NAME

NAME Institute

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Pre-Medical
Model Entrance Exam

2074

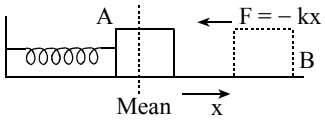
(Set-III)

Date: 2075/04/19

Hints and Solutions

Physics

1. b) Air resistance is in opposite directions of velocity.
2. b)



From A to B, loss in KE = gain in elastic PE

$$= \frac{1}{2} Kx^2 \propto x^2$$

3. c) $L = mvr$

$$V = \frac{L}{mr} \qquad F_c = \frac{mv^2}{r} = \frac{m}{r} \times \frac{L^2}{m^2r^2}$$

$$V^2 = \frac{L^2}{m^2r^2} \qquad F_c = \frac{L^2}{mr^3}$$

4. b)
5. a) $\Delta v = v_e - v_0 = \sqrt{2gR} - \sqrt{gR} = (\sqrt{2} - 1)\sqrt{gR}$

$$= (\sqrt{2} - 1)\sqrt{\frac{GM}{R}}$$

6. c) $\phi = \frac{r\theta}{l} = \frac{4 \times 10^{-3} \times 30^o}{1} = 0.12^o$
7. c) $PV = \mu RT$

$$P \propto \frac{T}{V}$$

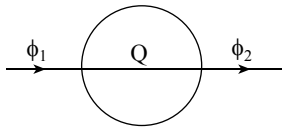
8. a) $\Delta U = C_V \Delta T = \frac{R}{\gamma - 1}(T_2 - T_1)$
9. a)
10. c) $m = \frac{360}{60} = 6$

Since m is an even integer, total number of images will be $m - 1 = 5$

11. b) $\mu = \frac{\lambda_1}{\lambda_2} = \frac{600}{400} = \frac{3}{2}$

$$C = \sin^{-1}\left(\frac{1}{\mu}\right) = \sin^{-1}\left(\frac{2}{3}\right)$$

12. b) From Gauss's law



$$\text{Net flux} = \frac{\text{Total charge enclosed}}{\varepsilon_0} = \frac{1}{\varepsilon_0} \times Q \quad \therefore Q = \varepsilon_0(\phi_2 - \phi_1)$$

Chemistry

13. a) Blanc fire is finely divided $BaSO_4$.

14. a) $2NaHCO_3 + MgCl_2 \rightarrow MgCO_3 + 2NaCl + H_2O$.

15. b) The size of isoelectronics increases with decrease in atomic number.

16. a) $^{228}_{90}Th \longrightarrow {}_{83}Bi^{212} + 4_2He^4 + 1_{-1}e^0$

17. b) $\overset{1}{CH_3}.\overset{2}{CO}\ \overset{3}{C}(CH_3)\ \overset{4}{H}CH_3$ i.e., 3-methyl butan-2-one

18. d) Draw all structures.

19. c) $CH \equiv CH + HOCl \rightarrow CH(OH) = CHCl \xrightarrow{HOCl} CH(OH)_2CHCl_2 \rightarrow CHCl_2.CHO$

20. b) $C_2H_4 + 3O_2 \longrightarrow 2CO_2 + 2H_2O$
20 ml of C_2H_4 requires O_2 = 60 ml.

21. b) The balanced equation is,
$Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ \rightarrow Cr^{3+} + 6Fe^{3+}\ 7H_2O$

22. c) The oxidation state of central sulphur in sodium thiosulphate is +6.

23. b) First line in Lyman series means transition from n = 2 to n = 1. The energies of second and first orbitals of H atom are equal to the energies of fourth and second orbital respectively of He^+.

24. d) Fe^{3+} has maximum number of unpaired electrons (5) and hence has maximum value of magnetic moment.

25. d) Rest all form complex with NH_3 e.g. $Ag(NH_3)^+$; $Cu(NH_3)_4^{2+}$; $Cd(NH_3)_4^{2+}$.

Botany

26. a) Monocots are characterized by presence of scattered vascular bundles (atactostele).

27. c) Edible part of cabbage is vegetative bud.

28. b) Carrot has edible conical root while corms, potato (tuber), ginger (rhizome) are modified underground stems.

29. a) Zygomorphic flower with vexillary aestivation (butterfly like corolla) is common character of family Papilionaceae (Leguminosae).

30. d) Mitosis is equational division for chromosomes and found in all types of cell either haploid or diploid.

31. d) Heliophytes prefers to grow in direct sun light or sunny area.

32. d) Bacteriophage is virus of bacteria containing dsDNA as genetic material and protein coat or capsid.

33. d) Interferon is antiviral protein produced by certain host cells against viral infections.

34. c) Biota is collective form of all producer (plants), consumers (animals) and decomposers.

35. b) Epipetalous stamens with persistent calyx is common character of family Solanaceae.

36. c) Zygotic meiosis is common character of algae and fungi. Sporic meiosis is present in bryophytes, pteridophytes, gymnosperms and angiosperms.

37. d) Pyrenoids are algal character found in chloroplast and contain central core of protein surrounded by starch.

Zoology

38. c) Sub-pharyngeal ganglia- 1pair – nerves- 3 pairs

39. c) In Crustacea:- Head and thorax fused to form cephalothorax.

40. d) the renal portal unite with sciatic and while running along the outer border of kidney of its side it receives blood form lumbar region by a dorso-lumbar vein.

41. c) Lipase and maltase activate over emulsified fats and convert it into colloidal soap and glycerol.

42. a) Geological time scale.
Azoic era → Archaeozoic era → Proterozoic → Palaeozoic → Mesozoic → coenozoic era

43. b) Homo erectus (Java ape man)
→ Cranial capacity 900°C
→ Large protruding Jaws
→ First first used for protection and cooking

44. c) Fixed action pattern: inborn adaptive mechanism found to be same in all members of species.

45. b) Sporozoites of malarial parasite enters into liver cells of humans and start liver schizogony.

46. b) Hemix is the process of purification act on the part of mega nucleus. vagina.

47. b) Lepidopterology → Moths and Butterfly
Neonatology → Child and upto age of 2-months

48. b) Blubber and flipper – E.g. Whale

49. b) Cuticle in Ascaris is permeable to salt, water and metabolic waste product. Cuticle and anti-enzyme both gives parasitic adaptation.

50. b) The cavity common to all sponges is **spongocoel** or **paragastric** cavity lined with, flagellated **Choanocytes**.

Result will be published on Sunday

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Best of Luck