

TEST SERIES CSIR-NET/JRF JUNE 2018

BOOKLET SERIES **D**

FULL LENGTH TEST - I

Paper Code **03**

Test Type: **TEST SERIES**

LIFE SCIENCES

Duration: 3:00 Hours

Date: 06-06-2018

Maximum Marks: 200

Read the following instructions carefully:

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

Part - A: This part shall carry **15** 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 **25** 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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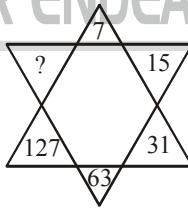


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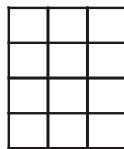


PART-A

1. The average age of 3 friends is 23. If the age of 4th friend is added, the average age remain 23. The age of 4th friend is
 (a) 22 years (b) 23 years (c) 24 years (d) None
2. I have to be at a certain place at certain time and I find that I shall be 15 minutes too late, if I walks at 4 km an hour, and 10 minutes too soon, if I walks at 6 km an hour. How far have I to walk?
 (a) 3 km (b) 5 km (c) 6 km (d) 8 km
3. The least number when increased by 8, is divisible by 32, 36 and 40 is
 (a) 1432 (b) 1434 (c) 1436 (d) 1438
4. The unit digit of $(16)^{2018}$ is
 (a) 2 (b) 4 (c) 6 (d) 8
5. The value of remainder when 9183254 is divided by 6 is
 (a) 2 (b) 3 (c) 4 (d) 5
6. Area of circle is equal to the area of a rectangle having perimeter of 50 cm and length is more than the breadth by 3 cm. Then diameter of the circle is
 (a) 7 cm (b) 21 cm (c) 28 cm (d) 14 cm
7. A boat travels up stream from P to Q and down stream from Q to P in 3 hours. If the speed of the boat in still water is 9 km/hr and the speed of the current is 3 km/hr, then the distance from P to Q is
 (a) 14 km (b) 8 km (c) 12 km (d) 6 km
8. A train running at the speed of 90 km/h crosses a 250 meter long and 10 meter wide bridge in 22 seconds. Then the length of train is
 (a) 280 m (b) 260 m (c) 300 m (d) 250 m
9. Amit walks 10 meters towards north and 10 meters to the right. Then every time turning to his left, he walks 5, 15 and 15 meters respectively. How far is he from his starting point?
 (a) 5 metres (b) 10 metres (c) 15 metres (d) 20 metres
10. The missing number is



- (a) 190 (b) 221 (c) 236 (d) 255
11. The number of rectangles in the following figure is



- (a) 56 (b) 60 (c) 44 (d) 64



12. Out of four friends A, B, C and D
A and B play football and cricket
B and C play cricket and hockey
A and D play basket ball and football
C and D play hockey and basket ball
Then the friend who does not play hockey is
(a) D (b) C (c) B (d) A
13. Four children are sitting in a row. A is occupying the seat next to B but not next to C. If C is not sitting next to D, who is occupying seat adjacent to D
(a) B (b) A (c) Impossible to tell (d) C
14. Two dice are rolled, then the probability that the sum of the numbers obtained is 4, is
(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) $\frac{1}{12}$ (d) $\frac{3}{12}$
15. Plants receive their nutrients mainly from
(a) chlorophyll (b) atmosphere (c) light (d) soil

PART-B

16. Proteasomes are
(a) proteomes of lysosomes
(b) protein complexes which recognize and degrade ubiquitinated proteins
(c) protein and cholesterol complexes which help in cholesterol transport
(d) protein and RNA complexes which are involved in mRNA splicing
17. An amino acid has a non-ionizable R group. The pK_a 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 $H_3N^+-\overset{\overset{R}{|}}{C}-COO^-$
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
18. In an experiment involving mapping of 3 genes (a, b and c) in *Drosophila*, a three point test cross is carried out. The parental cross was AABbCC \times aabbcc. The genotypes of the double crossovers are: Aabbcc and aaBbCc. Based on this, determine the order of the genes.
(a) acb (b) cab (c) abc (d) bac
19. A woman is normal vision but has colour blind father marries to a normal vision male. What are the chances that their daughter would have colour blind vision?
(a) 100 % (b) 50% (c) 25% (d) 0%



20. Which of the following is true about the X-linked disorder?
- An affected father always transferred to his son.
 - An affected father always transferred to his daughter and to his grand son.
 - An affected mother only transferred to her daughter.
 - Transfer of the trait is independent to the sex of the parents.
21. Which of the following is the correct order of protein assembly at bacterial replication origin?
- DNA A, DNA B, primase, polymerase
 - DNA B, DNA A, primase, polymerase
 - DNA A, primase, DNA B, polymerase
 - DNA B, primase, DNA A, polymerase
22. σ (sigma) subunit of E. coli RNA polymerase is needed only for initiation of transcription in Bacteria. Which of the following eukaryotic protein has similar function to sigma factor (σ factor)
- TFIIB
 - TFIIA
 - TFIIG
 - TFIIE
23. What is the other name of Meroblastic cleavage ?
- Partial/parietal cleavage
 - Curved cleavage
 - Vertical cleavage
 - Spiral cleavage
24. Double fertilization is characteristic of
- pollen grains
 - angiosperms
 - monocots
 - divots
25. Engrailed expression in *Drosophila melanogaster* defines
- anterior margined of the segment.
 - anterior compartment of each segment.
 - posterior margin of each paarasegment.
 - posterior compartment of each segment.
26. The membrane lipid molecules assemble spontaneously into bilayers when placed in water and form a closed spherical structure known as
- Lysosome
 - Peroxisome
 - Liposome
 - Endosome
27. A nerve impulse or action potential is generated from transient changes in the permeability of the axon membrane to Na^+ and K^+ ions. The depolarization of the membrane beyond the threshold level leads to Na^+ flowing into the cell and a change in membrane potential to a positive value. The K^+ channel then opens allowing K^+ to flow outwards ultimately restoring membrane potential to the resting value. The Na^+ and K^+ channels operate opposite directions because
- there is an electrochemical gradient growth generated by proton transport
 - there is a difference in Na^+ and K^+ concentrations on either side of the membrane
 - Na^+ is a voltage-gated channel, whereas K^+ is ligand gated
 - Na^+ is dependent on ATP whereas K^+ is not
28. Cancer causing genes can be functionally classified into mainly three types
- genes that induce cellular proliferation
 - tumor suppressor genes
 - genes that regulate apoptotic pathway
- Epstein-Barr virus that causes cancer by modulating apoptotic pathway, contains a gene having sequence homology with which of the following genes?
- Bax
 - Bcl-2
 - p53
 - Caspase-3



29. Which of the cyclins have/has essential functions in S-phase of cell cycle?
(a) A-type (b) B-type (c) D-type (d) Both B- and D-type
30. Phosphatidyl serine, an important component of biological membrane, is located in
(a) the outer leaflet but flip flops to inner leaflet under specific conditions
(b) both the leaflets
(c) the middle of the bilayer
(d) the inner leaflet but flip flops to outer leaflet under specific conditions
31. What is the principal difference between cytotoxic (type II) and immune complex (type III) hypersensitivity?
(a) Participation of B cells (b) Participation of T cells
(c) Site of antigen antibody complex formation (d) Both a and b
32. Tc cells can recognize
(a) MHC I molecules (b) MHC II molecules
(c) both MHC I and II molecules (d) cannot recognize any of the cells
33. _____ and _____ regulate homeostasis.
(a) Hepatic, endocrine systems (b) Cardiovascular, nervous systems
(c) Nervous, digestive systems (d) Nervous, endocrine systems
34. During the middle of the ovarian cycle the surge in LH occurs that trigger the
(a) ovulation. (b) uterine lining secretion indirectly menstruation.
(c) FSH uptake. (d) uterine lining secretion directly.
35. Progesterone is produced by _____ within the ovary.
(a) primary follicles (b) secondary follicles
(c) tertiary follicles (d) corpus luteum
36. In a species population, stabilizing selection acts to
(a) allow directional change. (b) elaborate new trails
(c) alter trail. (d) maintain a certain phenotype
37. _____ was one of the striking examples of natural selection.
(a) Wing of bird (b) Wing of bat
(c) Color of peppered moth (d) White eye of *Drosophila*
38. Female greylag geese will retrieve an egg that has rolled just outside her nest. This is an example of?
(a) FAP (b) Imprinting
(c) Habituation (d) MAP
39. The first assumption of the optimal foraging theory is
(a) Optimal foraging results from natural selection
(b) Natural selection will only favour behaviour that maximizes energy return
(c) Natural selection selects foraging behaviour that maximizes the size of prey sought
(d) Optimal foraging is genetically determined
40. 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

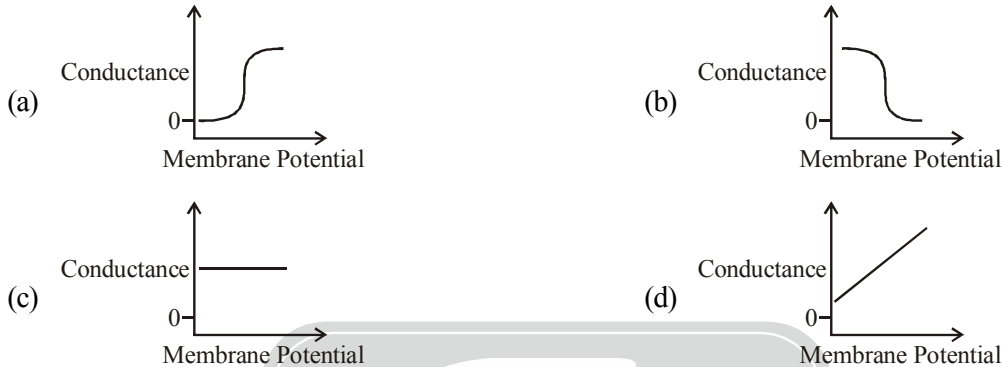


41. The ovary is half inferior in flowers of
(a) Guava (b) Peach (c) Cucumber (d) Cotton
42. Which kind of symmetry occurs in sea anemone.
(a) Bilateral (b) Radial (c) Asymmetry (d) None of these
43. A cell with osmotic potential -2.5MPa and pressure potential 0.5MPa is placed in a solution with osmotic potential -1.4MPa and pressure potential 0.4MPa . In which direction will water move?
(a) From solution to cell
(b) From cell to solution
(c) Would not move in any direction
(d) Would first move from cell to solution and after that from the solution to the cells
44. Na^+ – glucose transport is an example of
(a) Symport (b) Antiport
(c) Facilitated transport (d) ATP driven active transport
45. How does DCMU, a herbicide, acts to control weeds ?
(a) It blocks photosynthesis by competing for the binding site of plastoquinones.
(b) It accepts electrons from P 700
(c) It accepts electrons from P680
(d) It damages chlorophyll a
46. Which of the following is correct with respect to vectors ?
(a) Substitution vectors have an essential proton removed and replaced with the DNA to be cloned.
(b) Substitution vectors include cleavage in middle of stuffer fragment DNA to be cloned is inserted.
(c) Stuffer fragment is inserted into insertion vectors.
(d) Stuffer fragment is not inserted into replacement vectors.
47. Taq DNA polymerase differs from the klenow fragment in having
(a) $5' \rightarrow 3'$ polymerase (b) $5' \rightarrow 3'$ exonuclease activity
(c) $3' \rightarrow 5'$ exonuclease activity (d) Endonuclease activity
48. In an animal, setting a direction of movement based on some memory or map is known as
(a) orientation (b) Navigation (c) Mapping (d) Voyage
49. During exponential growth, the population
(a) Grows at a rate of 100 births per year
(b) Reaches its carrying capacity at a higher rate.
(c) Grows at its maximum per capita rate
(d) Exceeds its carrying capacity.
50. Change in population density is given by
(a) $(\text{natality} + \text{emigration}) + (\text{mortality} - \text{emigration})$
(b) $(\text{mortality} + \text{immigration}) - (\text{natality} + \text{emigration})$
(c) $(\text{natality} + \text{mortality}) - (\text{immigration} - \text{emigration})$
(d) $(\text{natality} - \text{mortality}) + (\text{immigration} - \text{emigration})$



PART-C

51. Which one of the following schematics CORRECTLY depicts the variation of conductance as a function of membrane potential for the voltage-gated K^+ -channel?



52. Mitochondria were isolated and permeabilized with a detergent. They were incubated with succinate, ADP and P_i in the presence of O_2 . ATP synthesis and O_2 consumption were measured. Which one of the following statements is *true*?
- (a) ATP synthesis will occur but O_2 consumption will not occur
 (b) O_2 consumption will occur but ATP synthesis will not occur
 (c) both O_2 consumption and ATP synthesis will occur
 (d) both O_2 synthesis and ATP synthesis will not occur
53. A three point test cross was carried out in *Drosophila melanogaster* involving three adjacent genes X, Y and Z, arranged in the same order. The distance between X to Y is 10 map unit (mu) and that between X to Z is 25 map. The coefficient of coincidence = 0.88. What is the percentage of double recombinants in the progeny obtained from the testcross?
- (a) ~2% (b) ~4% (c) ~6% (d) ~8%
54. A black mouse is homozygous for the dominant alleles (AABB) is crossed with a yellow mouse that is homozygous recessive for the alleles (aabb). On intercrossing the F₁, the F₂ progeny was obtained in the following ratio: 9 black: 3 brown: 4 yellow. The progeny from the cross AaBa X aabb are in the ratio
- (a) 1 Black : 2 Brown : 2 yellow (b) 1 Black : 2 yellow: 1 Brown
 (c) 1 Brown : 1 Brown (d) 1 Black : 1 yellow: 1 Brown
55. Mutants of lac Y (Y^-) gene of *E. coli* do not synthesize the lactose permease protein. The following statements refer to the behaviour of lac Y^- mutants under different experimental conditions. Following are the statement about Y^- mutants
- A) No synthesis of β - galactosidase when Y^- cells are induced with lactose.
 B) Synthesis of β - galactosidase when cells are induced with lactose.
 C) Synthesis of β - galactosidase to the addition of lactose, but no permease activity.
 D) No synthesis of β - galactosidase when cells are induced with IPTG.
- Which of the statements are Incorrect about the Y^- mutants?
- (a) A and B (b) B and C only (c) A and D (d) only A



56. Bacterial lac operon is an inducible system. what will be the phenotype of an E. coli strain having a genotype $I^{-}O^{+}Z^{-}Y^{+}/F' I^{+}O^{c}Z^{+}Y^{-}$?
- Constitutive for both β -galactosidase and lac permease.
 - Inducible for both β -galactosidase and lac permease.
 - Inducible for β -galactosidase and constitutive for lac permease.
 - Constitutive for β -galactosidase and inducible for lac permease
57. Which of the following statement is true about zebrafish gastrulation?
- The posterior portion of the embryonic shield establishes the primary dorsal-ventral axis in the zebrafish.
 - The *nieuwkoop* Center is established when the cortical rotation of yolk cytoplasm occurs immediately after fertilization.
 - Active cell movement of blastoderm cell over the yolk mass surface is referred to as epiboly and is part of gastrulation.
 - The first cleavage division of a fertilized zebrafish egg completely cleaves the egg and establishing a blastopore lip.
58. The ABC model for floral identity in *Arabidopsis* reminiscent of the models for homeotic gene function was derived from studies in *Drosophila*, because
- homeobox genes in both the organisms specify the identity of regions of the mature organism.
 - the homeotic genes in both organisms is patterning of dorso-ventral asymmetry.
 - one homeotic gene is expressed at the two ends, a second expressed in to domains more central to that of the first, thus contributing unambiguous identities to all regions of the organism in both organisms.
 - in both organisms, the homeotic genes interact, so that it is often the combination of genes present that is critical in unambiguously specifying structures in the adult.
59. In a tissue, cells are bound together by physical attachment between cell to cell or between cell to extracellular matrix. Following are some of the characteristics of cell junctions:
- Adherens junctions are cell-cell anchoring junctions connecting actin filament in one cell with that in the next cell
 - Desmosomes are cell-matrix anchoring junctions connecting actin filament in one cell to extracellular matrix.
 - Gap junctions are channel forming junctions allowing passage of small water soluble molecules from cell to cell
 - Tight junction are occluding junctions, which seal gap between two cells
 - Hemidesmosomes are cell-matrix anchoring junctions connecting intermediate filament in one cell to extracellular matrix.

Which of the following combination of statements is not correct?

- (a) 1 and 2 (b) 1 and 3 (c) 3 and 4 (d) 4 and 5
60. EcoRI restriction sites on a 10kb DNA fragment are shown below:

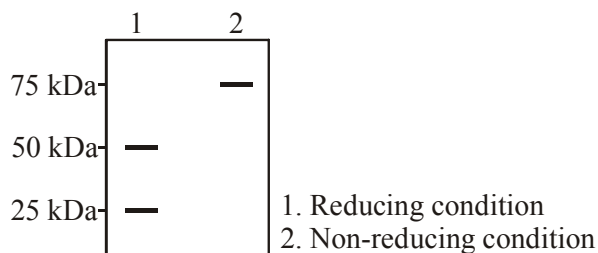


Upon partial digestion, what are the lengths (in kb) of all the possible DNA fragments obtained?

- (a) 2, 3, 4, 5, 6, 7, 8 and 10 (b) 2, 3, 4, 5, 6, and 7
 (c) 2, 3, 4 and 7 (d) 2 and 3

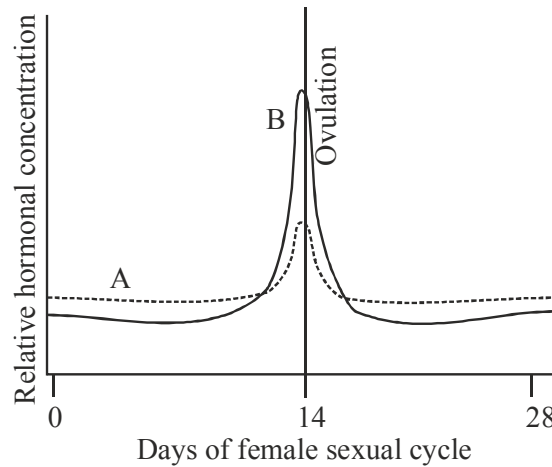


61. A purified oligomeric protein was analyzed by SDS-PAGE under reducing and non-reducing conditions. A one litre solution of 1 mg/ml concentration has 4.01×10^{18} molecules of the oligomeric protein. Based on the data shown below, deduce the total number of polypeptide chains that constitute this protein.



- (a) 2 (b) 4 (c) 6 (d) 12
62. The fluidity of a phospholipid membrane increases when the fatty acid
- chain length increases and degree of unsaturation decreases
 - chain length decreases and degree of unsaturation increases
 - chain length decreases and degree of unsaturation decreases
 - chain length increases and degree of unsaturation increases
63. Which one of the following sequence is appropriate for testing a patient for antibody against the AIDS virus with the ELISA procedure ?
- Patient's serum/Enzyme substrate/HIV antigen/Enzyme labelled antibody against HIV.
 - HIV antigen/Patient's serum/Enzyme labelled antibody against human gamma globulin/Enzyme substrate.
 - Enzyme labelled antibody against human gamma globulin/Patient's serum/HIV antigen/Enzyme substrate.
 - None of the above
64. Which among the following is the correct order of Clonal Selection Theory ?
- Lymphocyte development and differentiation, presentation of antigens, challenge of B and T lymphocytes, T-lymphocyte response and the production and activities of antibodies by B lymphocytes.
 - Challenge of B and T lymphocytes, lymphocyte development and differentiation, presentation of antigens, the production and activities of antibodies by lymphocytes and T-lymphocyte response.
 - Production and activities of antibodies by B lymphocytes lymphocyte development and differentiation, presentation of antigens, challenge of B and T lymphocytes and T-lymphocyte response
 - Challenge of B and T lymphocytes, presentation of antigens, the production and activities and differentiation and T-lymphocyte response.
65. By increasing the temperature of the human scrotum by 2°C (i.e., near the normal body core temperature) and holding it there would do what ?
- Have considerable effect on male reproductive processes.
 - Increases the fertility of the man by impairing the production of gonadal steroid hormones.
 - Decreases the man's sexual interest.
 - Reduce the fertility of the man by impairing spermatogenesis.

66. The graph represents relative plasma concentration of hormones (A and B) during reproductive cycle in a normal female. Which one of the following combinations is correct?



- (a) (A) is FSH and (B) is estrogen
(b) (A) is estrogen and (B) is LH
(c) (A) is FSH and (B) is LH
(d) (A) is LH and (B) is FSH
67. The primitive environment was created by Urey and Miller in the spark chamber and used hydrogen, ammonia, methane and water vapour to simulate the chemical origin of life. Which among the following was the surprising molecule they obtained after the experiment ?
- (a) Lipids
(b) Carbohydrates
(c) Proteins
(d) Amino acids
68. In the Hardy-Weinberg equilibrium, population with A and a alleles have a frequency of the allele a is 0.4. What would be the percentage of the population that is homozygous for this allele ?
- (a) 4%
(b) 16%
(c) 28%
(d) 32%
69. Which one of the following pairs of animals comprises 'jawless fishes'?
- (a) Guppies and hag fishes
(b) Lampreys and eels
(c) Mackerels and Rohu
(d) Lampreys and hag fishes
70. In plant roots, ions are taken up from the soil by active transport in some cells and passive transport in other. In which of the following cells are ions up actively?
- I. Root epidermis
II. Root cortex
III. Endodermis
IV. Xylem vessels.
- (a) I and II
(b) II and III
(c) III only
(d) I, II and III

71. T.W. Engelmann performed an experiment where he used a prism to disperse sunlight into its constituent lights. This rainbow was allowed to fall on a green algal filament. When a population of O_2 seeking bacteria was introduced into this system, which of the following would be observed ?
- The bacteria were seen to be collected in the region of red light as the filament absorbs red light and photosynthesises.
 - The bacteria were seen to be collected in the region of blue light as the filament reflects blue light, which drives photosynthesis.
 - The bacteria were seen to be collected in the region of green light as the filament absorbs green high end photosynthesises.
 - The bacteria died because of CO_2 production by the filaments
- (a) I only (b) II and III (c) III only (d) IV only
72. Why is subculturing of cells necessary ?
- Not enough space for cell growth
 - Accumulation of toxins
 - Not enough nutrients for cell growth.
- (a) I and II (b) II and III (c) III and I (d) I, II, III and IV
73. Match the following
- | | |
|-------------------------------|---|
| A. Electroencephalography | (i) Observing metabolic processes to diagnose diseases. |
| B. Magnetic resonance imaging | (ii) Sinusoidal brain waves |
| C. fMRI | (iii) Blood oxygen level dependent contrast |
| D. PET | (iv) Magnetic properties of hydrogen ion in body |
- (a) A → ii, B → iv, C → iii, D → i (b) A → i, B → iii, C → ii, D → iv
(c) A → ii, B → iii, C → iv, D → i (d) A → i, B → ii, C → iii, D → iv
74. Identify the pollinators for the flowers with following pollination syndromes
- Flowers dull coloured, located away from foliage, floral parts turgid.
 - Flowers bright red, crowded turgid, nectar watery and sucrose rich.
 - Flowers white with pleasant odor, corolla tube long, night blooming.
- (a) (i)-Bird, (ii)-Bat, (iii)-Butterfly (b) (i)-Bat, (ii)-Bird, (iii)-Moth
(c) (i)-Bat, (ii)-Bird, (iii)-Bee (d) (i)-Bird, (ii)-Bat, (iii)-Carrionfly
75. The Hawaiian honeycreeper is a nectar feeding bird which fails to defend flowers that are either infrequently encountered or are very abundant. Below are some reasons why it might do so.
- Infrequently encountered flowers have more cost for defending than the energy gain from it.
 - If flowers are abundant, then adding the cost of defending then is futile.
 - The birds fail to locate the small patches of flowers when they are infrequent.
 - The birds do not defend areas larger than 200 sqm.
- (a) I and II (b) II and III (c) III and IV (d) I, II and III



Space for Rough Work





**CSIR-UGC-NET/JRF LIFE SCIENCES
TEST SERIES-4
(Full Length Test - I)**

Date : 06-06-2018

[ANSWER KEY]

PART-A

- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (b) | 2. (b) | 3. (a) | 4. (c) | 5. (a) |
| 6. (d) | 7. (c) | 8. (c) | 9. (a) | 10. (d) |
| 11. (b) | 12. (d) | 13. (b) | 14. (c) | 15. (d) |

PART-B

- | | | | | |
|---------|---------|---------|---------|---------|
| 16. (b) | 17. (a) | 18. (d) | 19. (d) | 20. (b) |
| 21. (c) | 22. (a) | 23. (a) | 24. (b) | 25. (d) |
| 26. (c) | 27. (b) | 28. (b) | 29. (c) | 30. (d) |
| 31. (c) | 32. (a) | 33. (d) | 34. (a) | 35. (d) |
| 36. (d) | 37. (c) | 38. (a) | 39. (b) | 40. (b) |
| 41. (b) | 42. (b) | 43. (a) | 44. (b) | 45. (a) |
| 46. (d) | 47. (b) | 48. (b) | 49. (c) | 50. (d) |

PART-C

- | | | | | |
|---------|---------|---------|---------|---------|
| 51. (a) | 52. (d) | 53. (a) | 54. (b) | 55. (c) |
| 56. (c) | 57. (c) | 58. (d) | 59. (a) | 60. (a) |
| 61. (a) | 62. (b) | 63. (b) | 64. (a) | 65. (d) |
| 66. (a) | 67. (d) | 68. (b) | 69. (d) | 70. (d) |
| 71. (a) | 72. (d) | 73. (a) | 74. (b) | 75. (a) |

