LEADER & ACHIEVER COURSE

PHASE : MLM,N,R,S,MAZI,L,T,U,M2AP1A, M2AP1B, M4AA2A
TARGET : PRE-MEDICAL 2020

Test Type : **MAJOR** Test Pattern : NEET(UG)

TEST DATE : 28 - 02 - 2020

TEST SYLLABUS : 03

HINT – SHEET

1. As we know

$\frac{\Delta T}{T} = \frac{1}{2}\alpha\Delta\theta$ where $\Delta\theta = \theta_{actual} - \theta_{calibration}$

So, $\frac{5}{10} = \left(\frac{T-15}{30-T}\right)$ $\Rightarrow 30 - T = 2T - 30$

$\Rightarrow T = 20°C$

2. $V_{RMS} = \sqrt{\frac{4+9+16+25+36}{5}} = 4.24$

3. $\eta_{max} = 1 - \frac{T_2}{T_1} = 1 - \frac{300}{400} = 0.25 = 25\%$

Therefore 26% efficient engine is impossible.

4. $\frac{KE_{max}}{KE_{avg}} = \frac{\frac{1}{2}KA^2}{\frac{1}{4}KA^2} = \frac{2}{1}$

5. Given amplitude = 0.5 m

f = 2Hz, $\omega = 2\pi f = 4\pi$, travelling in positive x-direction so sign of t & x are different.

6. By anamolus behaviour of water, density of water increase between 0 to 4°C, decrease for higher tempeature.

7. $W = P\Delta V$, for contraction of volume ΔV is negative.

8. $\eta = 1 - \frac{T_2}{T_1}, \frac{T_1}{T_2} = \frac{1}{1-\eta}$

$\omega = \frac{T_2}{T_1 - T_2} = \frac{1}{(T_1/T_2)-1}$

$= \frac{1}{[1/(1-\eta)]-1} = \frac{1-\eta}{\eta}$

As $\eta = 10\% = 0.1$, $\omega = \frac{1-0.1}{0.1} = 9$

9. $k_{eq} = k_1 + k_2 \Rightarrow T = \frac{1}{2\pi}\sqrt{\frac{M}{k_{eq}}}$

10. $V = \frac{\omega}{k} = \frac{100}{1/10} = 1000 \text{ m/s}$

11. When a body is heated, the distance between any two points on it increases.

12. $W = Q - \Delta U = 110 - 40 = 70$ J

13. Only sin & cos represents simple harmonic motion so $\tan\omega t$ will not represent a SHM

14. $f = \sqrt{f_1^2 + f_2^2} = 5\text{Hz}$

15. 2d = v × t, where v = velocity of sound = 330 m/s

t = Persistence of hearing $= \frac{1}{10}$ sec .

$\Rightarrow d = \frac{v \times t}{2} = \frac{330 \times \frac{1}{10}}{2} = 16.5$ meter

16. K.E. per degree of freedom $= \frac{1}{2}kT$

For polyatomic gas, mean K.E. $= \frac{nkT}{2}$

17. $nC_{P_{eq}} = \left(\frac{1}{2}\right)\left(\frac{7}{2}R\right) + \left(\frac{1}{4}\right)\left(\frac{5}{2}R\right) = \frac{19R}{8}$

$Q = nC_{P_{eq}}\Delta T = \frac{19R}{8} \times 100$, R = 2 cal/mol-K

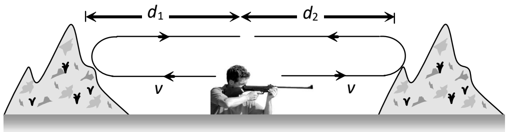
$Q = \frac{19 \times 2}{8} \times 100 = 475 \text{ cal}$

18. $\frac{d^2x}{dt^2} + \frac{16}{9}x = 0$

Here $\omega^2 = \frac{16}{9}$

$\omega = \frac{4}{3}$ unit

19. $v = \omega/k = 2$ units

20. 

$$2d_1 + 2d_2 = v \times t_1 + v \times t_2$$

$$\Rightarrow 2(d_1 + d_2) = v(t_1 + t_2)$$

$$d_1 + d_2 = \frac{v(t_1 + t_2)}{2} = \frac{340 \times (1.5 + 3.5)}{2} = 850 \text{ m.}$$

21. When the bimetallic strip is kept in a cold bath the length of X decreases faster and therefore the strip bends towards the left.

22. Using relation = $\frac{T_2}{T_1} \quad \left(\frac{P_2}{P_1}\right)^{\frac{\gamma-1}{\gamma}} \quad (8)^{\frac{3/2-1}{3/2}} \quad 2$

$\Rightarrow T_2 \quad 2T_1$

$\Rightarrow T_2 \quad 2(273 \quad 27) \quad 600\text{K} \quad 327\ \text{C}$

23. $\frac{T}{2} = (6-2)$, $\quad T = 8$ sec

24. Maximum particle velocity is
$V_{max} = A\omega = 1800 \times 60 \times 10^{-6}$ m/s

wave velocity $V = \frac{\omega}{k} = \frac{1800}{5.3} \text{ m/s}$

$\frac{V_{max}}{V} = 5.3 \times 60 \times 10^{-6} = 3.18 \times 10^{-4}$

25. The resultant amplitude is given by

$A_R = \sqrt{A^2 + A^2 + 2AA\cos\theta} = \sqrt{2A^2(1+\cos\theta)}$
$= 2\ A\cos\theta/2 \qquad (\because 1 + \cos\theta = 2\cos^2\theta/2)$

26. $\eta = 1 - \frac{T_2}{T_1} \Rightarrow \frac{30}{100} = 1 - \frac{77+273}{T_1}$

$T_1 = 500$ K, or 227ºC

27. $\frac{3}{2}P_0V_0 + \frac{10}{2}P_0V_0 = \frac{13}{2}P_0V_0$

28. Slope is irrelevant. Time period $T = 2\pi\sqrt{(M/2k)}$

29. The wave speed depends on factors of tension in the string and its composition. Hence, since the wave speed is unchanged, with an increased frequency, there is a decreased wavelength ($v = f\lambda$)

30. If suppose n_s = frequency of string $= \frac{1}{2l}\sqrt{\frac{T}{m}}$
n_f = Frequency of tuning fork = 480 Hz
x = Beats heard per second = 10
as tension T increases, so n_S increases (↑)
Also it is given that number of beats per sec decreases (i.e. x↓)
Hence $n_S\uparrow - n_f = x\downarrow \longrightarrow$ Wrong ...(i)
$n_f - n_S\uparrow = x\downarrow \longrightarrow$ Correct ...(ii)
$\Rightarrow n_S = n_f - x = 480 - 10 = 470$ Hz.

31. $E = \frac{Q}{At} = \sigma T^4$

$\frac{Q}{t} = \sigma AT^4 \Rightarrow 10 = \sigma A(400)^4 \qquad$ ...(1)

and $\left(\frac{Q}{t}\right)_2 = \sigma A(800)^4 \qquad$ ...(2)

From eq. (1) and (2)

$\frac{10}{\left(\frac{Q}{t}\right)_2} = \left(\frac{400}{800}\right)^4 \Rightarrow \left(\frac{Q}{t}\right)_2 = 160\text{W}$

32. Given $P \propto T^3$, but we know for an adiabatic process, the pressure $P \propto T^{\gamma/\gamma-1}$

So, $\frac{\gamma}{\gamma-1} = 3 \Rightarrow \gamma = \frac{3}{2} \Rightarrow \frac{C_P}{C_V} = \frac{3}{2}$

33. R = 4 + 3 = 7

34. From graph (1), Wavelength (λ) = 4 cm
From graph (2), Time period (T) = 0.8 s
$v = f\lambda = \lambda/T = 4/0.8 = 5$ cm/s

35. L = 1m = 100 cm, m = (0.5/100)
$= 5 \times 10^{-3}$ g/cm and p = 4
In the transverse arrangement the frequency of the vibrating string is equal to the frequency of the tuning fork, i.e., 200 Hz.

Now, $n = \frac{p}{2L}\sqrt{\frac{T}{m}}$

or $200 = \frac{4}{2 \times 100}\sqrt{\frac{T}{5 \times 10^{-3}}}$

$\therefore T = 5 \times 10^5$ dyne.

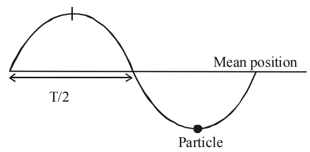
36. $N = \frac{PV}{RT} \times N_A$

$= \frac{1.3 \times 10^5 \times 7 \times 10^{-3}}{8.314 \times 273} \times 6.023 \times 10^{23}$
$= 2.4 \times 10^{23}$

37. In isothermal expansion temperature remains constant, hence no change in internal energy.

38. $f = \omega^2 x$
$0.5 = \omega^2 \times 0.02$
$\omega = 5$
$V_{max} = \omega a = 0.5$ m/s

39. It is clear from figure that the particle will come after a time T/4 to its mean position.



40. Theory

41. A→B ⇒ constant pressure
B→C ⇒ constant temperature
C→A ⇒ constant volume

42. $\eta = \frac{T_1 - T_2}{T_1} = \frac{(273+727)-(273+227)}{273+727}$

$= \frac{1000-500}{1000} = \frac{1}{2}$

43. $\frac{1}{2}K\left(\frac{A^2}{4}\right) = 2.5 \Rightarrow TE = \frac{1}{2}KA^2 = 2.5 \times 4 = 10J$

44. $V = \frac{\omega}{k} = \frac{60}{2} = 30\ m/s$ in –x direction

sign if t & x is same.

45. $\longrightarrow C/2$ $\quad f = 10GH_2$

O ———— S

$f_{app} = \left(1+\frac{V}{C}\right)f = \left(1+\frac{1}{2}\right)\times 10GH_2 \Rightarrow \frac{3}{2}\times 10 = 15GH_2$

46.

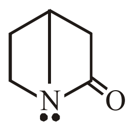
Homologous series	Smallest Member
Alkanal	H –CHO
Alkanone	$CH_3–\overset{O}{\overset{\|\|}{C}}–CH_3$
Alkonoic acid	$CH_3–COOH$
Alkene	$CH_2=CH_2$

47. $\overset{5}{C}H_3–\overset{4}{C}H_2–\overset{3}{C}H_2–\overset{2}{C}H(\overset{1}{C}H_3)–O–CH_3$ are chain isomers

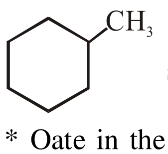
$\overset{4}{C}H_3–\overset{3}{C}H_2–\overset{2}{C}H(CH_3)–\overset{1}{C}H_2–O–CH_3$

48. Compound which having α–C–H with $–NO_2$, –NO

–CHO, Ketone group.

49. No resonance due to bred't rule. 

50. Carbon-Carbon multiple bond is absent in

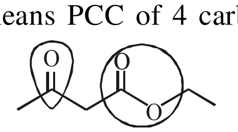


so will give test of unsaturation.

51. * Oate in the name suggest ester os PFG with ethyl group attached to oxygen atom of $–\overset{O}{\overset{\|\|}{C}}–O–R$

* Oxo suggest ketone/aldehyde as subsitunt.
* but as word root means PCC of 4 carbon

∴ Structure is :-

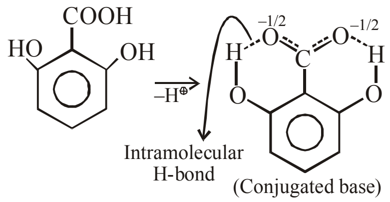


Ketone Ester

52. See cos/pos

(3) have pos (crossing all four groups)

53.



54. A- octet complete R.S.

55. $CH_3–CH(CH_3)–COONa \xrightarrow{\text{Electrolysis}} CH_3–CH(CH_3)–CH(CH_3)–CH_3$

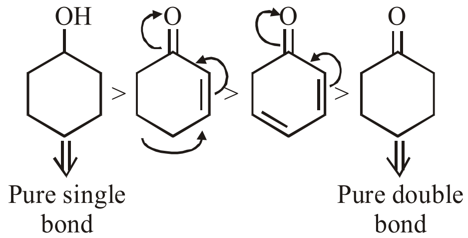
58. Stability order decide by

(A) Octet rule

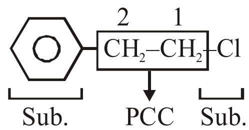
(B) Polar R.S. < Non- Polar R.S.

(C) –ve charge OH high E.N. Atom and +ve charge OH less E.N. atom.

59.



61.

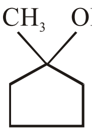
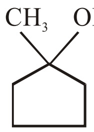


1-chloro-2-phenylethane

63. D is not valid resonating structure

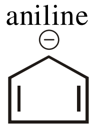
(Nitrogen contain 10 e^- s)

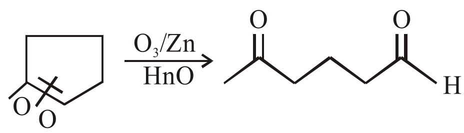
64. Nitro compound having at least one active-H (α-H) show tautomerism.

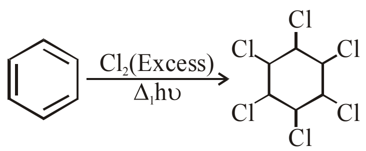
65. A :  , B : 

66. $C_6H_5–O–CH_2–CH_2–CH(CH_3)–CH_3$, NCERT/XII/319

67. Due to high BP and steam volatile nature of aniline it is separate by steam distillation.

68. 

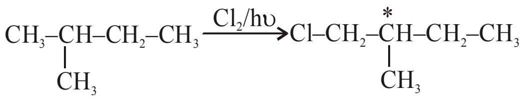
69. 

70. 

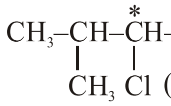
71. 1, 2, 3 have different structure so no. G.I.

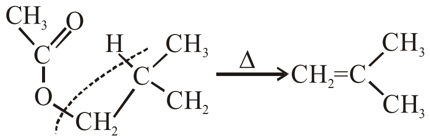
72. Factual question NCERT Pg. # 356

73. Acidic strength of active αh $-CHO > -\overset{O}{\overset{\|}{C}}- > -\overset{O}{\overset{\|}{C}}-O-R$

74. 

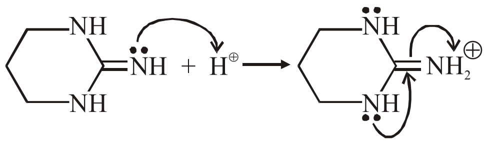
(d & ℓ) → (2)



75. 

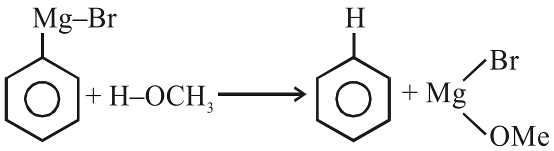
76. R and S.

77. Photochemical smog does not involve SO_2.

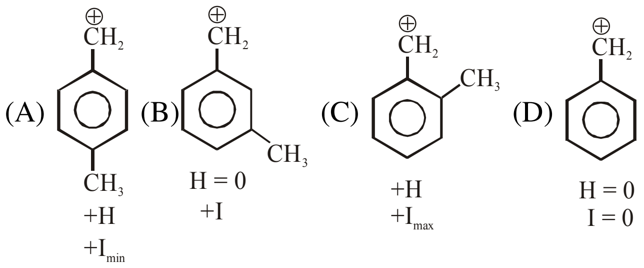
78. 

After protonation conjugated acid stable by resonance.

79. NCERT-XI, Pg. # 388 (Old), 396 (New)

80. 

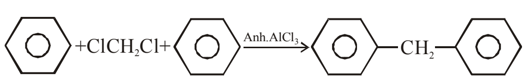
82. Stability of $C^{\oplus} \propto \frac{+M}{-M} \alpha \frac{+H}{-H} \alpha \frac{+I}{-I}$

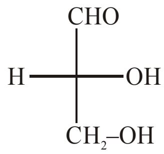


Stability :- C > A > B > D

83. More αH OH alkene more stable.

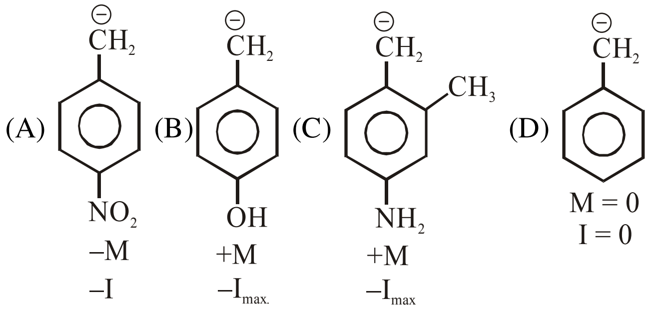
84. NCERT-XI, Pg. # 388 (Old), 396 (New)

85. 

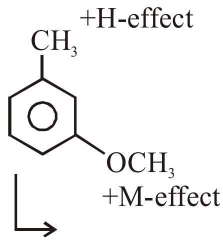
86.  is 'D' or 'R'

So see directly 'R' configuration.

87. Stability of $C^{\ominus} \propto \frac{-M}{+M} \alpha \frac{-H}{+H} \alpha \frac{-I}{+I}$

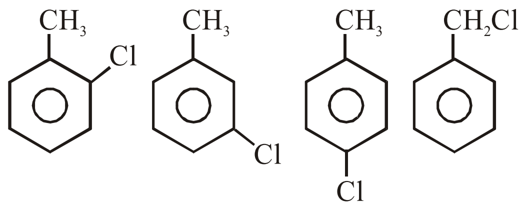


Stability order P > S > Q > R

89. 

So most $e^{\ominus}$ density in benzene ring.

90. Isomers of C_7H_7Cl are ⇒ (4)



91. NCERT(XI) Pg # 48/48(H) Para:4.1.5

102. NCERT(XI) Pg # 57/57(H) Para:4.2.11.2

111. NCERT(XI) Pg # 50/48(H) Para:4.2.2

112. NCERT(XI) Pg # 56/55(H) Para:4.2.11

113. NCERT(XI) Pg # 104/104(H) Para:7.1.2

122. NCERT(XI) Pg # 54/54(H) Para:4.2.10

123. NCERT(XI) Pg # 113/113(H) Fig:7.16

143. NCERT(XI) Pg # 114/114(H) Para:7.4.2

152. NCERT(XI) Pg # 103/103(H) Para:7.1.2

172. NCERT(XI) Pg # 102/102(H) Para:7.1.1