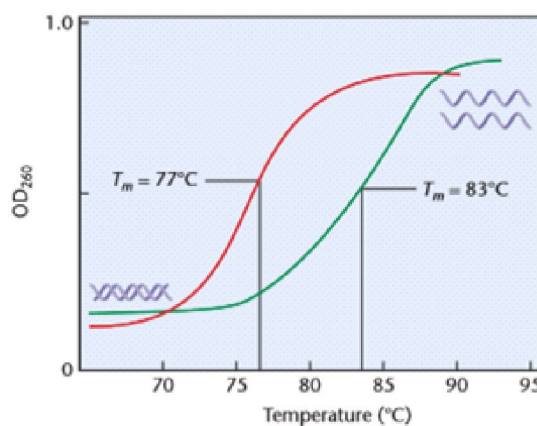
30. Number of ATPs required to synthesize one molecule of glucose through  $C_4$  pathway  
(a) 18 (b) 30 (c) 12 (d) 20
31. Chief source of nitrogen for green plants are  
(a)  $N_2$  (gas)  
(b)  $NO_3^{2-}$   
(c)  $NH_4^-$  salts  
(d) Low molecular weight - organic nitrogenous compounds
32. The number of electrons involved in the reduction of nitrate to ammonia is  
(a) 8 (b) 6 (c) 10 (d) 4
33. Which of the following is not correctly matched  
(a) Carpel - Stigma, style and ovary  
(b) Perianth - Petals and corolla  
(c) Microsporocyte - Vegetative cell & generative cell  
(d) Megasporeocyte - Epidermal cell, cortex & mesophyll cell
34. Cryptochrome is the pigment that absorbs  
(a) Green light (b) Yellow light  
(c) Blue light (d) Red light
35. In photosynthesis, the light energy is used to  
(a) generate low energy electrons (b) produce ATP and NADPH  
(c) generate chlorophyll (d) form water from oxygen
36. Which period is dubbed as the age of prokaryotic microbes?  
(a) precambrian (b) phanerozoic  
(c) archean (d) proterozoic.
37. Which of the following is the direct ancestor of Homo sapiens?  
(a) Australopithecus (b) H. sapiens neanderthals  
(c) Homoerectus (d) Homosapiens fossilis.
38. The correct sequence for the manufacture of molecules/organic compounds on the primitive earth is  
(a)  $NH_3$ , nucleic acid, protein and carbohydrate (b) Protein, carbohydrate, water and nucleic acid  
(c)  $NH_3$ , protein, carbohydrate and nucleic acid (d)  $NH_3$ , water, nucleic acid and protein.
39. Which one of the following is categorized under living fossils?  
(a) Pinus (b) Cycas  
(c) Selaginella (d) Metasequoia
40. In which era reptiles were dominant?  
(a) coenozoic era (b) mesozoic era  
(c) palaeozoic era (d) archaeozoic era.
41. Proximate causes  
(a) explain the evolutionary significance of a behaviour  
(b) are immediate cause of behaviour such as environmental stimuli  
(c) indicate that much of the animal behaviour is innate  
(d) are endogenous, although they may be set by oxogenous cues



42. The behaviour in which one animal is aggressive or attacks another animal, the other respond by returning the aggression or submitting is called.
- (a) Agnostic (b) Territory  
(c) Hierarchy (d) Altruism
43. Saving the life of your \_\_\_\_\_ would do the least for increasing your inclusive fitness.
- (a) Father (b) Brother-in-law  
(c) Son (d) Cousin
44. A young animal develops an attraction towards an object or animals is called
- (a) Learning (b) Maturation  
(c) Imprinting (d) Social behaviour
45. An altruistic behaviour which spreads by kin selection \_\_\_\_\_ the organism's personal fitness, it increase what Hamilton called the organism's \_\_\_\_\_ fitness.
- (a) increase, inclusive (b) reduce, inclusive  
(c) increase, reproductive (d) reduce, reproductive

### PART-C

46. In the Meselson–Stahl Experiment  $^{15}\text{N}$  labelled *E. coli* cells were transferred to a medium containing only  $^{14}\text{NH}_4\text{Cl}$ . Considering the the time of transfer to the new medium ( $^{14}\text{NH}_4\text{Cl}$ ) as  $t = 0$  and the *E. coli* cells were allowed to replicate over several generations. After two generation cell samples were removed and isolated DNA was subjected to sedimentation equilibrium centrifugation. Which of the following is true for the isolated DNA?
- (a) only a single band of intermediate density DNA ( $^{15}\text{N}/^{14}\text{N}$ )  
(b) two density bands of DNA - one intermediate band ( $^{15}\text{N}/^{14}\text{N}$ ) and one lighter band ( $^{14}\text{N}/^{14}\text{N}$ ) of equal proportion.  
(c) two density bands of DNA but the proportion of the lighter band ( $^{14}\text{N}/^{14}\text{N}$ ) is more.  
(d) two density bands of DNA but the proportion of the lighter band ( $^{15}\text{N}/^{15}\text{N}$ ) is more.
47. Given is the melting profile of two DNA.



A melting profile shows the increase in UV absorption versus temperature for two DNA molecules, one having a melting point ( $T_m$ ) of  $83^\circ\text{C}$  and another with a melting point ( $T_m$ )  $77^\circ\text{C}$ . Which of the following statement are true for the above melting profile.



- A) The curve with ( $T_m$ ) of  $83^\circ\text{C}$  has higher G, C content.  
 B) The curve with ( $T_m$ ) of  $77^\circ\text{C}$  has higher G, C content.  
 C) The Molecule with ( $T_m$ ) of  $77^\circ\text{C}$  is more stable than the molecule of  $T_m$  of  $83^\circ\text{C}$ .  
 D) The Molecule with ( $T_m$ ) of  $83^\circ\text{C}$  is more stable than the molecule of  $T_m$  of  $77^\circ\text{C}$ .  
 (a) A and B                      (b) B and C                      (c) C and D                      (d) A and D
48. Attenuation that is associated with gene regulation of trp operon characterised by  
 (a) Immature termination of translation                      (b) Immature termination of transcription  
 (c) Termination of replication                      (d) Ribosome fails to read transcript
49. Puromycin is an antibiotic used to inhibit protein synthesis, causing premature chain termination during translation. Given below are few statements about the antibiotic.  
 A) It enters the E-site of the ribosome where it prevents the release of deacetylated tRNA after the action of peptidyl transferase.  
 B) Puromycin resembles the initiator tRNA, f-met -tRNA and binds exclusively to the P-site.  
 C) It resembles the 3' end of the aminoacyl tRNA and binds to the A-site of the ribosome.  
 D) Puromycin inhibits both prokaryotic and eukaryotic protein synthesis.  
 E) Puromycin inhibits only prokaryotic protein synthesis.  
 Which of the above statement(s) is/are true?  
 (a) A and F only                      (b) B only                      (c) C and D only                      (d) C and E
50. There are various subclasses of antibodies found in body fluids and body secretions. Many different functions may be attributed to these subclasses. Given below in column I is a major functions of different subclasses and column II consists of the name of the subclass.

Column - I		Column - II	
A	Binds to macrophages by Fe	(i)	IgA
B.	Binds to mast cells and basophils	(ii)	IgD
C.	First B cell receptor	(iii)	IgE
D.	No major specific function known other than antigen binding	(iv)	IgG
E.	Protector of mucous membrane	(v)	IgM

Select the correct combination.

- (a) A – (i), B – (ii), C – (iii), D – (iv), E – (v)                      (b) A – (ii), B – (iii), C – (iv), D – (v), E – (i)  
 (c) A – (iii), B – (iv), C – (v), D – (i), E – (ii)                      (d) A – (iv), B – (iii), C – (v), D – (ii), E – (i)
51. Which process is responsible for one person to produce over a million different antibody molecules that do not possibly require over a million different genes ?  
 (a) Alternative splicing of exons after transcription  
 (b) Increased rate of DNA mutation.  
 (c) DNA rearrangements followed by alternative splicing of the transcripts.  
 (d) Crossing over in the thymus cells.





52. What is the main advantage of passive immunization over active immunization ?
- (a) Provides antibody more rapidly. (b) Antibody persists for a longer period.  
(c) Contains primarily IgM (d) Can be administered orally.
53. What could be the oligomeric status of the protein if the IgG was fractionated by size exclusion chromatography and it was observed to have a molecular mass of 150 kDa and the SDS-PAGE analysis under reducing conditions revealed two bands of size 50 kDa and 25 kDa ?
- (a) 3 polypeptide chains of molecular mass 50 kDa each.  
(b) 2 polypeptide chains of molecular mass 75 kDa each.  
(c) 2 polypeptides of 50 kDa and two of 25 kDa.  
(d) None of the above
54. Which step in photosynthesis contributes the greatest number of protons to the generation of a concentration gradient across the thylakoid membrane.
- (a) The Q cycle (b) Reduction of  $\text{NADP}^+$  to NADPH  
(c) Oxidation of  $\text{H}_2\text{O}$  to  $\text{O}_2$  (d) None of the above
55. Both nitrogen and iron deficiency lead to yellowing of leaves. However, it is observed that after iron deficiency symptoms appear first in younger leaves, whereas nitrogen deficiency symptoms start appearing in older leaves. The possible reason for this difference may be that
- (a) Unlike older leaves, younger leaves require more iron than nitrogen  
(b) Unlike older leaves, younger leaves require more nitrogen than iron  
(c) Unlike nitrogen, iron is mobilized by plants from elder leaves to younger leaves  
(d) Unlike iron, nitrogen is mobilized by plants from older leaves to younger leaves
56. In an experiment conducted in the dark, isolated chloroplasts are kept in buffer (pH 4.0) at  $4^\circ\text{C}$  until their internal pH is equal to 4.0. Then, they are transferred to a buffer of pH 8.0, and ADP and  $\text{P}_i$  are added at the same time. Which of the following will happen?
- (a) Chloroplast 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

57. Match the term in List-I to List-II

**List-I**

- A) Association  
B) Imitation  
C) Innovation  
D) Imprinting

**List-II**

- 1) A dolphin learn the commands "throw ball" and retrieve ring  
2) A cat learn to come running into the kitchen when it hears the electric can opener  
3) When their mother was killed, ducklings on a farm learned to follow a tractor  
4) Young monkey's learning of alarm calls by their parents

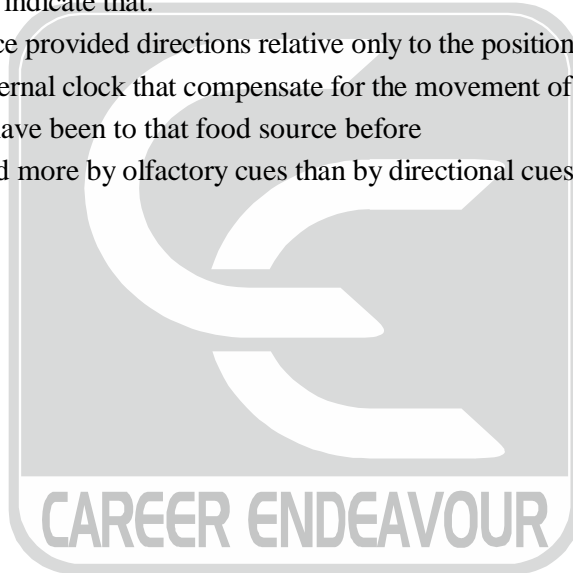
**Codes**

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





58. Consider the following statements.
- I) Reciprocal altruism help or sacrifice rapid later
  - II) Kin selection present when self sacrifice relatives leads to altruism
  - III) Courtship ritual minimizes agonistic behaviour before mating
  - IV) Cognition is the ability to store process and use sensory information
- Choose the correct statements.
- (a) I, II and IV
  - (b) II, III and IV
  - (c) I, III and IV
  - (d) I, II, III and IV
59. Male bighorn sheep fight each other to determine which male will mate with females. The fight by charging each other, rearing up and clashing their horns together. The male with the bigger set of horn usually wins from this description, you would expect male bighorn sheep to be affected by?
- (a) Sexual selection
  - (b) Adaptive radiations
  - (c) Ecological races
  - (d) Gradualism
60. The ability of honey bees to fly directly to a food source, after having to wait several hours from the time of the waggle dance, indicate that.
- (a) The waggle dance provided directions relative only to the position of hive
  - (b) Bees have an internal clock that compensate for the movement of the sun during the elapsed time
  - (c) The bees must have been to that food source before
  - (d) Bees are directed more by olfactory cues than by directional cues



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**Space for Rough Work**





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

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

Date : 27-05-2018

### [ANSWER KEY]

#### PART-A

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

#### PART-B

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

#### PART-C

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

