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40 YEARS OF TEACHING EXCELLENCE
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PRABAL TEST PAPER

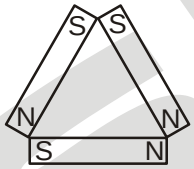
Time : 1 : 00 Hr. **Question : 50**

PHYSICS

01. The speed of electron in third orbit of Li^{++} ion is
(1) 2.2×10^6 ms^{-1} (2) 6.6×10^6 ms^{-1}
(3) 0.7×10^6 ms^{-1} (4) none of these

02. If in YDSE, the slit separation is 1.5 mm, the distance of screen from slits is 1m and wavelength of monochromatic light used is 0.6 μ then distance between second dark fringe and fourth bright fringe on same side is
(1) 0.4 mm (2) 0.8 mm
(3) 1.0 mm (4) none of these

03. Three identical bar magnets each of magnetic moment M are placed in the form of an equilateral triangle as shown.

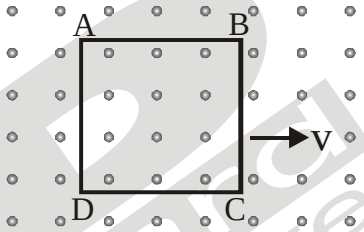


The net magnetic moment of the system is
(1) Zero (2) 2 M (3) M $\sqrt{3}$ (4) $\frac{3M}{2}$

04. **Assertion:** The poles of magnet cannot be separated by breaking into two pieces.
Reason: The magnetic moment will be reduced to half when a magnet is broken into two equal pieces.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If assertion is true but reason is false.
(4) If assertion and reason both are false.

05. Two circuits have coefficient of mutual induction of 0.09 henry. Average e.m.f. induced in the secondary by a change of current from 0 to 20 ampere in 0.006 second in the primary will be
(1) 120 V (2) 80 V (3) 200 V (4) 300 V

06. A metallic square loop ABCD is moving in its own plane with velocity v in a uniform magnetic field perpendicular to its plane as shown in the figure. Choose correct alternative



(1) A and B are equipotential
(2) D and C are equipotential
(3) B and D are equipotential
(4) Both (1) and (2) are correct

07. The potential energy of a particle varies with distance y as $U = \frac{Py^{\frac{1}{2}}}{Q + y^2}$, where P and Q are constants. The dimensional formula for $\frac{P}{Q}$ is

(1) $\left[ML^{\frac{3}{2}}T^{-2}\right]$ (2) $\left[ML^{\frac{1}{2}}T^{-2}\right]$
(3) $\left[ML^2T^{-\frac{3}{2}}\right]$ (4) $\left[ML^{-\frac{3}{2}}T^{-1}\right]$

08. Air is pushed into a soap bubble of radius r to double its radius. If the surface tension of the soap solution is S, the work done in the process is
(1) $8\pi r^2 S$
(2) $12\pi r^2 S$
(3) $16\pi r^2 S$
(4) $24\pi r^2 S$

09. When a metal wire is stretched by a load, the fractional change in its volume $\frac{\Delta V}{V}$ is proportional to

(1) $\frac{\Delta l}{l}$ (2) $\left(\frac{\Delta l}{l}\right)^2$

(3) $\sqrt{\frac{\Delta l}{l}}$ (4) $\left(\frac{\Delta l}{l}\right)^{3/2}$

10. The length of an elastic string is a metre when the longitudinal tension is 4 N and b metre when the longitudinal tension is 5 N. The length of the string (in metre) when the longitudinal tension is 9 N is

(1) a – b (2) 5b – 4a

(3) $2b - \frac{a}{4}$ (4) 4a – 3b

CHEMISTRY

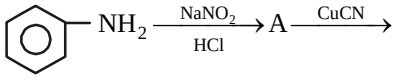
11. Match List–I with List–II.

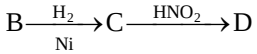
	List-I		List-II
(A)	$[PtCl_4]^{2-}$	(I)	sp^3d
(B)	BrF_5	(II)	d^2sp^3
(C)	PCl_5	(III)	dsp^2
(D)	$[Co(NH_3)_6]^{3+}$	(IV)	sp^3d^2

(1) (A)→(II), (B)→(IV), (C)→(I), (D)→(III)
(2) (A)→(III), (B)→(IV), (C)→(I), (D)→(II)
(3) (A)→(III), (B)→(I), (C)→(IV), (D)→(II)
(4) (A)→(II), (B)→(I), (C)→(IV), (D)→(III)

12. Given below are two statements:
Statement I: Both $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$ complexes are octahedral but differ in their magnetic behaviour.
Statement II: $[Co(NH_3)_6]^{3+}$ is diamagnetic whereas $[CoF_6]^{3-}$ is paramagnetic.
In the light of the above statements, choose the correct answer from the options given below:
(1) Both Statement I and Statement II are true
(2) Both Statement I and Statement II are false
(3) Statement I is true but Statement II is false
(4) Statement I is false but Statement II is true

13. Aniline in a set of reactions yielded a product D.

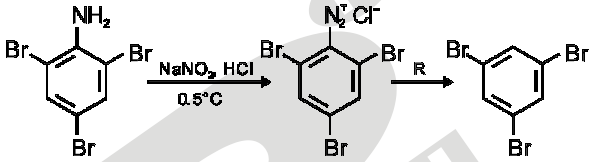




The structure of the product D would be
(1) $C_6H_5NHCH_2CH_3$ (2) $C_6H_5CH_2NH_2$
(3) $C_6H_5CH_2OH$ (4) C_6H_5NHOH

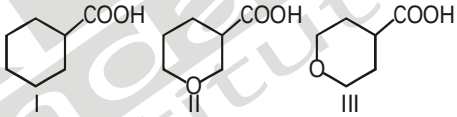
14. The correct statement regarding the basicity of arylamine is:
(1) arylamines are generally less basic than alkylamine because the nitrogen lone-pair electrons are delocalized by intraction with the aromatic ring π-electron system
(2) arylamines are generally more basic than alkylamine because the nitrogen lone pair electrons are not delocalized by interaction with the aromatic ring π-electron system
(3) arylamines are generally more basic than alkylamine because of aryl group
(4) arylamines are generally more basic than alkylamine because the nitrogen atom in arylamines sp-hybridized

15. The reagent 'R' in the given sequence of chemical reaction is:



(1) CuCN/KCN (2) H_2O
(3) CH_3CH_2OH (4) HI

16. The correct order of stregths of the carboxylic acids is

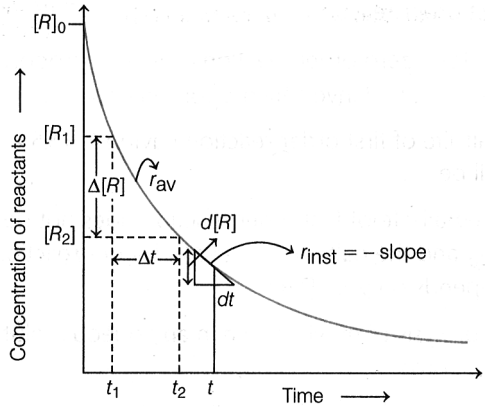


(1) II > III > I (2) III > II > I
(3) II > I > III (4) I > II > III

17. Select the correct statement
(1) q = +ve means heat is transferred from the system to the surroundings
(2) q = –ve means heat is transferred from the surroundings to the system
(3) q = +ve means heat is transferred from the surroundings to the system
(4) q = –ve means heat is absorbed from the surroundings to the system

18. Which of the following statements is correct ?
(1) The energy can be created
(2) According to first law of thermodynamics, the energy of an isolated system is not constant
(3) In an isolated system, W=0, q=0, $\Delta U \neq 0$
(4) $\Delta U = q + W$, will depend only on initial and final state

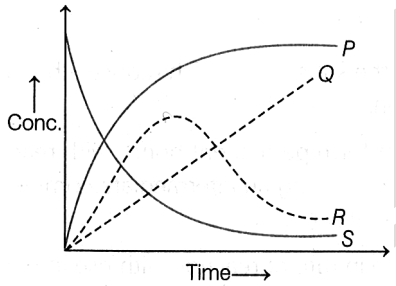
19. The value of r_{av} from the graph shown below is



(1) $r_{av} = \frac{+\Delta[R]}{\Delta t}$ (2) $r_{av} = \frac{-[R_2]-[R_1]}{(t_1-t_2)}$

(3) $r_{av} = \frac{-d[R]}{dt}$ (4) $r_{av} = \frac{-\{[R_2]-[R_1]\}}{(t_2-t_1)}$

20. For a reaction,
$A + B \rightarrow C + D$
The curve which depicts the variation of the concentration of products is



(1) P (2) Q (3) R (4) S

BOTANY

21. In snapdragon, cross between red and white flower yield pink flower. If the pink flower is crossed with the red flower again, what will be ratio of progeny?
[Red = RR, White = rr, Pink = Rr]
(1) RR-75%, Rr-25%
(2) RR-100%
(3) RR-50%, Rr-50%
(4) RR-25%, Rr-25%, rr-50%

22. Which of the following is correct for dihybrid cross?
(1) 2 YY RR, 2 Yy RR, 3 yy Rr, 4 Yy Rr
(2) 9 YY RR, 3 Yy RR, 3 yy Rr, 1 Yy Rr
(3) 1 YY RR, 2 Yy RR, 2 yy Rr, 4 Yy Rr
(4) 1 YY RR, 3 Yy RR, 1 yy Rr, 3 Yy Rr

23. The chromosomes as well as genes occur in pair and the two alleles of a gene pair are located on
(1) homologous chromosomes
(2) non-homologous chromosomes
(3) single chromosome
(4) X-chromosome

24. Choose the incorrect option.
(1) Friedrich Miescher in 1869 identified DNA as an acidic substance and named it nuclein.
(2) Erwin Chargaff said that the ratio between A and T, G and C of dsDNA is constant and equals one
(3) The two strands of dsDNA are complementary to each other
(4) If the sequence of bases in one strand is unknown, then the complementary strand sequence can be predicted

25. In sea urchin DNA, which is double-stranded 17% of the bases were shown to be cytosine. The percentages of the other three bases expected to be present in this DNA are
(1) G/34 %, A/24.5 %, T/24.5 %
(2) G/17 %, A/16.5 %, T/32.5 %
(3) G/17 %, A/33 %, T/33 %
(4) G/8.5 %, A/50 %, T/24.5 %

26. Consider the given statements and choose the option that correctly fill the blanks.
(i) The length of DNA in a human cell is about.....
(ii) Positively charged basic proteins that are found in eukaryotes are called.....
(iii) A typical nucleosome contains.....bp of DNA helix.

	(i)	(ii)	(iii)
(1)	2.3 m	arginine	200
(2)	2.0 m	lysine	400
(3)	2.4 m	protamine	300
(4)	2.2 m	histone	200

27. Hershey and Chase used ^{35}S and ^{32}P to prove that DNA is the genetic material. Which of the given statement is incorrect w.r.t. the conclusive facts of their experiment?
(1) Progeny viruses retained ^{32}P, but not ^{35}S
(2) Retention of ^{32}P in progeny viruses indicated that DNA was passed on
(3) Loss of ^{35}S in progeny viruses indicated that proteins were not passed on
(4) Both proteins and DNA enters the bacteria from the virus

28. Which group present in RNA nucleotide is very reactive and makes RNA more liable and easily degradable than DNA?
(1) 3-OH' group at every nucleotide
(2) 2-OH' group on ribose sugar
(3) 3-OH' group on ribose sugar
(4) 4-OH' group on ribose sugar

29. Match Column-I (terms) with Column-II definitions) and select the correct option.

Column-I		Column-II	
(a)	Population	(i)	Part of the earth consisting of all the ecosystems of the world.
(b)	Community	(ii)	Assemblage of all the individuals belonging to different species occurring in an area.
(c)	Ecosystem	(iii)	Group of similar individuals belonging to the same species, found in an area.
(d)	Biosphere	(iv)	Interaction between the living organism and their physical environmental components.
		(v)	Classification of organisms based on the type of environment.

a b c d **a b c d**

(1) (i) (iv) (v) (iii) (2) (v) (ii) (iii) (i)

(3) (ii) (iii) (iv) (v) (4) (iii) (ii) (iv) (i)

30. Smaller animals tend to lose body heat very fast as compared to larger animals because they have

(1) higher surface to volume ratio.

(2) lower surface to volume ratio.

(3) equal values of surface and volume.

(4) very low BMR (basal metabolic rate).

31. Carrying capacity K means ..... .

(1) organism's capability of maximum reproduction

(2) nature's limit for supporting maximum growth of a species

(3) nature's limit for supporting maximum number of communities

(4) organism's capability to withstand environment odds

32. As the number of individuals approaches the carrying capacity of a population, which of the following is predicted by the sigmoidal growth curve?

(1) Population biomass will remain the same.

(2) Population density will increase exponentially.

(3) Population growth rate will decrease.

(4) Population growth rate will increase.

33. Which of the following is most appropriately defined?

(1) Host is an organism which provides food to another organism.

(2) Amensalism is a relationship in which one species is benefited whereas the other is unaffected.

(3) Predator is an organism that catches and kills other organism for food.

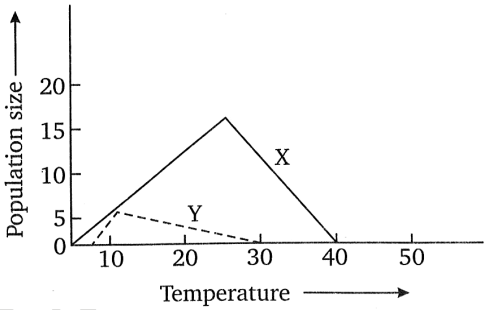
(4) Parasite is an organism which always lives inside the body of other organism and may kill it.

34. Match Column-I (interspecific relations) with Column-II (their examples) and choose the correct option.

	Column-I		Column-II
(a)	Commensalism	(i)	Epiphyte on tree
(b)	Mutualism	(ii)	Fig tree and wasp
(c)	Co-evolution	(iii)	Cattle egret and grazing cattle
(d)	Sexual deceit	(iv)	Sea anemone and clown fish
		(v)	Lichen
		(vi)	Mycorrhiza
		(vii)	Mediterranean orchid Ophrys

	(a)	(b)	(c)	(d)
(1)	(i), (iii), (iv)	(ii), (v), (vi)	(ii)	(vii)
(2)	(iii), (iv)	(i), (ii), (v)	(iii)	(v), (vi)
(3)	(i), (iii)	(ii), (iv)	(ii)	(vii)
(4)	(iv)	(v), (vi)	(i)	(vii)

35. The activities of two aquatic species in relation to temperature is provided in the graph. Accordingly choose the correct option:



(1) Species X shows greater thermal tolerance than species Y

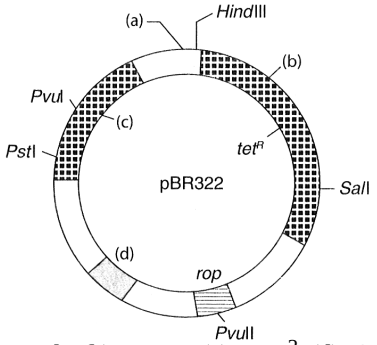
(2) Both the species X and Y maintain their activity under narrow range of temperature

(3) Both the species X and Y show rapid decrease in activity at 6-8°C

(4) Species Y is more active above 15°C

ZOOLOGY

36. Identify (a), (b), (c) and (d) in the given diagram of E. coli cloning vector pBH 322.



(1) (a)–HindI; (b)–EcoRi; (c)–amp^3; (d)–Ori

(2) (a)–HindI; (b)–BamHI; (c)–kan^R; (d)–amp^R

(3) (a)–BamHI; (b)–PstI; (c)–Ori; (d)–amp^3
(4) (a)–EcoRI; (b)–BamHI; (c)–amp^R; (d)–Ori

37. Select the incorrect statement.
(1) More than 900 restriction enzymes have been isolated from over 230 strains of bacteria.
(2) In the year 1963, two enzymes responsible for restricting the growth of bacteriophage in Escherichia coli were isolated.
(3) Some key tools for recombinant DNA technology are restriction enzyme, polymerase enzyme, ligase, vectors and host organisms
(4) EcoR-I cut the DNA between bases A and T only when the sequence GAATTC is present in the DNA

38. EcoRI cut palindrome sequence which produces overhanging stretches called sticky ends on each strand. These are named sticky because
(1) they can combine with any DNA.
(2) they form hydrogen bonds with their complementary cut counterpart.
(3) they facilitate the action of the enzyme DNA ligase
(4) Both (2) and (3).

39. Find the true statement,
(1) Ori means origin of transcription.
(2) Some bacterial cells may have copy number of plasmid varying from 15-100.
(3) Vector should have many recognition sites for commonly used restriction enzymes so that alien DNA can attach to any one of the sites easily.
(4) Tet^R gene in pBR322 can be cleaved by PvuI and PstI

40. Which vector is used to deliver gene in animal cell?
(1) Retroviruses
(2) Disarmed retroviruses
(3) T_i plasmid
(4) E.coli

41. The ability to form tumours is found in plasmids of
(1) E. coli. (2) Pseudomonas.
(3) Agrobacterium. (4) Pneumococcus.

42. For a plasmid to be a cloning vector, the minimum numbers of elements required are
(1) origin of replication, multiple cloning site and selection marker.
(2) origin of replication, multiple cloning site, selection marker and promoter.
(3) origin of replication, multiple cloning site, selection marker and translational start site.
(4) origin of replication, multiple cloning site and promoter.

43. Which of the following organisms is not correctly matched with its cell wall degrading enzyme?
(1) Plants cells – Cellulase
(2) Algae – Methylase
(3) Fungi – Chitinase
(4) Bacteria – Lysozyme

44. Which of the following restriction enzymes was the first to be discovered?
(1) EcoRI (2) BamHI
(3) HindII (4) SmaI

45. In isolation of genetic material (DNA) from nucleus, the RNA can be removed by ribonuclease and protein by protease. Purified DNA then precipitates after the addition of _____.
(1) $CaCl_2$ (2) ether
(3) chilled ehtanol (4) acetic acid

46. Which of the following steps are catalysed by Taq polymerase in a PCR reaction?
(1) Denaturation of template DNA
(2) Annealing of primers to template DNA
(3) Extension of primer end on the template DNA
(4) All of these

47. During gel electrophoresis for separation of DNA fragment,
(1) smallest fragment will move to the farthest point towards cathode.
(2) smallest fragment will move to the farthest point towards anode.
(3) largest fragment will move to the farthest point towards cathode.
(4) largest fragment will move to the farthest point towards anode.

48. Which of the following statements is correct in the context of observing DNA separated by agarose gel electrophoresis?
(1) DNA can be seen in visible light.
(2) DNA can be seen without staining in visible light.
(3) Ethidium bromide stained DNA can be seen in visible light.
(4) Ethidium bromide stained DNA can be seen under exposure to UV light.

49. Protein encoded gene cryIAb controls
(1) cotton bollworm. (2) beetles.
(3) corn borer. (4) flies.

50. A nematode _____ infects the roots of tobacco plants and causes great reduction in yield.
(1) Ancylostoma
(2) Necator
(3) Meloidegyne incognitia
(4) Wuchereria