

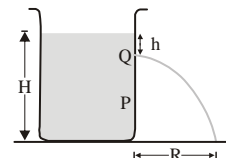
SAMPLE PAPER - 102

Time : 1 : 15 Hr.

Question : 60

PHYSICS

01. The refractive index of glass is 1.520 for red light and 1.525 for blue light. Let D_1 and D_2 be angles of minimum deviation for red and blue light respectively in a prism of this glass, then:
- (1) $D_1 < D_2$
 (2) $D_1 = D_2$
 (3) D_1 can be less than or greater than D_2 depending upon the angle of prism
 (4) $D_1 > D_2$.
02. Which of the following statement is correct ?
- (1) In myopia, the image of distant objects is focused before retina
 (2) In hypermetropia, the image of nearby object is focused before retina
 (3) In hypermetropia, the image of distant object is focused before retina
 (4) In myopia, the image of distant object is focused beyond retina
03. One division on the main scale of a vernier callipers is equal to 1 mm. Its vernier scale has 20 equal divisions which match with 16 main scale division. The least count of the vernier callipers is
- (1) 0.02 mm (2) 0.2 mm (3) 0.8 mm (4) 0.08 mm
04. A uniform solid drum of radius R and mass M rolls without slipping down a plane inclined at an angle θ . Its acceleration along the plane is
- (1) $\frac{1}{3} g \sin \theta$ (2) $\frac{1}{2} g \sin \theta$
 (3) $\frac{2}{3} g \sin \theta$ (4) $\frac{5}{7} g \sin \theta$
05. The moment of inertia of a body about a given axis is 1.2 $\text{kg}\cdot\text{m}^2$. Initially, the body is at rest. In order to produce a rotational kinetic energy of 1500 J, an angular acceleration of 25 rad/s^2 must be applied about that axis for duration
- (1) 4 s (2) 2 s (3) 8 s (4) 10 s
06. The gravitational force between two masses at a distance d apart is 6 N when placed on earth. If these masses are taken to Mars and kept at same separation, then the force between them will be
- (1) 1 N (2) $\frac{1}{6}$ N (3) 36 N (4) 6 N
07. A man decides to dig so deep into the earth that acceleration due to gravity at the depth is $\frac{3}{4}$ th of the acceleration due to gravity on the surface of earth. The radius of earth is 6400 km and acceleration due to gravity at the surface of earth is 9.8 m/s^2 . The depth upto which man would have to dig is
- (1) 400 km (2) 800 km
 (3) 1600 km (4) 3200 km
08. When a certain weight is suspended from a long uniform wire, its length increases by 1 cm. If the same weight is suspended from another wire of the same material and length but having a diameter half of the first one then the increase in length will be
- (1) 0.5 cm (2) 2 cm (3) 4 cm (4) 8 cm
09. Water stands at a height H in a large tank whose sides are vertical. A hole is made in one of the walls of the tank at a depth h below the surface of water. The distance R from the foot of the wall where the emerging stream of water strikes the floor is :



- (1) $2\sqrt{h(H-h)}$ (2) $4\sqrt{h(H+h)}$
 (3) $4\sqrt{h(H-h)}$ (4) $2\sqrt{h(H+h)}$

CHEMISTRY

10. Two simple harmonic motions are given are

$$x_1 = \frac{a}{2} \sin \omega t + \sqrt{3} \cdot \frac{a}{2} \cos \omega t$$

and $x_2 = a \sin \omega t + a \cos \omega t$

The ratio of amplitudes of the first motion to that of the second is

- (1) $\frac{\sqrt{3}}{2}$ (2) $\frac{1}{\sqrt{2}}$
 (3) $\sqrt{2}$ (4) $\frac{1}{\sqrt{3}}$

11. Sound waves of frequency 320 Hz are sent into the top of a vertical tube containing water at a level that can be adjusted. If the standing waves are produced at two successive water levels 20 cm and 73 cm that produces resonance then the speed of sound waves in the air of the tube is

- (1) 256 m/s (2) 300 m/s
 (3) 339 m/s (4) 489 m/s

12. The threshold intensity of human ear is 10^{-12} W/m^2 . The intensity of a 60 dB sound is

- (1) 10^6 W/m^2 (2) 1 m W/m^2
 (3) $1 \mu \text{ W/m}^2$ (4) 100 MW/m^2

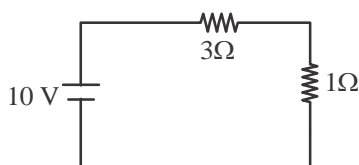
13. If two conducting spheres are separately charged and then brought in contact

- (1) The total energy of the two spheres is conserved
 (2) The total charge on the two spheres is conserved
 (3) Both energy and charge are conserved
 (4) The final potential is always a mean of the original potentials of spheres

14. Two metal wires of identical dimensions are connected in series. If σ_1 and σ_2 are the electrical conductivities of the metals respectively, then the effective conductivity of the combination is

- (1) $\sigma_1 + \sigma_2$ (2) $\frac{\sigma_1 + \sigma_2}{2}$
 (3) $\frac{\sigma_1 \cdot \sigma_2}{\sigma_1 + \sigma_2}$ (4) $\frac{2\sigma_1 \cdot \sigma_2}{\sigma_1 + \sigma_2}$

15. In the following circuit, the 1Ω resistor dissipates power P. If this resistor is replaced by 9Ω , the power dissipated in it is



- (1) 9 P (2) 3 P
 (3) $\frac{P}{3}$ (4) P

16. Which of the following polymer is biodegradable?

- (1) $\left(\text{CH}_2 - \underset{\text{Cl}}{\text{C}} = \text{CH} - \text{CH}_2 \right)_n$
 (2) $\left(\text{CH}_2 - \text{CH} = \underset{\text{CN}}{\text{CH}} - \text{CH}_2 - \text{CH}_2 - \text{CH} \right)_n$
 (3) $\left(\text{O} - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2 - \underset{\text{O}}{\text{C}} - \text{O} - \underset{\text{CH}_2\text{CH}_3}{\text{CH}} - \text{CH}_2 - \underset{\text{O}}{\text{C}} \right)_n$
 (4) $\left(\text{N} - \underset{\text{H}}{\text{C}}(\text{H}) - (\text{CH}_2)_6 - \underset{\text{H}}{\text{N}} - \underset{\text{O}}{\text{C}} - (\text{CH}_2)_4 - \underset{\text{O}}{\text{C}} \right)_n$

17. Atomic radii of C and H atoms are 77 pm (for single bond) and 37 pm respectively. The bond length of C – H bond is likely to be:

- (1) 114 pm (2) 40 pm
 (3) more than 114 pm (4) less than 114 pm

18. According to valence bond theory:

- (1) a sigma bond is stronger than a pi-bond
 (2) pi-bond is formed in addition to a sigma bond in the same two atoms already bonded by sigma bond.
 (3) overlapping of atomic orbitals is to a larger extent in a sigma bond than a pi-bond.
 (4) all of the above

19. Which of the following does not have nodal plane?

- (1) $\sigma 1s$ (2) $\sigma 2p_z$
 (3) $\pi 2p_x$ (4) Both (1) and (2)

20. Match the bond line notations of the given compounds in column-I with those of condensed formulae in Column-II and select the correct response.

	Column-I		Column-II
(p)		(i)	$(\text{H}_3\text{C})_2\text{CHCH}(\text{CH}_3)_2$
(q)		(ii)	$\text{HCCCH}_2\text{CH}(\text{OH})\text{CH}_3$
(r)		(iii)	$\text{H}_3\text{C}(\text{CH}_2)_6\text{CH}_3$
(s)		(iv)	

- (1) (p)–(iv); (q)–(i); (r)–(iii); (s)–(ii)
 (2) (p)–(iv); (q)–(ii); (r)–(i); (s)–(iii)
 (3) (p)–(iv); (q)–(iii); (r)–(ii); (s)–(i)
 (4) (p)–(iv); (q)–(ii); (r)–(iii); (s)–(i)

21. Which of the following is the correct decreasing order of stability of carbanion (shown)?

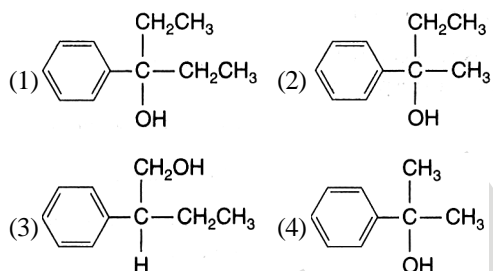
- (1) $\overset{\ominus}{\text{C}}\text{H}_3 > \text{CH}_3\overset{\ominus}{\text{C}}\text{H}_2 > (\text{CH}_3)_2\overset{\ominus}{\text{C}}\text{H} > (\text{CH}_3)_3\overset{\ominus}{\text{C}}$
 (2) $\text{CH}_3\overset{\ominus}{\text{C}}\text{H}_2 > \overset{\ominus}{\text{C}}\text{H}_3 > (\text{CH}_3)_2\overset{\ominus}{\text{C}}\text{H} > (\text{CH}_3)_3\overset{\ominus}{\text{C}}$

- (3) $(\text{CH}_3)_2\overset{\ominus}{\text{C}}\text{H} > \text{CH}_3\overset{\ominus}{\text{C}}\text{H}_2 > \overset{\ominus}{\text{C}}\text{H}_3 > (\text{CH}_3)_3\overset{\ominus}{\text{C}}$
 (4) $(\text{CH}_3)_3\overset{\ominus}{\text{C}} > (\text{CH}_3)_2\overset{\ominus}{\text{C}}\text{H} > \text{CH}_3 - \overset{\ominus}{\text{C}}\text{H}_2 > \overset{\ominus}{\text{C}}\text{H}_3$

22. Select the correct statement out of the following:
 (1) Every canonical structure of a compound has higher potential energy than the hypothetical actual structure
 (2) The difference of potential energies of actual structure and the most stable canonical structure is called resonance energy.
 (3) More the number of canonical structures of similar energy, higher is the value of resonance energy and higher is the stability
 (4) All of the above are correct statements

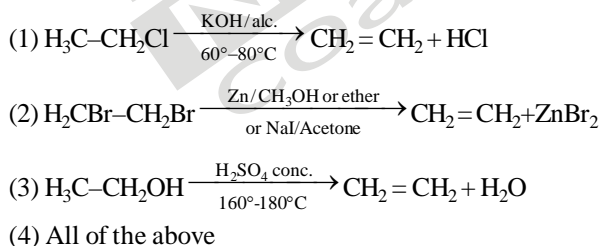
23. Which of the following will not evolve O_2 on reaction with ozone?
 (1) PbS (2) KMnO_4
 (3) Hg (4) KI

24. Which is the major product of the reaction of $\text{C}_2\text{H}_5\text{MgBr}$ and propiophenone (ethyl phenyl ketone)?

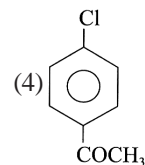
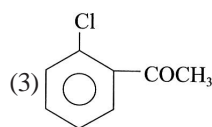
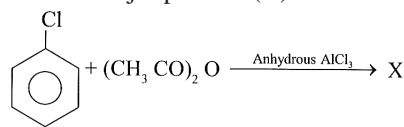


25. Which of the following adds on $\text{CH}_3 - \text{CH} = \text{CH}_2$ according to Anti-Markovnikov rule in the presence of organic peroxide?
 (1) HCl (2) HBr
 (3) HI (4) All of these

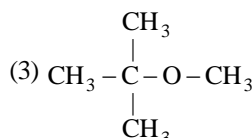
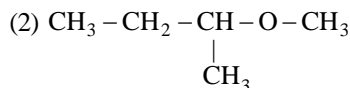
26. Which of the following is the laboratory method for the preparation of ethene?



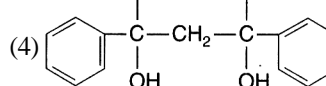
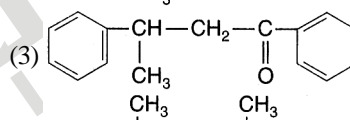
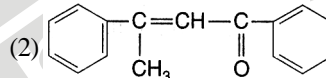
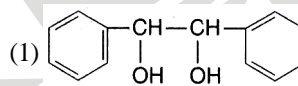
27. What is major product (X)



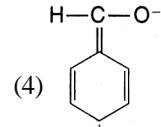
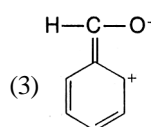
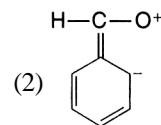
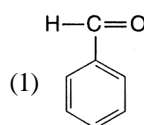
28. Among the following ethers, which one will produce methyl alcohol on treatment with hot concentrated HI?



29. Acetophenone when reacted with a base, $\text{C}_2\text{H}_5\text{ONa}$ and then heated yields a stable compound which has the structure



30. Which of the following is not a resonating form of benzaldehyde?



31. Match the following columns.

Column I		Column II	
A.	Test cross	1.	9:3:3:1
B.	Monohybrid cross	2.	Tt×tt
C.	Back cross	3.	Tt×TT
D.	Dihybrid cross	4.	3 : 1

- (1) A-2; B-4; C-3; D-1
 (2) A-2; B-4; C-1; D-4
 (3) A-3; B-4; C-1; D-2
 (4) A-1; B-4; C-1; D-3

32. Protein synthesis involves

- I. transcription.
 II. translation.
 III. transversion.
 IV. translocation.

Choose the correct combination.

- (1) I, II, III and IV (2) II, III and IV
 (3) I, II and III (4) I and II

33. **Process**

- I. Transcription (eukaryotic)
 II. Translation (eukaryotic)
 III. Replication (eukaryotic)
 IV. Transcription (prokaryotic)
 V. Translation (prokaryotic)
 VI. Replication (prokaryotic)

Fill up A to F.

- (1) A-Nucleus, B-Cytoplasm, C-Nucleus, D-Cytoplasm, E-Cytoplasm, F-Cytoplasm
 (2) A-Cytoplasm, B-Cytoplasm, C-Nucleus, D-Cytoplasm, E-Nucleus, F-Cytoplasm
 (3) A-Cytoplasm, B-Cytoplasm, C-Nucleus, D-Nucleus, E-Nucleus, F-Cytoplasm
 (4) A-Cytoplasm, B-Nucleus, C-Nucleus, D-Cytoplasm, E-Nucleus, F-Cytoplasm

34. How many microsporangia are there in each lobe of anther?

- (1) One microsporangia (2) Two microsporangia
 (3) Three microsporangia (4) Four microsporangia

35. Haploid plant cultures are got from

- (1) Leaves (2) Root tip
 (3) Pollen grain (4) Buds

36. From the following, how many are varieties of wheat?

- Atlas 66, Himgiri, Sonalika, Kalyan sona, Jaya, Ratna
 (1) 3 (2) 2 (3) 4 (4) 5

37. IARI, New Delhi released several vegetable crops that are rich in vitamins and minerals. With respect to that select the correct match.

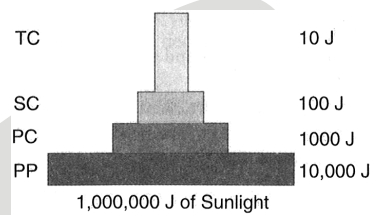
	Column-I		Column-II
1.	Vitamin A	A.	Carrot, spinach, pumpkin
2.	Vitamin C	B.	Bitter gourd, bathua, mustard, tomato
3.	Fe and Ca	C.	Spinach and bathua
4.	Protein	D.	Bean-broad, lablab, French and garden peas

- (1) A-2, B-3, C-1, D-4 (2) A-1, B-2, C-3, D-4
 (3) A-4, B-1, C-2, D-3 (4) A-3, B-4, C-1, D-2

38. What kind of microbes is present in 'flocs' formed during secondary treatment of sewage?

- (1) Aerobic (2) Anaerobic
 (3) Symbiotic (4) Aero tolerant

39. How much energy of sunlight is converted by primary producers into NPP in the above energy pyramid?



- (1) 2% (2) 10%
 (3) 1% (4) 110%

40. The largely tropical Amazonian rain forest in South America has the greatest biodiversity on earth. It is the home for more than _____ species of plants. _____ of fishes, _____ of birds, _____ of mammals, _____ of amphibians, _____ of reptiles and of more than _____ invertebrates.

- (1) 30,000, 4000, 1200, 427, 427, 387, 1,25,000
 (2) 40,000, 3000, 1200, 427, 427, 387, 1,25,000
 (3) 40,000, 3000, 1300, 427, 427, 378, 1,25,000
 (4) 40,000, 3000, 1200, 427, 427, 378, 1,25,000

41. $\log S = \log C + Z \log A$ (Logarithmic formula for species-area relationship). True about this formula

- (1) S = Species richness; A = Area
 (2) Z = Regression coefficient
 (3) C = Y-intercept
 (4) All of these

42. Binomial nomenclature consists of two words

- (1) Genus and species (2) Order and family
 (3) Family and genus (4) Species and variety

43. Sepals or petals in a whorl just touch one another at the margin without overlapping is found in

- (1) China rose (2) Pea
 (3) Cassia (4) Calotropis

44. The floral formula of Fabaceae is

- (1) $\% \overset{\circ}{K}_{(5)} C_{1+2+(2)} A_{(9)+1} \underline{G}_1$
 (2) $\% \overset{\circ}{K}_{(5)} C_{1+2-(2)} A_{(9)+1} \underline{G}_1$

- (3) $\frac{1}{2} K_{(5)} C_{1+2} A_{9+1} G_1$
 (4) $\frac{1}{2} K_{(5)} C_{1+2+2} A_{(9)-1} G_1$

45. What does a chloroplast contain?
 (1) Chlorophyll
 (2) Carotenoids
 (3) Both (1) and (2)
 (4) Anthocyanin

ZOOLOGY

46. Name two vitamins, one containing sulphur & other cobalt:
 (1) Biotin & B₁₂
 (2) Folic acid & cyanocobalamine
 (3) Biotin & folic acid
 (4) Folic acid & B₁₂

47. Match the items given in column I with those in column II and choose the correct option:

	Column-I		Column-II
a.	Rennin	i.	Vitamin B ₁₂
b.	Enterokinase	ii.	Facilitated transport
c.	Oxyntic cells	iii.	Milk proteins
d.	Fructose	iv.	Trypsinogen

- (1) a-iii; b-iv; c-ii; d-i (2) a-iv; b-iii; c-i; d-ii
 (3) a-iv; b-iii; c-ii; d-i (4) a-iii; b-iv; c-i; d-ii

48. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of:
 (1) Non-recombinant bacteria containing beta galactosidase
 (2) Insertional inactivation of alpha galactosidase in non-recombinant bacteria
 (3) Insertional inactivation of alpha galactosidase in recombinant bacteria
 (4) Inactivation of β glycosidase enzyme in recombinant bacteria
49. While isolating DNA from bacteria, which of the following enzymes is not used?
 (1) Lysozyme (2) Ribonuclease
 (3) Deoxyribonuclease (4) Protease
50. Which of the following statements does not hold true for restriction enzyme?
 (1) It recognizes a palindromic nucleotide sequence
 (2) It is an endonuclease
 (3) It is isolated from viruses
 (4) It produces the same kind of sticky ends in different DNA molecules

51. Bee-keeping is known as
 (1) Pisciculture (2) Silviculture
 (3) Apiculture (4) Aquaculture

52. In MOET _____ cell stage, the fertilized eggs are recovered non-surgically and transferred to surrogate mothers.
 (1) 8-32 (2) 2-4 (3) 6-8 (4) 4-6

53. Cystic fibrosis is an autosomal recessive disease. In an island having a population of 200 people, 98 people suffer from cystic fibrosis. How many people are carriers of this disease?
 (1) 42 (2) 84 (3) 18 (4) 64

54. There is an irregular mating population. If the frequency of an autosomal recessive lethal gene is 0.4 then the frequency of the carriers in a population of 200 individual is:
 (1) 72 (2) 36 (3) 96 (4) 104

55. For natural selection the important factor is
 (1) Disuse (2) Variation
 (3) Catastrophe (4) Special creation

56. Synapsids existed
 (1) 300 mya (2) 150 mya
 (3) 350 mya (4) 50 mya

57. By the year 2000, the world population rocketed to
 (1) 6 million (2) 6 billion
 (3) 6 trillion (4) 600 million

58. Which one of following is not an IUD?
 (1) Vaults (2) Cu T
 (3) Multiload 375 (4) Progestasert

59. The endometrium undergoes cyclical changes during the _____ cycle.
 (1) Menstrual (2) Oestrous
 (3) Thermal (4) None of these

60. Acrosome is a modified
 (1) Golgi body (2) ER
 (3) Vacuole (4) Ribosome