

EDT - 19 - Physics (2017 Aspirants)  
(SOLUTION)

1. (3)  
Forbidden energy gap of a semiconductor does not change with change in temperature
2. (2)  
Due to addition of impurity, the conductivity increases and therefore, the resistivity decreases.
3. (3)  
Fact, for semiconductors, energy gap  $< 3\text{eV}$
4. (3)  
An intrinsic semiconductor has equal number of free electrons and holes.
5. (2)  
In the reverse bias the majority charge carriers (electron in n-side and holes in p-side) are pulled away from the junction due to the applied electric field. Therefore, width of the p-n junction increases.
6. (2)  
$$E \approx \frac{12400}{\lambda(\text{in } \text{\AA})}$$
$$\lambda = \frac{12400}{60 \times 10^{-3}} = 2.07 \times 10^5 \text{\AA}$$
$$= 2.07 \times 10^{-5} \text{ m}$$
7. (1)  
LED is a heavily doped p-n junction when in forward bias emits light
8. (2)  
Forward bias has positive p-type and negative n-type. In other words, during forward bias p-type will be at higher potential and n-type will be at lower potential.
9. (3)  
The junction diode will conduct when it is forward biased. Therefore, the output voltage will be obtained during positive half cycle.
10. (3)  
In a photodiode, the emf is produced by photo voltaic action is proportional to the intensity of incident light.
11. (2)  
Copper is a conductor whose resistance decreases with decrease in temperature, whereas silicon is a semiconductor whose resistance increases with decrease in temperature.

12. (1)  
 $n_i^2 = n_h n_e$   
 $(10^{19})^2 = 10^{21} \times n_e$   
 $\therefore n_e = 10^{17} \text{ atoms/m}^3$
13. (3)  
 $E = \frac{v}{d} = \frac{0.50}{5 \times 10^{-7}} = 1 \times 10^6 \text{ v/m}$
14. (4)  
 Fact
15. (3)  
 Fact
16. (3)  
 $\alpha = \frac{\Delta I_c}{\Delta I_e} = 0.98$   
 $\frac{\Delta I_c}{2} = 0.98$   
 $\Delta I_c = 2 \times 0.98 = 1.96 \text{ mA}$   
 $\Delta I_e = \Delta I_c + \Delta I_b$   
 $\therefore \Delta I_b = \Delta I_e - \Delta I_c = 2 - 1.96 = 0.04 \text{ mA}$
17. (2)  
 Fact
18. (3)  
 Fact
19. (3)  
 Zener diode is used for voltage stabilising.
20. (2)  
 Input  $\rightarrow \sin \omega t$   
 Output  $\rightarrow \sin^2 \omega t$  which involves  $\cos 2\omega t$   
 Frequency of output is doubled in full wave rectification
21. (4)  
 Voltage gain = current gain  $\times$  resistance gain  
 $= \beta \times \frac{R_L}{R_{in}} = 60 \times \left( \frac{24}{3} \right) = 480$
22. (1)  
 Output of AND gate is made as input of NOT gate  
 $y = \overline{A.B}$ , which is output of NANA gate
23. (1)  
 $y = \overline{\overline{A.B}} = A + B \Rightarrow \text{OR gate}$

24. (1)  
Current gain in common base mode,  $\alpha < 1$

25. (2)  
 $\alpha = 0.98$   
Then  $\beta = 49$

$$\text{Power gain} = \beta^2 \times \frac{R_{out}}{R_{in}}$$

$$6.0625 \times 10^6 = (49)^2 \times \frac{5 \times 10^5}{R_{in}}$$

$$\therefore R_{in} \approx 198 \Omega$$

26. (3)  
 $y = \overline{\overline{A + B}} = A.B \Rightarrow \text{AND gate}$

27. (2)  
Fact

28. (2)  
 $\alpha$  is less than 1  
 $\beta$  is more than 1

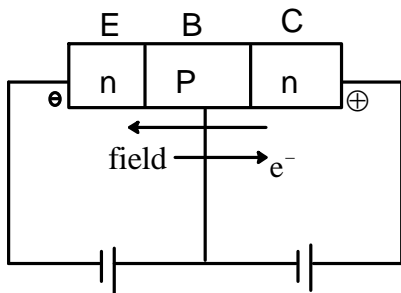
29. (4) Reverse bias offers very high resistance

30. (1) Fact

31. (3) Collector is connected in reverse bias

32. (1) Transistor should be in active mode in order to enable it to work as amplifier.

33. (1)  
The emitter of a transistor is always forward biased and collector is always reverse biased. In npn transistor, the emitter is n-type so that electrons move from emitter to collector via base.



34. (3)  
 $\Delta = \frac{\Delta I_c}{\Delta I_e}$   
 $0.99 = \frac{\Delta I_c}{5}$   
 $\therefore \Delta I_c = 5 \times 0.99 = 4.95 \text{ mA}$

35. (3)  
When a forward bias is applied to a p-n junction, it opposes the potential barrier. As a result, the potential barrier across the junction decreases
36. (3)  
Length of antenna,  $\ell = 20\text{m}$   
 $\ell = \frac{\lambda}{4}$   
 $\therefore \lambda = 4\ell = 4 \times 20 = 80\text{m}$
37. (2) Communication satellites move in geostationary orbits.
38. (1)  
 $d_T = \sqrt{2Rh}$   
 $\therefore d_T \propto h^{\frac{1}{2}}$
39. (1)  
Area,  $A = \pi d_T^2 = \pi(2Rh) = (2\pi R).h$   
 $A \propto h$
40. (2)  
In amplitude modulation, the frequency of the modulated wave is equal to the frequency of the carrier wave.
41. (2) Fact
42. (1) Fact
43. (3)  
Frequency of modulated wave,  $f_m = 1\text{KHz} = 0.001\text{MHz}$   
Frequency of carrier wave,  $f_c = 2\text{MHz}$   
 $\therefore$  Frequencies of side bands are  $(f_c - f_m)$  and  $(f_c + f_m)$   
 $= (2 - 0.001)\text{MHz}$  and  $(2 + 0.001)\text{MHz}$   
 $= 1.999\text{MHz}$  and  $2.001\text{MHz}$
44. (3)  
Information source  $\rightarrow$  transmitter  $\rightarrow$  channel  $\rightarrow$  receiver  $\rightarrow$  user of information
45. (1)  
 $m = \frac{A_m}{A_c} \times 100$   
 $75 = \frac{A_m}{12} \times 100$   
 $\therefore A_m = 0.75 \times 12 = 9\text{V}$

# PACE IIT | MEDICAL | MHT-CET

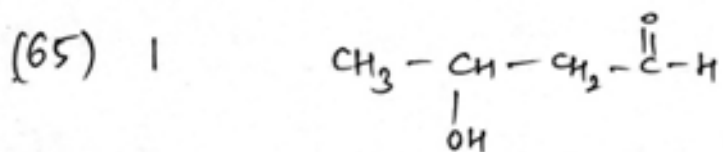
ANDHERI / BORIVALI / DADAR / CHEMBUR / THANE / NERUL / KHARGHAR / POWAI

EDT - 19 - Chemistry (2017 Aspirants)  
(SOLUTION)

- (46) 3  $\begin{array}{c} \text{CH}_3 \\ \diagup \\ \text{C} = \text{CH} - \text{NO}_2 \\ \diagdown \\ \text{CH}_3 \end{array}$
- (47) 1 aldehyde are oxidised
- (48) 1 Wolff Kishner reaction
- (49) 3 Ethanal > propanal > propanone > Butanone
- (50) 4
- (51) 4 Tollen's reagent
- (52) 1
- (53) 2  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$  will be formed
- (54) 3 glyoxal
- (55) 2
- (56) 4 Aldol condensation
- (57) 1
- (58) 1
- (59) 3 due to resonance stabilization of the carboxylate ion.
- (60) 3 C: H: O 8: 8: 2 4: 4: 1
- (61) 4
- (62) 1

(63) 1

(64) 4 both oxidation and reduction



(66) 2 propanal

(67) 4



(69) 2

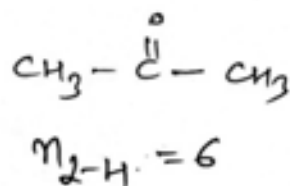
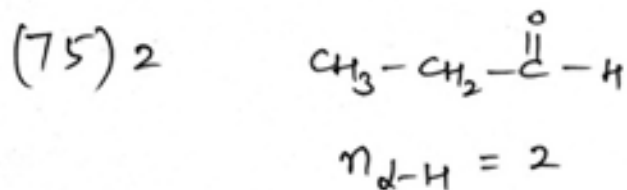
(70) 4 Zn-Hg & conc. HCl

(71) 1

(72) 2 4-hydroxy-2-methylpentanal

(73) 2

(74) 2



(76) 2

(77) 2

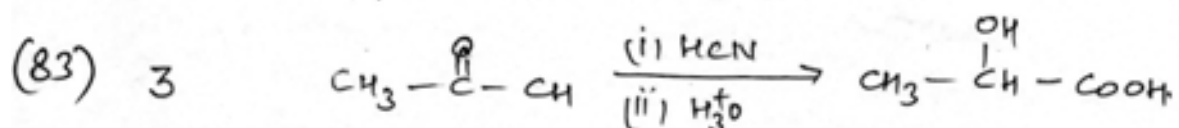
(78) 4

(79) 2

(80) 4  $>C=NOH$

(81) 2  $CH_3CH_2CH_2OH$   $CH_3OCH_2CH_3$   
Propanol ethyl methyl ether

(82) 4 by reduction & Cannizzaro's reaction



(84) 3 due to Inductive effect

(85) 1  $X \rightarrow CH_3CH_2CH_2MgBr$   $Y \rightarrow CH_3CH_2CH_2COOH$

(86) 3 HCl greater the value of  $K_a$  lesser will be  $pK_a$ .

(87) 4 Ozonolysis

(88) 4

(89) 2 Acetaldehyde

(90) 4 Aldol condensation.

**EDT - 19 - Botany(2017 Aspirants)**  
**(SOLUTION)**

91. (4)
92. (1)
93. (2)
94. (2)
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107. (4)
108. (3)
109. (3)
110. (1)
111. (1)
112. (2)
113. (2)
114. (4)
115. (4)
116. (1) In halophytes pneumatophores are required for exchange of gases
117. (3)
118. (3) Immigration is addition in a population from some other region
119. (3) Many parasites feed on one body
120. (4) Leaf like stem modification will not possess stomata,hence reducing the rate of transpiration.
121. (2)
122. (3)
123. (3)
124. (1)
125. (2)
126. (3)
127. (1)
128. (3)
129. (3)
130. (3)



131. (4)  
132. (4)  
133. (1)  
134. (3)  
135. (2)  
136. (2) Gross production in any ecosystem has highest value  
137. (1)  
138. (4) These are decomposers present at every trophic level  
139. (1)  
140. (1)  
141. (3)  
142. (2)  
143. (1)  
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173. (2)  
174. (2)  
175. (3)  
176. (3)  
177. (4)

- 178. (2)** Researchers have put an average price tag of US \$ of 33 trillion a year on fundamental ecosystem services out of which soil formation accounts for 50%
- 179. (4)**
- 180. (1)**