TEST SERIES CSIR-NET/JRF JUNE 2018

BOOKLET SERIES E

FULL LENGTH TEST - II

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

LIFE SCIENCES

Duration: 3:00 Hours **Date: 10-06-2018**

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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PART-A

1. The missing number is

13	54	?
7	45	32
27	144	68

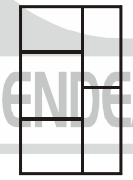
(a) 42 (b) 36 (c) 36 (d) 4

2. A 5m 10 mg car goes past a 10 m truck at rest on the road. If the speed of the car is 6 m/s. Then the time taken to go past is

(a) 2sec (b) $\frac{5}{2}$ sec (c) $\frac{2}{5}$ (d) 3 sec

3. Suppose
(1) $x = 2$
(2) then $x - 2 = x^2 - 2^2$ (as both sides are zero)
(3) therefore $(x-2) = (x-2)(x+2)$
Concelling $(x-2)$ from both sides
(4) $1 = x + 2$
(5) Then $x = -1$
which is the wrong step ?
(a) 1 to 2 (b) 2 to 3 (c) 3 to 4 (d) 4 to 5

4. Five congruent rectangles are drawn inside a big rectangle of perimeter 198 as shown.



What is the perimeter of ane of the rectangles ?
(a) 50 (b) 75 (c) 25 (d) 90

5. Starting from a point 'M' Hari walkedc 18 metres towards south. He turned to his left and walked 25 meters. He than turned to his left and walked 18 meters. He again turned to his left and walked 35 metres and reach a point 'p'. How for Hari is from the point M and in which direction ?
(a) 10 m east (b) 10 m west (c) 35 m west (d) 10 m south

6. Six friends are sitting in a circle facing the centre. Deepa is sitting between prakash and pankaj. Priti is between mukesh and Lalit. Prakash and Mukesh are opposite to each other. Then who is sitting oposite to priti ?
(a) Prakash (b) Deepa (b) Pankaj (d) Lalit

7. A condidate who scores 30% fails by 5 maksx, while another condidate who scores 40% makes gets 10 more than minimum pass marks. The mimimum marks required to pass are
(a) 50 (b) 70 (c) 100 (c) 30

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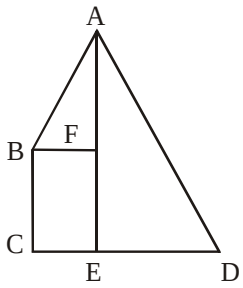
8. The radius of a wheel is 22.4 cm. What is the distance coverd by the wheel in making 500 resolutions is

(a) 252 m (b) 704 m (c) 352 m (d) 808 m

9. A plot ABCD is as shown in the figure, where AF = 30m, CE = 40 m, ED = 50 m, AE = 120 m Then the Area of plot ABCD is

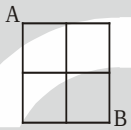


(a) 1800 m^2 (b) 2400 m^2 (c) 3600 m^2 (d) 7200 m^2

10. Two number are such that the ratio between themc is 3:5 but if each is increased by 10, the ratio between them be ciomes 5: 7, The numbers are

(a) 3, 5 (b) 7, 9 (c) 13, 22 (d) 15, 25

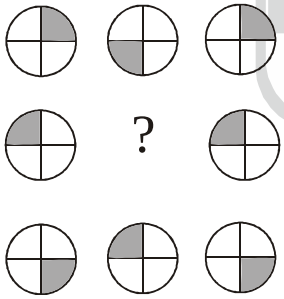
11. A person goes from A to B always moving to the right or downwards along the lines. How many different routes
can he adopt ?

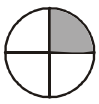
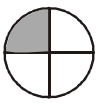
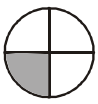
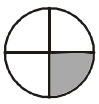


(a) 4 (b) 5 (c) 6 (d) 7

12. A student on her first 5 tests, receives on an average score of N points. In her sixth test she exceeds her previous average score by 24 points, then what is the average score for the first 6 tests ?

(a) N +20 (b) N + 10 (c) N + 4 (d) N + 5

13. 

(a)  (b)  (c)  (d) 

14. To completely pave a rectangular floor of size 4×5, we need *n* number of square tiles, then *n* is

(a) 4 (b) 20 (c) 10 (d) 5

15. Location of B is North of A and location of C is east of A. The distances AB and AC are 5 km and 12 km respectively. The shortest distance (in km) between B and C is

(a) 60 km (b) 13 km (c) 17 km (d) 7 km

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PART-B

16. Genetic cross was performed true bred lines of red colour and white colour flower plant. the F1 were selfed and obtained F2 of the phenotypic ratio 3:1. Which of the following is true about the cross?
    (a) Monohybrid cross (b) Dihybrid cross
    (c) Genetic epistasis (d) Genetic imprinting
17. The characteristic sequence 5' –G/ANNAUG -3' is found in mammalian mRNA which is three bases upstream from the AUG initiator codon? This called
    (a) Shine-Dalgarno sequence (b) Kozak sequence
    (c) Internal ribosome entry sites (d) Translation termination site
18. What does the trophoblast give rise to ?
    (a) Neurla (b) Placenta
    (c) Blastopore (d) Chorion
19. The primitive streak of a bird embryo is the functional equivalent of the _____ in a frog.
    (a) archenteron (b) blastopore
    (c) gastrula (d) blastocoels
20. Naked" DNA is.
    (a) Free from nucleic acid (b) Is free of the cell
    (c) Is free of protein (d) Contain just the sugar- phosphate backbone
21. The primary function of polysaccharides attached to glucoproteins in the animal cell membrane is to
    (a) facilitate diffusion of molecules down their concentration gradients
    (b) maintain membrane fluidity at low temperatures
    (c) maintain the integrity of a fluid mosaic membrane
    (d) mediate cell-to-cell recognition
22. On which of the following do the HIV respond ?
    (a) Cell cycle inhibitors (b) Reverse transcriptase inhibitors
    (c) Protein formation inhibitors (d) None of the above
23. On what basis does the SDS-PAGE separate proteins ?
    (a) Shape (b) Size
    (c) Isoelectric point (d) Number and the sequence of amino acids
24. What is the cell fusion called, in monoclonal antibody technology, in which the tumor cells can replicate endlessly when fused with mammalian cells that produce an antibody ?
    (a) Myeloma (b) Hybrid cells
    (c) Hybridoma (d) Lymphoblast
25. A patient comes to doctor suffering from leg trauma and excess inflammation, he needs the administration of
    (a) glucocorticoids (b) cortisol
    (c) mineralocorticoids (d) epinephrine
26. _____ synchronizes circadian rhythms and may be involved in onset of puberty.
    (a) Adrenalin (b) Thyroxin
    (c) Melatonin (d) Oxytocin

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27. Many homologous structures are found in pigs, frogs and snakes indicate that, these organisms orginated from a(n)
(a) phylogenies (b) common ancestors
(c) eveolutionary relations (d) hereditary characters

28. The origin and evolution of man started from ____ discovered up to present time according to fossils record.
(a) Africa (b) South America
(c) North America (d) Asia

29. The process in which the response to 'stimuli' decreases after being repetitive exposure to it, called
(a) Learning (b) Habituation
(c) Classical conditioning (d) Instrumental conditioning

30. Two plants can be conclusively said to belongs to the same species if they
(a) Can reproduce freely with each other and form seeds
(b) Have more than 90 percent similar genes
(c) Look similar and possess identical secondary metabolites
(d) Have same number of chromosomes

31. In sponge which of the following are responsible for maintaining the current of water
(a) Pinacocytes (b) Porocytes (c) Choanocytes (d) Amoebocytes

32. 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

33. Which of the following hormones stimulate ethylene release ?
(a) Auxin (b) Gibberelin (c) Cytokinin (d) Abscisic acid

34. Which property of lignin makes it an important adaption permitting plants to colonize dry land ?
(a) It is an important constituent of cuticle
(b) It is an important constituent of xylem and helps it to conduct water without it being collapsed.
(c) It provides toughness to the plant.
(d) It is indigestible to herbivores.

35. The enzyme which is used to prevent unwanted ligation of DNA molecules during cloning is:
(a) Horse radish peroxidase (b) Phosphate kinase
(c) Alkaline phosphatase (d) terminal phosphatase

36. Agrobacterium tumefaciens is a
(a) gram negative soil bacterium cousing crow gall disease in dicots
(b) gram negative soil bacterium causing crown gall disease in monocots
(c) gram negative soil bacterium causing crown gall disease in dicots
(d) gram negative soil bacterium causing crown gall disease in dicots

37. You constructed a genomic library of a bacterium that could help revert histidine auxotrophs to histidine prototrophs. could the same library be used to help revert orginine prototrophs ?
(a) yes, as it is a genomic library and includes all genes.
(b) yes, only if the mutation is recessive
(c) No, as we do not know all the proteins the bacterial genome encodes for.
(d) No, another genomic library would need to be prepared for orginine auxotrophs.

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38. A non-poisonous snake has red, black and yellow bands of color similar to that of a poisonous snake. What hind of mimicry is exhibited here ?
(a) Batesian mimicry (b) mullerian mimicry
(c) Wasmannian mimicry (d) None of the above

39. Which national park is famous for its great Indian one horned rhino ?
(a) Rajaji National Park (b) Jim Corbett National Park
(c) Barndipur National park (d) Kaziranga National Park

40. Cellulose, the structural polysaccharide of plant is a polymer of
(a) β -D-Glucose (b) β -D-Glucose
(c) β -D-Galactose (d) β -D-Galacturonic acid

41. Vitamin D is derived from which of the following precursor by the action of UV light ?
(a) 7-dehydrocholesterol (b) Lanosterol
(c) cholecalciferol (d) Squalene epoxide

42. Which amino acid has a non-polar and aliphatic R group ?
(a) Leucine (b) Tryptophan
(c) Glutamate (d) All of the above

43. What is the kind of linkage if the two dominant non-allelic genes are 50 map units apart ?
(a) Complete (b) Incomplete
(c) Cis type (d) Trans type

44. Protein that can span the lipid bilayer
(a) diffuse easily from the membrane
(b) usually has more hydrophilic regions
(c) usually has both hydrophobic acid hydrophilic regions
(d) Both a and c

45. All among the following statements are true about DNA pol I of *E.coli*, except
(a) it belongs to -family of DNA polymerase (b) it catalyzes translesion DNA synthesis
(c) it has exonuclease activity (d) it catalyzes error-prone replication

46. In a DNA replication, the telomerase RNA act as a/an
(a) primer (b) template
(c) enzyme (d) cofactor

47. The component of animal nervous system that provide the instruction for carrying out a particular fixed action pattern is called ?
(a) Sign stimulus (b) Stimulus / response chain
(c) Innate releasing mechanism (d) Supra chiasmatic nuclei

48. The process of mating of individuals which are more closely releated than the average of the population to which they belong is called ?
(a) Heterosis (b) Self breeding
(c) Inbreeding (d) Hybridization

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49. All are the typical events associated with cell signalling, except
(a) release of calcium ions from cell membranes
(b) stimulation of apoptosis
(c) activation of protein kinases
(d) All of these

50. Which hormone passes through the cell membrane, binds to its intracellular receptor and activate it, without the need of membrane bound receptor ?
(a) Estrogen (b) Thyroid
(c) Acetylcholine (d) Epinephrin

PART-C

51. An enzyme requires both aspartate (pKa of side chain = 4.5) and histidine (pKa of side chain = 6.5) residues in the catalytic site to be protonated for activity. The expected enzyme activity (in %) at a pH of 5.5 would be closest to
(a) 90 (b) 78 (c) 50 (d) 10

52. In two dimensional gel electrophoresis, the first step is to generate a series of protein bands by isoelectric focusing and in a second step, a strip of this gel is turned 90 degree, placed on another gel containing SDS and electric current is again applied. What happen in the second step?
(a) Based on the molecular weights, proteins with similar isoelectric points become further separated
(b) To visualize the isoelectric focus pattern, the individual bands become stained.
(c) In the second gel, the individual bands become visualized by interacting with protein-specific antibodies
(d) The proteins in the bands separate more completely because the second electric current is in the opposite polarity to the first current

53. Given the following are the statements about quantitative inheritance
A) Quantitative inheritance results in a range of measurable phenotypes of a polygenic trait.
B) Polygenic traits often demonstrate continuous variation.
C) Certain alleles of quantitative trait loci (QTL) have an additive effect on the character/trait.
D) Alleles governing quantitative traits do not segregate and assort independently.
Which of the above are CORRECT?
(a) A and B only (b) B and C only
(c) C and D only (d) A, B and C only

54. Haemophilia, is a recessive X-linked trait in human. A population has affected male in the frequency of 2 individuals per 100 males. What is the frequency of the homozygous female affected with haemophilia?
(a) 0.02 (b) 0.04 (c) 0.0004 (d) 0.98

55. Attenuation is a mechanism involved in the regulation of tryptophan operon in *E. coli*. When tryptophan levels are high in the cell, region 2 of the trpL is blocked from pairing with region 3. This allows the pairing of region 3 and 4 leading to the formation a rho-independent termination. Which of the following is true for the structure of trpL in the absence of tryptophan?
A) Ribosome get stalled near the region 1 and protein synthesis has been inhibited.
B) Region 2 pairs with region 3 and allows transcription of the structural genes.

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C) Region 1 and 2 will pair, allowing 3 and 4 to pair leading to attenuation.

D) Region 2 and 3 will pair leading to attenuation.

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

56. Following are the statements about the DNA and RNA polymerases.

A) Both required template DNA.

B) Bothe require primer to initiate synthesis of nucleic acid.

C) DNA pol require nucleoside triphosphates (NTPs) as substrates, but not for RNA pol.

D) Polymerization of nucleotides in 5´ to 3´ directions for DNA pol, but 3´ to 5´ in RNA pol.

Which of the above are true?

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

57. When enough protein is available, stopping mRNA from being continuously translated into protein is an important mechanism and this is accomplished by

(a) transcribing antisense RNA from ordinary inactive DNA; that will bind with sense mRNA and prevent the ribosome from further translating it.

(b) regulating those genes that produce repressor proteins that physically bind to mRNA and stop its activity in ribosomes.

(c) transcribing mRNA that contain stop units encoded in its sequence so that only a limit number of passes can be made through ribosomes.

(d) the protein products of mRNA translation that act as feedback repressors which limit the translation process

58. A stop codon has been created within a coding sequence, in case of 'non-sense' mutation those results in termination of translation because there is no corresponding tRNA to recognize them. However, tRNA molecules are themselves coded by genes, which are of course susceptible to mutation. Hence, it is possible to change an existing tRNA gene in such a way that it will recognize one of the stop codons rather than (or as well as) the codon it normally recognizes. What is such a phenomenon called in which the effect of a mutation can be negated by a second, unrelated mutation ?

(a) Back mutation (b) Complementation

(c) Suppression mutation (d) Epitasis

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59. For successful transfer of a foreign gene from the engineered Ti-plasmid to the plant genome, few cis-acting DNA elements and trans-acting protein factors are very much essential. Select the correct combination from the following.

(a) Opine catabolism genes, Left border sequence, Right border sequence

(b) Opine catabolism genes, Left border sequence, Virulence genes

(c) Hormone biosynthetic genes, Right border sequence, Virulence genes

(d) Left border sequence, Right border sequence, Virulence genes

60. p24 is an important core protein of HIV. This protein is abundant during active replication of the virus. The serum of and HIV patient was examined for the presence of p2f4 and antibody against p24 for proper diagnosis of the infection state. Match the clinical observations in column A with the inferences in column B.

Column A	Column B
A. p24-is present in the serum	a. Viral latency
B. Anti-p24 antibody is high in the serum	b. Progression of HIV from latency of lytic
C. Anti-p24 antibody begins to decline with corresponding increase in p24	c. Early stage of infection

(a) A-a, B-b, C-c
(b) A-b, B-a, C-c
(c) A-c, B-a, C-b
(d) A-c, B-b, C-c

61. siRNAs and miRNAs both are involved in achieving gene silencing although, major steps are similar but still there are distinct differences in the two processing pathways. Which among the following statements are related to some characteristic features of gene silencing ?

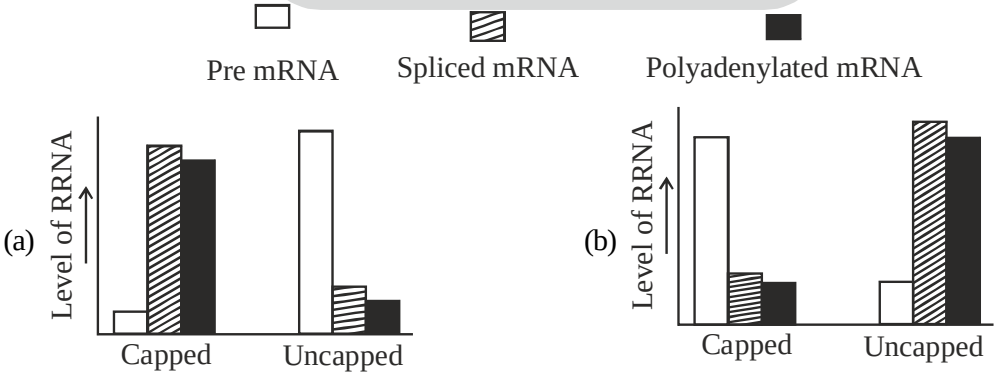
A. Both siRNAs and miRNAs are processed by cytoplasmic endonuclease Dicer.
B. 'Drosha' is needed for processing miRNAs and precursor siRNAs.
C. Both siRNAs and miRNAs show association with Argonaute protein.
D. Both the processing pathways involved RNA-induced silencing complex (RISC).

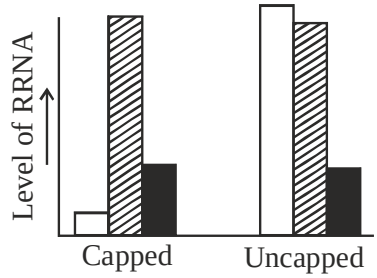
(a) A and B
(b) B and C
(c) C and D
(d) A and C

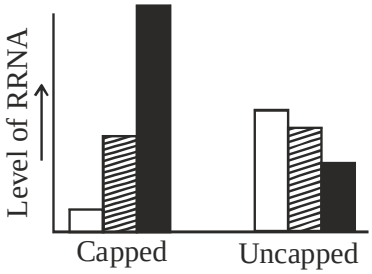
62. Both in gigantism and acromegaly there is enlargement of body but the major difference is that

(a) in gigantism and acromegaly the growth and skeleton is symmetrical.
(b) in gigantism the growth of body and skeleton is asymmetrical but not in acromegaly.
(c) in gigantism the growth of body and skeleton is symmetrical but not in acromegaly.
(d) gigantism is due to hypersecretion and acromegaly due to hyposecretion of STH.

63. While working with an *in vitro* eukaryotic transcription system, which produced both capped and uncapped mRNAs, you incubated these mRNAs with mammalian cell nuclear extract and then quantified the different products. Which of the following graphs correctly represents the expected result ?



(c) 

(d) 

64. In a random mating population in equilibrium, which one of the following brings about a change in gene frequency in a non-directional manner?

(a) mutations (b) random drift

(c) selection (d) migration

65. Age of fossils in the past was generally determined by radio-carbon method and other methods involve radioactive elements found in the rocks. More precise methods, which were used recently and led to the revision of the evolutionary periods for different groups of organisms, includes

(a) study of carbohydrates/proteins in fossils (b) study of the conditions of fossilization

(c) electron spin resonance (ESR) and fossil DNA (d) study of carbohydrates / proteins in rocks.

66. The most obvious difference between plant embryonic development and animal embryonic development is that

(a) plants develop from unfertilized eggs and animals develop from fertilized eggs.

(b) plant cells retain their relative potions after cell division, animal morphogenesis involves movement of cell within the embryo.

(c) plant embryos have an available source of nutrients, but animal embryos must begin feeding to obtain nuts.

(d) plant embryos produce their own nutrients through photosynthesis.

67. "Housekeeping genes" in bacteria are expressed constitutively, but not at the same level (the same number of molecules per cell). What is the primary mechanism responsible of variations in the level of constitutive enzymes from different genes ?

(a) All consitutive enzymes are synthesized at the same rate, but are not degraded equally.

(b) Their promoters have different affinities for RNA polymerase holoenzyme.

(c) Some constitutively expressed genes are more inducible than others.

(d) Some constitutively expressed genes are more repressible than others.

68. Consider the following given statements regarding Cot curves.

A. It requires melting and reannealing of DNA.

B. High Cot values indicate high repeat sequences.

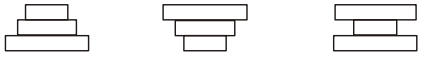
C. It is a sigmoidal curve.

D. It is a plot of concentration of DNA v/s time.

Which among the above given statements is not true regarding the Cot curve ?

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

69. Given below are age structures of three different population. Which of them depicts the population that is decreasing ?



I II III

(a) only I (b) Only II (c) Only III (d) Both I and II

70. Circular mRNAs, in eukaryotic cell, facilitates a rapid are of synthesis of that protein. Consider the following given mechanisms

A. Through 5'-3' intercalation of mRNA, eIF-4G and PABP promote this process.

B. Ribosomes are less active in recognizing circular mRNA.

C. PABP and eIF-4A promote this process.

D. Ribosomes can reinitiate translation without being disassembled.

Choose the correct statement.

(a) A and D (b) B and D

(c) A and C (d) B and C

71. Which among the following is an incorrect statements ?

(a) Like microtubules and actin filaments, intermediate filaments form polarized structures and their function depends on this polarity

(b) A single epithelial cell can make a variety of keratins, all of which copolymerize into a single keratin filament system

(c) Keratins and vimentin-related proteins do not co-polymerize with each other

(d) Both a and c

72. Which of the following step is not involved in indirect cell communication ?

(a) Release of a chemical messenger

(b) Transport of the chemical messenger through the extracellular environment to the target cell

(c) Communication of the signal to the target cell via receptor binding

(d) A chemical message diffuses though a gap junction causing a cellular response in the target cell

73. In which system, a sense organ senses the stimulus and sends a signal to the integrating center (e.g. the brain), which sends out a signal via a neuron to an endocrine gland, which further releases a hormone into the circulatory system, which carries the hormone to the target organs (e.g., heart, lungs and muscles) ?

(a) First order feedback loop (b) Second order feedback loop

(c) Direct feedback loop (d) Indirect feedback loop

74. Southern blotting involved

(a) DNA fragments separation by electrophoresis followed by hybridization with a labelled probe sequence and then transfer to a membrane

(b) DNA fragments transfer to a membrane followed by separation by electrophoresis and then hybridization with a labelled probe sequence

(c) DNA fragments separation by electrophoresis followed by transfer to a membrane and then hybridization with a labelled probe sequence

(d) DNA fragments hybridization with a labelled probe sequence followed by separation by electrophoresis and then transfer to a membrane

75. Two hybrid analysis used for detecting integrating gene products mainly depend on

(a) a promoter that responds directly to one of the two proteins whose interaction is being measured

(b) stimulation of transcription by interaction of two Gal4p domains *via* fused protein sequences

(c) binding of Gal4p domain to a DNA sequence

(d) All of the above

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[ANSWER KEY]

PART-A

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

PART-B

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

PART-C

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