TEST SERIES CSIR-NET/JRF DEC. 2018

BOOKLET SERIES C

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

LIFE SCIENCES

Duration: 2:00 Hours **Date: 02-12-2018**

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. On a cloth a shopkeeper gives 52% discount to Ram and to Hari he gives Successive discount of 30% and 30% respectively. The customer geting better discount is _____.
(a) Ram (b) Hari (c) both equal (d) can't be determined

2. Income Ratio of A, B,C, D are
A : B = 1 : 2
B : C = 2 : 3
C : D = 3 : 4
and difference of income of A and D is 3,000 Rs. What is the income of C.
(a) 3,000 Rs (b) 24,00 Rs (c) 36,00 Rs (d) 2,000 Rs

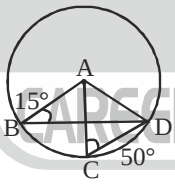
3. Rohan keeps 12,000 Rs in two banks in a certain Ratio. bank I gives 10 % interst where as bank II gives 30% interset. After one year Rohan gets 2400 Rs as interest. What was the amount in bank I.
(a) 6,000 Rs. (b) 4,000 Rs. (c) 8,000 Rs. (d) 9,000 Rs.

4. A right circular cone of height '*h*' is divided in two parts of equal height. What is the ratio of weight of lower part to the upper part ?
(a) 8 : 1 (b) 7 : 1 (c) 9 : 2 (d) 4 : 1

5. If $x+\frac{1}{x}=2$, then what is the value of $x^{13}+\frac{1}{x^{13}}$
(a) 0 (b) 1 (c) 2 (d) 13

6. What is the probability of being the sum of 9 from the throw of two unbiased dice
(a) $\frac{1}{4}$ (b) $\frac{1}{9}$ (c) $\frac{1}{12}$ (d) $\frac{1}{6}$

7. In the below figure, *A* is the centre of the circle and $\angle ACD = 50°$, and $\angle ABD = 15°$, then what is the value of $\angle BAC$?
(a) 100°
(b) 70°
(c) 80°
(d) 75°



8. Two cylinders have radius in the ratio 3 : 1 and heights in the ratio 1 : 3. Ratio of their volumes is -
(a) 1: 3 (b) 2: 1 (c) 3 : 1 (d) 1 : 4

9. Find the angle of elevation of the sun, if the shadow of a tower is $\sqrt{3}$ times the length of the tower.
(a) 60° (b) 30° (c) 45° (d) 0°

10. If in a certain code 'STUDENT' is coded 'TVXHJTA' , then what will be the code for 'TEACHER'
(a) UGHXYMK (b) UGDGYNK (c) UGDGMKY (d) SGDGMKY

PART-B

11. A fertilized egg is called a:
(a) germ cell (b) embryo (c) zygote (d) blastula

12. Which of the following reflects Weismann's model of development?
    (a) somatic development and change does not contribute directly to the characteristics of the next generation
    (b) factors, or "determinants", in the nucleus regulate development
    (c) development is "mosaic"
    (d) all of the above were important to Weismann's view of biological development
13. The experiments of Spemann and Mangold first defined what feature of amphibian embryos?
    (a) the zygote (b) the blastopore
    (c) the neural tube (d) the organizer
14. Genes control development by:
    (a) controlling where and when proteins are synthesized
    (b) containing small preformed body parts and organs that become "expressed" during development
    (c) directly controlling phenotypes, without intermediates or influence from the environment
    (d) acting as enzymes to build proteins
15. The folding of sheets of cells, the migration of cells, and cell death are all mechanisms of:
    (a) cleavage division (b) pattern formation
    (c) morphogenesis (d) differentiation
16. How much time drosophila embryo takes to hatch out and become 1st instar larvae?
    (a) one hour (b) three hours
    (c) one day (d) ten days
17. In Xenopus during gastrulation germ layer start moving inside the embryo through blastopore in contrast, in chickens, gastrulation involves cells moving inward through the:
    (a) blastoderm (b) yolk
    (c) cleavage furrow (d) primitive streak
18. In mammalian development, the embryo will form from which population of cells?
    (a) the blastocyst (b) the inner cell mass
    (c) the trophectoderm (d) the blastocoel
19. Identify the hormone secreted by the pituitary gland that causes the smooth muscle of the uterus to contract during parturition in mammals
    (a) Vasopressin (b) Oxytocin (c) Prolactin (d) Gonadotropins
20. Which of the following statements is FALSE for the nitric oxide gas?
    (a) An intracellular signaling molecule
    (b) Deamination of histidine results into nitric oxide production
    (c) Stimulates guanylyl cyclase to produce cGMP
    (d) Can be produced by activated neutrophils
21. A class of spermicides (used for contraception) inhibits the flagellar motion of the sperm thereby preventing it from swimming towards the egg. This is achieved by
    (a) inhibiting the motor protein dyneine (b) inhibiting the motor protein kinesin
    (c) disrupting the microfilaments (d) depolymerizing microtubules
22. The correct sequence for sperm migration after its production in testis is
    (a) Seminiferous tubule $\rightarrow$ epididymis $\rightarrow$ vas deferens $\rightarrow$ urethra
    (b) Urethra $\rightarrow$ vas deferens $\rightarrow$ epididymis $\rightarrow$ seminiferous tubule
    (c) Epididymis $\rightarrow$ vas deferens $\rightarrow$ urethra $\rightarrow$ seminiferous tubule
    (d) Seminiferous tubule $\rightarrow$ vas deferens $\rightarrow$ epididymis $\rightarrow$ urethra

23. What is the size of DNA region that is specifically recognized by the type II restriction enzymes?
(a) 2 to 4 base pairs. (b) 4 to 6 base pairs.
(c) 8 to 10 base pairs. (d) 40 to 60 base pairs.

24. Select the plasmid used by Cohen and Boyer for their transformation experiment.
(a) pBR322 (b) PUC 18
(c) PUC 17 (d) pSC 101

25. Name the vector that can maintain the largest fragment of foreign DNA.
(a) Bacterial Artificial Chromosome (BAC) (b) Yeast Artificial Chromosome (YAC)
(c) Cosmid (d) pUC 18

26. Select the type of restriction endonuclease that cuts the DNA within the recognition site.
(a) Type I (b) Type II
(c) Type III (d) All of the above

27. After four cycles in a PCR reaction, each molecule of a duplet DNA will give rise to
(a) 16 single strands of DNA (b) 16 double strands of DNA
(c) 18 single strands of DNA (d) 18 double strands of DNA

28. *Agrobacterium tumefaciens* is a
(a) Gram-negative soil bacterium causing crown gall disease in monocots.
(b) Gram-positive soil bacterium causing crown gall disease in both dicots and monocots.
(c) Gram-negative soil bacterium causing crown gall disease in dicots.
(d) Gram-positive soil bacterium causing crown gall disease in dicots.

29. The transfer of T-DNA and processing into plant genome requires the product of _____ genes.
(a) *vir* B, E (b) *vir* A, G (c) *vir* D, C (d) All of the above

30. Which one of the following is correct matching of a plant, its habit and the forest type where it normally occurs?
(a) Prosopis, tree, scrub (b) Saccharum, grass, forest
(c) Shorea robusta, herb, tropical rain forest (d) Acacia catechu, tree, coniferous forest

31. The Temperate Grassland or Shrub-Land Biome is commonly known as –
1. Steppe in Central Asia
2. Prairie in North America
3. Veld in South America
Choose the correct option:
(a) 1 and 2 (b) 1 and 3 (b) 2 and 3 (d) 1, 2 and 3

32. The 'Olive Ridley turtles' are considered to be endangered because of their few remaining nesting sites in the world. In this context, which among thefollowing Statement(s) is/are correct?
1. Their peculiar behaviour of synchronized nesting in mass numbers is known as 'Arribada'.
2. Gahirmatha Beach in Orissa is one of their few nesting grounds in the world.
(a) Only 1 (b) Only 2 (c) Both 1 and 2 (d) Neither 1 nor 2

33. The 'thickness' of Stratospheric Ozone layer is measured in/on:
(a) Sieverts (b) Dobson units (c) Melson units (d) Beaufort Scale

34. The largest number of Tiger Reserves are located in :
(a) Karnataka (b) Andhra Pradesh (c) Madhya Pradesh (d) West Bengal

35. Which of the following statements is true?
(a) Photochemical smog always contains Ozone.
(b) The toxic effect of Carbon Monoxide is due to its greater affinity for haemoglobin as compared to oxygen.
(c) Lead is the most hazardous metal pollutant of automobile exhaust.
(d) All the above

36. Which one of the following is a useful biological indicator of Sulphur-dioxide pollution ?
(a) Bryophytes (b) Algal blooms (c) Pseudomonas (d) Lichens

37. In Nitrogen Cycle, soil nitrates are transformed into free nitrogen by:
(a) Nitrifying bacteria (b) Denitrifying bacteria
(c) Ammonifying bacteria (d) Both (a) and (c)

38. Which of the following is not a characteristic of the fungi
(a) They are all absorptive heterotrophs
(b) They have a cell wall made of chitin
(c) Mitosis takes place with the nuclear membrane
(d) They are all motile

39. The unicellular green algae that undergo both sexual and asexual reproduction are
(a) chlamydomonas (b) selaginella (c) pinus (d) Dryopteris

40. A marine biologist dredged up a small animal from the bottom of the ocean. It was uniformly segmented, with short, stiff appendages and soft, flexible skin. It had a complete digestive system and a circulatory system but no skeleton. Based on this description, this animal sounds most like
(a) a Lancelet (b) a crustacean (c) a mollusc (d) an annelid

41. African sleeping sickness is due to
(a) Plasmodium vivax transmitted by Tsetse fly
(b) Trypanosoma lewsii transmitted by Bed Bug
(c) Trypanosoma gambiense transmitted by Glossina palpalis
(d) Entamoeba gingivalis spread by Housefly.

42. The level of taxonomic study concerned with biological aspects of taxa, including intraspecific populations, speciation, and evolutionary rates and trends.
(a) alfa taxonomy (b) Beta taxonomy (c) gamma taxonomy (d) theta taxonomy

43. An aquatic plant introduced from America to check pollution turned out to be a troublesome weed in Indian water bodies. The name of this 'invasive alien species' is :
(a) Opuntia (b) Aegilops (c) Eichhornia (d) Pistia Eichhornia

44. In which of the following food chains, the Pyramid of Numbers will be always inverted?
(a) Grassland Food chain (b) Ponds Food chain
(c) Forests Food (d) Parasitic food chain

45. The National Chambal (Gharial) Wildlife Sanctuary, which is one of the large eco-reserves of the country is co administered by which among the following states?
(a) Rajasthan & Uttar Pradesh (b) Rajasthan & Madhya Pradesh
(c) Madhya Pradesh & Uttar Pradesh (d) Rajasthan, Madhya Pradesh & Uttar Pradesh

PART-C

46. Match the following:

1) Isolecithal egg	A) Cephalochordata
2) Mesolecithal egg	B) Amphibians
3) Alecithal	C) Human
4) Centrolecithal	D) Insects

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

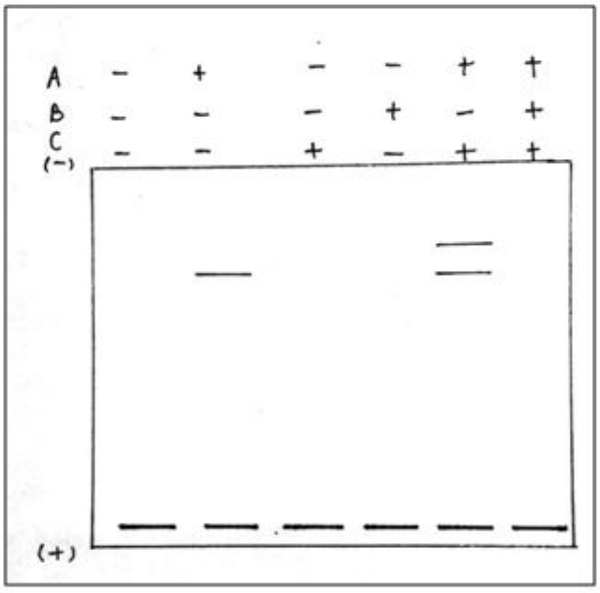
47. Nipah Virus outbreak has been reported lately in number of Indian states. Diagnosis of this pathogen can be done using some of the following techniques.

A) Western blot and Southern blot
B) Northern blot and western blot
C) ELISA and RT-PCR
D) PCR and electron microscopy

Choose the combination of techniques that correctly lists the detection methods.

(a) A and B only
(b) C and D only
(c) B and C only
(d) A and D only

48. Electrophoretic Mobility Shift Assay (EMSA), is a technique which is used to study protein-DNA interaction and for validating the DNA binding sites for transcription factors. While working with three proteins, A, B and C, a researcher used EMSA to validate the potential role of these proteins in gene expression. The purified proteins were allowed to bind to a labelled DNA and the results obtained after autoradiography are as follows:



Following conclusions were made

i) Protein A possesses DNA binding motif
ii) Protein C possesses DNA binding motif

iii) Protein C binds to the DNA-protein A complex

iv) Protein A, B and C form a complex and prevents nuclear localisation of A.

v) Presence of Protein B, causes nuclear localisation of protein A and C.

Choose the CORRECT combination of interpretations.

(a) (i) and (iii) only.
(b) (i), (iii) and (v) only.
(c) (i) and (iv) only.
(d) (i), (iii) and (iv) only.

49. The activation of zygotic hunchback expression by blond protein illustrates what principle in the establishment of positional information in embryos ?

(a) The mother can influence development through the parping of materials into the egg
(b) A gradient of a protein can activate a gene in a create region of an embryo through a threshold effect.
(c) The identity of segments in the embryo is a reflection of their position in the embryo
(d) A cascade of gene activations occurs in the syncitial blastoderm.

50. What are the lin-4 and lin-14 genes of C. elegans ?

(a) Lin-4 encodes a miRNA that represses lin-14 translation, which in turn regulates the timing of larval development
(b) Lin-4 and lin-14 are genes that are named for their contral of the first division and hence the underage of the AB and P1 cells.
(c) Lin-4 and lin-4 are C. elegans versions of the Hox genes.
(d) Lin-4 and lin-14 both encode mRNA that serve as cell-cell signalling molecules in C. elegans.

51. If the nerve supply to newt limb is served before amputation, how will this affect regeneration?

(a) It will have no effect, since regeneration involves growth of new muscle, bone and connective tissue
(b) Regeneration of most tissues will occur normally, but regeneration of the nerves will not occur
(c) Outgrowth will occur, but the identity of the limb will be lost and normal proximo-destal patterning will not occur.
(d) A blastema will form but will hot grow and regeneration will foil.

52. Choose the combination of statements that are correct for the cerebrum of the human brain

P. It is the largest part of brain
Q. Controls the pituitary hormone secretion
R. Involved in coordinating the movements of the body
S. Receives and processes the sensory information

(a) PQ (b) QR (c) PS (d) QS

53. Choose the correct match from A, B, C and D

Group I	**Group II**
P. Epinephrine	1. Uterine contractions
Q. Parathormone	2. Water resorption
R. Oxytocin	3. Ca^{2+} uptake
S. Luteinizing hormone	4. Glycogen breakdown
	5. Thyroid hormone synthesis
	6. Progesterone secretion

(a) P-1, Q-2, R-5, S-6
(b) P-5, Q-6, R-1, S-2
(c) P-5, Q-2, R-3, S-4
(d) P-4, Q-3, R-1, S-6

54. Match the diseases in **Group-I** with the corresponding hormones in **Group-II**.

Group-I	**Group-II**
P. Myxoedema	1. Excess secretion of T_3 and T_4
Q. Cushing's syndrome	2. Insufficient secretion of T_3 and T_4 in adults
R. Acromegaly	3. Growth hormone hypersecretion before complete ossification
S. Grave's disease	4. Glucocorticoid hypersecretion
	5. Growth hormone hypersecretion after complete ossification

(a) P-3, Q-2, R-1, S-5 (b) P-5, Q-3, R-2, S-4

(c) P-2, Q-4, R-5, S-1 (d) P-3, Q-1, R-4, S-2

55. Based on the dissociation constant K_d, the protein - ligand pair that has the strongest interaction is

(a) insulin and insulin receptor ($K_d = 1 \times 10^{-10}$)

(b) avidin and biotin ($K_d = 1 \times 10^{-15}$)

(c) HIV surface protein and anti-HIV IgG ($K_d = 4 \times 10^{-10}$)

(d) calmodulin and calcium ($K_d = 3 \times 10^{-6}$)

56. A batch of students studied the effect of changing either phospholipid composition or temperature on the transport of solutes across liposomal membranes. From these studies, the students arrived at the following conclusions:

P: Increase in the saturation of hydrogen chains led to an increase in the rate of diffusion of oxygen

Q: Decreasing the temperature to 5ºC led to a decrease in the rate of potassium transport by valinomycin (a carrier ionophore)

R: Increase in the hydrocarbon chain length did not have any effect on the transport mediated by gramicidin (a channel ionophore)

Which of these conclusion (s) is/are **NOT** correct?

(a) Only **R** (b) Only **Q** and **R** (c) Only **P** (d) Only **P** and **Q**

57. Plasmid pBR322 has been widely used in genetic engineering experiment having all of the following features except,

(a) Small overall size, which facilitates the plasmid entry into host cells.

(b) A number of conveniently located recognition sites for restriction enzymes.

(c) A number of palindromic sequences near the EcoRI site, which permit the plasmid to assume a confirmation that protects newly inserted DNA from nuclease degradation.

(d) Resistance to two different antibiotics, which permit a rapid screening for recombinant plasmids containing foreign DNA.

58. Why phage M13 vectors are widely used?

(a) For obtaining single stranded copies of cloned DNA suitable for DNA sequencing.

(b) For obtaining double stranded copies of cloned DNA suitable for DNA sequencing.

(c) For obtaining cloned DNA single stranded fragments for electrophoresis.

(d) For obtaining cloned DNA double stranded fragments for electrophoresis.

59. In an *in-vitro* DNA synthesizing mixture, what would result when the mixture contain the four ddNTPs and no dNTPs?

(a) It helps in the formation of phosphodiester bonds.

(b) All products would be one nucleotide longer than the primer.

(c) All products would have the same size as a primer.

(d) All products would have 2-3 nucleotides shorter than the primer.

60. In a gene cloning experiment, consider the following steps.

A. To produce a recombinant DNA molecule a fragment of DNA, containing the gene to be cloned, is inserted into a circular DNA molecule called a vector.

B. Vector multiplies within a host cell, producing numerous identical copies of itself and of the gene that it carries.

C. A colony or a clone is produced after a large number of cell divisions. Each cell in the clone contains one or more copies of the recombinant DNA molecule.

D. The vector transports the gene into a host cell, which is actually a bacterium, although other types of living cell can be used.

E. When the host cell divides, copies of the recombinant DNA molecule are passed to the progeny and further vector replication takes place.

In a gene cloning experiment, which of the following is correct sequence?

(a) A—B—C—D—E
(b) D—E—A—C—B
(c) E—D—A—C—B
(d) D—E—B—C—A

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[ANSWER KEY]

PART-A

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

PART-B

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

PART-C

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