

Since 1999



# NEET FRESH 2023-24

Mark 720	Group PCB	<b>PCB EXAM - 62</b>	Date : 02/01/2024 Time : 3:20 Hours
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## Answer Key Version - S (NEET FRESH All Batches)

Physics					Chemistry				
<b>Sec. A</b>	11. 2	22. 1	33. 1	43. 2	<b>Sec. A</b>	61. 2	72. 1	83. 3	93. 3
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02. 1	13. 4	24. 4	35. 3	45. 3	52. 3	63. 2	74. 1	85. 2	95. 4
03. 4	14. 4	25. 2	<b>Sec. B</b>	46. 3	53. 4	64. 1	75. 4	<b>Sec. B</b>	96. 1
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06. 1	17. 4	28. 4	38. 2	49. 1	56. 4	67. 1	78. 2	88. 1	99. 2
07. 1	18. 1	29. 2	39. 4	50. 4	57. 3	68. 2	79. 3	89. 2	100. 3
08. 3	19. 3	30. 4	40. 2		58. 3	69. 2	80. 1	90. 3	
09. 2	20. 3	31. 4	41. 4		59. 4	70. 4	81. 3	91. 1	
10. 2	21. 3	32. 4	42. 1		60. 3	71. 2	82. 3	92. 3	
Biology									
<b>Part-I</b>	110. 2	121. 3	132. 4	142. 1	<b>Part-II</b>	160. 3	171. 1	182. 3	192. 3
<b>Sec.A</b>	111. 1	122. 1	133. 1	143. 3	<b>Sec.A</b>	161. 1	172. 1	183. 3	193. 3
101. 3	112. 4	123. 4	134. 4	144. 3	151. 1	162. 3	173. 2	184. 1	194. 4
102. 3	113. 2	124. 4	135. 1	145. 3	152. 2	163. 2	174. 4	185. 3	195. 2
103. 4	114. 2	125. 4	<b>Sec.B</b>	146. 4	153. 2	164. 4	175. 3	<b>Sec. B</b>	196. 2
104. 4	115. 2	126. 4	136. 2	147. 1	154. 4	165. 2	176. 3	186. 2	197. 1
105. 4	116. 1	127. 3	137. 4	148. 4	155. 1	166. 2	177. 2	187. 1	198. 3
106. 1	117. 4	128. 4	138. 4	149. 2	156. 2	167. 1	178. 2	188. 4	199. 3
107. 1	118. 4	129. 3	139. 2	150. 3	157. 2	168. 2	179. 3	189. 4	200. 1
108. 1	119. 1	130. 2	140. 2		158. 2	169. 2	180. 3	190. 3	
109. 1	120. 1	131. 4	141. 2		159. 1	170. 4	181. 2	191. 3	

# PHYSICS

## SECTION - A (35 Questions)

01. (2) Applying Bernoulli's theorem,

$$P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2$$

$$P_1 - P_2 = \frac{1}{2}\rho(v_2^2 - v_1^2)$$

$$h\rho g = \frac{1}{2}\rho(v_2^2 - v_1^2)$$

$$v_2^2 - v_1^2 = 2hg = 2 \times 0.51 \times 1000 = 1020$$

$$v_2^2 = 1020 + v_1^2 = 1020 + 4 = 1024$$

$$\therefore v_2 = \sqrt{1024} = 32 \text{ cm s}^{-1}$$

02. (1) The wooden block rises up with an acceleration,

$$a = \frac{\text{Upthrust} - \text{Weight of block}}{\text{Mass of block}}$$

03. (4) Using equation of continuity,

$$a_1 v_1 = a_2 v_2$$

$$\pi(2R)^2 v = \pi R^2 v_2$$

$$v_2 = 4v$$

04. (3) Due to the acceleration of the elevator, the change in the apparent weight of the ice cubes is the same as the change in the buoyant force. So the portion of ice outside the soft drink remains the same.

05. (2) Initial speed of the ball is zero. As the ball falls through the viscous liquid, its speed first increases and after some time, it attains a constant terminal velocity.

06. (1) The ball attains constant velocity after falling through some distance in oil when the weight of ball gets balanced by upthrust and the upward viscous force.

07. (1) By Stoke's law, viscous drag force is

$$F = 6\pi\eta r v = 6 \times 3.14 \times 0.9 \times 5 \times 10^{-3} \times 10 \times 10^{-2} \text{ N} = 847.8 \times 10^{-5} \text{ N} \approx 8.48 \times 10^{-3} \text{ N}$$

08. (3)  $\rho >_{\text{oil}}$ , ball must sink in oil

As  $\rho <_{\text{water}}$ , ball must float in water

In equilibrium, the ball will stay at the interface of water and oil.

09. (2) Let  $V_1$  and  $V_2$  be the volumes of the parts of the sphere immersed in liquids of densities  $\rho_1$  and  $\rho_2$  respectively.

According to the law of floatation,

Weight of sphere = Weight of liquid 1 displaced + Weight of liquid 2 displaced

$$V\rho g = V_1\rho_1 g + V_2\rho_2 g$$

$$\Rightarrow (V_1 + V_2)\rho g = V_1\rho_1 g + V_2\rho_2 g$$

$$\Rightarrow V_1(\rho - \rho_1) = V_2(\rho_2 - \rho)$$

$$\therefore \frac{V_1}{V_2} = \frac{\rho_2 - \rho}{\rho - \rho_1}$$

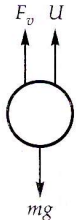
10. (2)

When the ball attains a constant velocity,

$$F_v + U = mg \Rightarrow F_v = mg - U$$

$U$  = Weight of glycerine displaced

$$= Vd_2 g = \left(\frac{m}{d_1}\right) d_2 g \Rightarrow F_v = mg \left(1 - \frac{d_2}{d_1}\right)$$



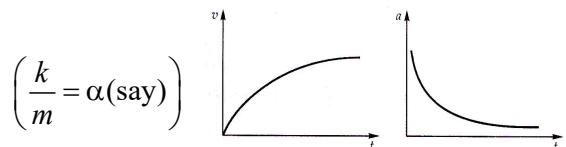
11. (2) The body will sink to the bottom due to the applied force.

12. (3)  $v_t = \frac{2}{9} \frac{gr^2(\rho - \sigma)}{\eta} \Rightarrow v_t \propto r^2$

13. (4) Archemedes' upward thrust will not act in the absence of gravity.

14. (4) Net downward force,  $ma = mg - kv$

$$\therefore a = g - \frac{k}{m}v = g - \alpha v$$



$$\Rightarrow \frac{dv}{dt} = g - \alpha v \Rightarrow \frac{1}{g - \alpha v} dv = dt$$

$$\therefore \int_0^v \frac{1}{g - \alpha v} dv = \int_0^t dt \Rightarrow \left[ \frac{\ln(g - \alpha v)}{-\alpha} \right]_0^v = [t]_0^t$$

$$\Rightarrow \ln(g - \alpha v) - \ln g = -\alpha t$$

$$\Rightarrow \ln \frac{g - \alpha v}{g} = -\alpha t$$

$$\therefore 1 - \frac{\alpha}{g}v = e^{-\alpha t}$$

$$\Rightarrow v = \frac{g}{\alpha}(1 - e^{-\alpha t}) = v_0(1 - e^{-\alpha t})$$

$$a = \frac{dv}{dt} = v_0 \alpha e^{-\alpha t} = a_0 e^{-\alpha t}$$

15. (2) Upthrust on the body is always equal to the weight of liquid displaced.

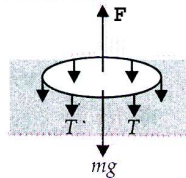
16. (2) [Tension] = [Force] = [MLT<sup>-2</sup>]

$$[\text{Surface tension}] = \frac{[\text{Force}]}{[\text{Length}]} = [\text{MT}^{-2}]$$

17. (4)  $h_{\text{oil}}\rho_{\text{oil}}g = h_{\text{water}}\rho_{\text{water}}g$   
 $140 \times \rho_{\text{oil}} = 130 \times \rho_{\text{water}}$   
 $\rho_{\text{oil}} = \frac{13}{14} \times 1000 \text{ kg/m}^3$   
 $\rho_{\text{oil}} = 928 \text{ kg m}^{-3}$
18. (1) Pressure depends only on the height of the liquid column and not on the shape of the containing vessel.
19. (3) Pressure difference between lungs and atmosphere  
 $= 760 \text{ mm} - 750 \text{ mm}$   
 $= 10 \text{ mm of Hg} = 1 \text{ cm of Hg}$   
 Suppose the student can suck water from depth  $h$ .  
 Then  
 $P = hdg = 1 \text{ cm of Hg}$   
 $h \times 1 \times g = 1 \times 13.6 \times g$   
 $h = 13.6 \text{ cm}$
20. (3)  $P = 76 \text{ cm} \times \rho_{\text{Hg}} \times g = h \times \rho_L \times g$   
 $h = \frac{\rho_{\text{Hg}}}{\rho_L} \times 76 \text{ cm} = \frac{13600}{760} \times 76 \text{ cm}$   
 $= 1360 \text{ cm} = 13.6 \text{ m}$
21. (3)  $Y = \frac{F}{A} \cdot \frac{l}{\Delta l} = \frac{2500}{10^{-5}} \times \frac{10}{0.01} = 2.5 \times 10^{11} \text{ Nm}^{-2}$
22. (1) As temperature increase then surface tension decrease so angle of contact increase.
23. (1) From the above problem, Energy stored per unit volume = Work done per unit volume =  
 $\frac{1}{2} \times \text{Stress} \times \text{strain}$
24. (4) As the liquid does not wet the solid surface,  
 so  $\theta > 90^\circ$
25. (2)  $\kappa = \frac{p}{\Delta V/V} = \frac{pV}{\Delta V}$   
 $= \frac{100 \times \frac{4}{3} \pi (3)^3}{0.3} \text{ atm} = 4\pi \times 3 \times 10^3 \text{ atm}$
26. (1)  $P_{\text{in}} = P_a + \frac{4T}{R}$   
 When  $R$  increases, pressure inside the soap bubble decreases.
27. (1) Net downward force in the string,  
 $ma = mg - T$

But  $T_{\text{max}} = \frac{2}{3}mg \quad \therefore ma_{\text{min}} = mg - \frac{2}{3}mg$   
 $a_{\text{min}} = g - \frac{2}{3}g = \frac{g}{3}$

28. (4)  $U = 2 \times 4\pi R^2 T$   
 $= 8\pi(0.5 \times 10^{-2})^2 \times 0.04 \text{ J} = 8\pi \times 10^{-6} \text{ J}$
29. (2)  $U = \text{Work done on the wire}$   
 $= \text{Average force} \times \text{Increase in length}$   
 $= \left(\frac{O+F}{2}\right)l = \frac{1}{2}Mgl \quad [F = Mg]$



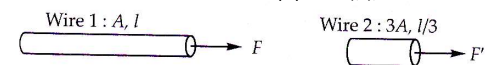
30. (4) Force required to lift the ring from the water surface,  
 $F = \text{Weight of ring} + \text{Force of surface tension}$   
 $= mg + 2 \times 2\pi R \times T$   
 $= mg + 4\pi TR$
31. (4) Restoring force on the spring,  
 $F = -kx \Rightarrow F \propto x$   
 $\Rightarrow$  F-x graph is a straight line with a negative slope.  
 Option (4) is correct.
32. (4) Increase in surface area =  $2 \times (20 - 8) \text{ cm}^2$   
 $= 24 \times 10^{-4} \text{ m}^2$   
 Work done =  $3 \times 10^{-4} \text{ J}$

$$\text{Surface tension} = \frac{\text{Work done}}{\text{Increase in surface area}}$$

$$= \frac{3 \times 10^{-4}}{24 \times 10^{-4}} = \frac{1}{8} \text{ Nm}^{-1}$$

$$= 0.125 \text{ Nm}^{-1}$$

33. (1) As same volume  $A_1 l_1 = A_2 l_2$ ,



$$Y = \frac{Fl}{A\Delta l} \Rightarrow F = \frac{YA\Delta l}{l}$$

$$F' = \frac{Y(3A)\Delta l}{(l/3)} = 9F$$

34. (4) Velocity of efflux,  $v = \sqrt{2gh}$   
 Volume flow rate,  
 $Q = Av = A\sqrt{2gh}$   
 $= 2 \times 10^{-6} \times \sqrt{2 \times 10 \times 2} = 4\sqrt{10} \times 10^{-6} \text{ m}^3/\text{s}$   
 $= 4 \times 3.16 \times 10^{-6} \text{ m}^3/\text{s} \approx 12.6 \times 10^{-6} \text{ m}^3/\text{s}$
35. (3)

$$Y = \frac{\text{Stress}}{\text{Strain}}$$

Strain is dimensionless.

$$[Y] = [\text{Stress}] = [\text{Pressure}] = \frac{MLT^{-2}}{L^2} = [ML^{-1}T^{-2}]$$

**Section - B (Attempt Any 10 Questions)**

36. (1)  $K = \frac{P}{\frac{\Delta V}{V}}$

As  $\rho V = \text{constant}$ , so

$$-\frac{\Delta V}{V} = \frac{\Delta \rho}{\rho}$$

$$\therefore K = \frac{P}{\frac{\Delta \rho}{\rho}} \Rightarrow \Delta \rho = \frac{\rho P}{K}$$

37. (3)  $T = \frac{2m_1 m_2}{m_1 + m_2} g = \frac{2 \times 3 \times 5 \times 10}{3 + 5} = \frac{75}{2} \text{ N}$

Stress,  $\frac{T}{\pi r^2} \leq \frac{24}{\pi} \times 100$

$$r^2 \geq \frac{75}{2 \times 24 \times 100}$$

$$r_{\min} = \frac{5}{40} \text{ m} = 12.5 \text{ cm}$$

38. (2) Thermal expansion = Mechanical compression

$$L_0 \alpha \Delta T = \frac{FL_0}{AY}$$

$$\therefore Y = \frac{F}{A \alpha \Delta T}$$

39. (4)  $V = \frac{4}{3} \pi r^3 \Rightarrow \frac{\Delta V}{V} = 3 \frac{\Delta r}{r}$

$$B = -\frac{p}{-\left(\frac{\Delta V}{V}\right)} \Rightarrow -\frac{\Delta V}{V} = \frac{p}{B}$$

$$\Rightarrow -3 \frac{\Delta r}{r} = \frac{p}{B} \Rightarrow -\frac{\Delta r}{r} = \frac{p}{3B}$$

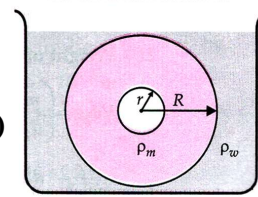
40. (2)  $Y = \frac{F l}{A \Delta l} \Rightarrow \Delta l = \frac{Fl}{AY}$

For series combination,

$$\Delta l = \Delta l_1 + \Delta l_2$$

$$\frac{F \times 2l}{AY} = \frac{Fl}{AY_1} + \frac{Fl}{AY_2}$$

$$\Rightarrow \frac{2}{Y} = \frac{1}{Y_1} + \frac{1}{Y_2} \Rightarrow Y = \frac{2Y_1 Y_2}{Y_1 + Y_2}$$



41.

(4)

Weight of the shell = Weight of water displaced

$$\frac{4}{3} \pi (R^3 - r^3) \rho_m g = \frac{4}{3} \pi R^3 \rho_w g$$

$$1 - \frac{r^3}{R^3} = \frac{\rho_w}{\rho_m} = \frac{8}{27}$$

$$\frac{r^3}{R^3} = 1 - \frac{8}{27} = \frac{19}{27} \Rightarrow \frac{r}{R} = \frac{(19)^{1/3}}{3}$$

42. (1)

43. (2) If  $A_0$  is the area of the orifice at the bottom below the free surface and  $A$  that of the vessel, then the time taken to empty the vessel is

$$t = \frac{A}{A_0} \sqrt{\frac{2H}{g}} \Rightarrow t \propto \sqrt{H}$$

$$\therefore \frac{t'}{t} = \sqrt{\frac{H/2}{H}} = \frac{1}{\sqrt{2}}$$

$$t' = \frac{1}{\sqrt{2}} \times t \approx 0.7 \times 10 \text{ min} = 7 \text{ min.}$$

44. (3)  $m = \pi r^2 h \rho = \pi r^2 \left( \frac{2T \cos \theta}{r \rho g} \right) \rho = \frac{2\pi r T \cos \theta}{g}$

$$\Rightarrow m \propto r \Rightarrow \frac{m'}{m} = \frac{2r}{r} = 2$$

$$m' = 2m = 2 \times 5 \text{ g} = 10 \text{ g.}$$

45. (3) When a spring is stretched, there is only a change in its shape. So shear modulus is useful. Tensile strength of steel spring is more than that of copper spring.

Assertion is true and reason is false.

46. (3) Surface energy of smaller bubbles = Surface energy of resulting bubble

$$8\pi r_1^2 T + 8\pi r_2^2 T = 8\pi r^2 T$$

$$r_1^2 + r_2^2 = r^2 \Rightarrow r = \sqrt{r_1^2 + r_2^2}$$

47. (4)  $h = \frac{2\sigma \cos \theta}{\rho r g}$

But  $h, \sigma, r$  and  $g$  are same for the three liquids.

$$\therefore \frac{\cos \theta}{\rho} = \text{constant}$$

$$\Rightarrow \frac{\cos \theta_1}{\rho_1} = \frac{\cos \theta_2}{\rho_2} = \frac{\cos \theta_3}{\rho_3}$$

Given;  $\rho_1 > \rho_2 > \rho_3$

$$\Rightarrow \cos \theta_1 > \cos \theta_2 > \cos \theta_3 \Rightarrow \theta_1 < \theta_2 < \theta_3$$

Also,  $\theta$  is acute for liquid which rises in a capillary.

$$\therefore 0 \leq \theta_1 < \theta_2 < \theta_3 < \frac{\pi}{2}$$

48. (2)

By Bernoulli's equation,

$$P + \frac{1}{2}\rho v^2 = P_0 + 0$$

$$P_0 - P = \frac{1}{2}\rho v^2$$

$$F_{\text{net}} = \frac{1}{2}\rho v^2 A$$

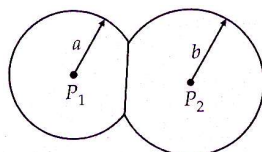
$$= \left( \frac{1}{2} \times 1.2 \times 40 \times 40 \times 250 \right) \text{N}$$

$$= 2.4 \times 10^5 \text{N, upwards.}$$

49. (1)

$$P_1 = P_0 + \frac{4T}{a}$$

$$P_2 = P_0 + \frac{4T}{b}$$



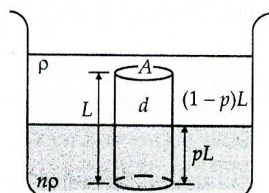
Excess pressure at the common surface is

$$P_1 - P_2 = 4T \left( \frac{1}{a} - \frac{1}{b} \right)$$

$$\frac{4T}{r} = 4T \left( \frac{1}{a} - \frac{1}{b} \right)$$

$$r = \frac{ab}{b-a}$$

50. (4)



Weight of the cylinder

= Upthrust exerted by the two liquids

$$\Rightarrow ALdg = (1-x)LAp\gamma + A(xL)(n\gamma)g$$

$$d = (1-x)\rho + xn\rho$$

$$= \rho - \rho x + xn\rho$$

$$= \rho[1-x+xn]$$

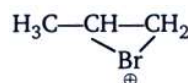
$$= \rho[1+x+(n-1)]$$

$$= \rho[1+(n-1)x]\rho$$

## CHEMISTRY

### SECTION - A (35 Questions)

51. (2)



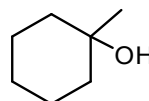
52. (3)

Delocalisation of benzene leads to saturation

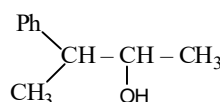
53. (4)

-NHR

54. (1)



55. (2)



56. (4)

BHC (or) Gammaxene (or) 6,6,6 is called lindane

57. (3)

Reactivity depends on stability of alkene product form according to hyper conjugation effect.

58. (3)

Butane, 2, 5-dimethylhexane and isohexane

59. (4)

Hex-3-ene

60. (3)

In presence of sunlight addition occurs

61. (2)

2, 3 dimethyl butane

62. (4)

All

63. (2)

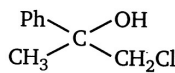
(A)  $\text{CH}_3\text{Cl}$ , (B)  $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$ , (C) KCN

64. (1)


$-\text{NO}_2$  is a meta-directing group. As it is also a deactivating group so no chance of introduction of second  $-\text{Br}$  atom.

65. (2)

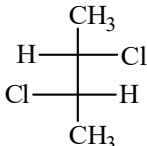
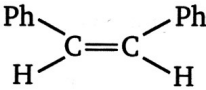
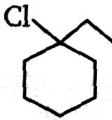
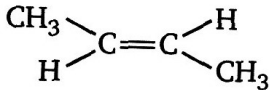
For statement (iii), Fluorination is too violent to be controlled. For statement (iv), Iodination is very slow and an irreversible reaction. It can be carried out in the presence of oxidizing agents like  $\text{HIO}_3$  or  $\text{HNO}_3$

- $\text{CH}_4 + \text{I}_2 \Rightarrow \text{CH}_3\text{I} + \text{HI}$   
 $5\text{HI} + \text{HIO}_3 \rightarrow 3\text{I}_2 + 3\text{H}_2\text{O}$
66. (3)  
 In nitration reaction  $\text{NO}_2^\oplus$  (nitronium ion) form as an electrophile.
67. (1)  

68. (2)  
 Eclipsed form has maximum torsional strain while staggered form has the least.
69. (2)  
 (i)-(d), (ii)-(a), (iii)-(e), (iv)-(c), (v)-(b)
70. (4)  
 A is correct but (R) is incorrect
71. (2)  $\text{AlCl}_3 / \text{HCl}$
72. (1)  
 As number of carbons increases boiling point increases and as branching increases boiling point decreases
73. (1) A – (s), B – (r), C – (q), D – (p)
74. (1)  
 Assertion is correct, reason is correct; reason is a correct explanation for assertion
75. (4)  

$$\text{CII}_3 - \text{CII}_2 - \text{CII} = \text{CII} - \text{CII}_3 \xrightarrow{\text{O}_3, \text{Zn}/\text{H}_2\text{O}} \text{CII}_3\text{CII}_2\text{CII} + \text{CII}_3\text{CII} + \text{CII}_2\text{CII} + \text{CII}_3$$
76. (4)  

$$\text{H}_2\text{C} = \text{CH}_2 \xrightarrow{\text{dil. alkaline, KMnO}_4} \text{HO} - \text{CH}_2 - \text{CH}_2 - \text{OH}$$
77. (2)  
 Soda lime and zinc dust
78. (2)  
 –Cl group is o-, p-directing due to +R effect ; however it is deactivating due to strong –I effect of Cl (difference from other o-, p-directing groups which are activating). The net result is that chlorobenzene undergoes o, psubstitution, but with difficulty.
79. (3) Peroxide
80. (1) Acidic nature of terminal alkynes
81. (3)  $\text{HI} > \text{HBr} > \text{HCl}$
82. (3) 
83. (3) Dehydrohalogenation
84. (1) Na in liq.  $\text{NH}_3$
85. (2)  
 $\text{H}_2/\text{Ni}$

## SECTION - B (Attempt Any 10 Questions)

86. (2)  
 Hydration of acetylene
87. (2)  
 According to Markovnikov rule
88. (1)  

89. (2)  

90. (3)  
 It gives Glyxal, Methy Glyxal
91. (1)  
 $\pi$ -electrons of benzene rings are delocalised throughout the molecule. This makes the molecule very stable. The stability resists breaking of double bonds for addition.
92. (3)  
 (A)  $\text{C}_6\text{H}_5\text{NO}_2$ , (B) m-Bromonitrobenzene, (C) m-Bromoaniline
93. (3)  

94. (3)  
 $(4n + 2) \pi$  electrons and planar structure are the essential conditions for aromaticity.
95. (4)  
 3
96. (1)  
 A and B as major and C as minor products
97. (2)  
 Stability of carbanion is directly proportional to % of S character of carbon on which negative charges is present.
98. (4)  

99. (2)  
 (iii)  $\text{CH}_4(\text{g}) + \text{O}_2(\text{g}) \xrightarrow{\text{Mo}_2\text{O}_3} \text{HCHO} + \text{H}_2\text{O}$   
 (iv)  $2\text{CH}_4(\text{g}) + \text{O}_2(\text{g}) \xrightarrow{\text{Cu}/523/100 \text{ atm}} 2\text{CH}_3\text{OH}$
100. (3)  
 (A), (C), (E), (F), (H)