

# PACE-IIT & MEDICAL

## ANSWER KEY FOR MOCK TEST- 48 (FOR 2020 ASPIRANTS) (30<sup>th</sup> Aug 2020)

1. (2)	2. (4)	3. (2)	4. (1)	5. (4)
6. (3)	7. (4)	8. (2)	9. (4)	10. (2)
11. (1)	12. (4)	13. (3)	14. (4)	15. (2)
16. (1)	17. (1)	18. (1)	19. (1)	20. (1)
21. (4)	22. (2)	23. (3)	24. (2)	25. (2)
26. (1)	27. (1)	28. (2)	29. (1)	30. (4)
31. (3)	32. (3)	33. (2)	34. (3)	35. (2)
36. (1)	37. (2)	38. (2)	39. (3)	40. (3)
41. (3)	42. (4)	43. (4)	44. (1)	45. (3)
46. (1)	47. (4)	48. (2)	49. (3)	50. (3)
51. (3)	52. (3)	53. (2)	54. (3)	55. (1)
56. (3)	57. (2)	58. (3)	59. (4)	60. (3)
61. (2)	62. (1)	63. (1)	64. (3)	65. (1)
66. (1)	67. (2)	68. (4)	69. (3)	70. (4)
71. (3)	72. (4)	73. (1)	74. (2)	75. (Bonus)
76. (4)	77. (2)	78. (1)	79. (1)	80. (2)
81. (3)	82. (4)	83. (3)	84. (4)	85. (1)
86. (1)	87. (3)	88. (1)	89. (4)	90. (3)
91. (4)	92. (1)	93. (4)	94. (1)	95. (4)
96. (4)	97. (2)	98. (2)	99. (2)	100. (4)
101. (1)	102. (Bonus)	103. (2)	104. (2)	105. (1)
106. (4)	107. (3)	108. (2)	109. (1)	110. (2)
111. (4)	112. (3)	113. (4)	114. (3)	115. (1)
116. (4)	117. (1)	118. (3)	119. (1)	120. (4)
121. (1)	122. (2)	123. (3)	124. (2)	125. (3)
126. (2)	127. (2)	128. (3)	129. (3)	130. (4)
131. (2)	132. (2)	133. (4)	134. (3)	135. (4)
136. (1)	137. (2)	138. (4)	139. (2)	140. (2)
141. (1)	142. (3)	143. (1)	144. (1)	145. (3)
146. (1)	147. (2)	148. (1)	149. (2)	150. (3)
151. (1)	152. (1)	153. (4)	154. (3)	155. (1)
156. (3)	157. (1)	158. (3)	159. (3)	160. (2)
161. (2)	162. (3)	163. (4)	164. (3)	165. (2)
166. (3)	167. (4)	168. (3)	169. (3)	170. (1)
171. (2)	172. (2)	173. (3)	174. (2)	175. (3)
176. (3)	177. (4)	178. (3)	179. (3)	180. (4)

## SOLUTIONS

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1. (2)

$$g \propto \frac{l}{T^2} \quad \frac{\Delta g}{g} = \frac{\Delta l}{l} + \frac{2\Delta T}{T}$$

$$\frac{\Delta g}{g} = \left( \frac{0.1}{20} + \frac{1 \times 2}{90} \right) \times 100\% = 3\%$$

2. (4)

$$t_{\text{total}} = \sqrt{\frac{2h}{g}} \quad t_2 = \sqrt{\frac{2h}{g}} - \sqrt{\frac{h}{g}}$$

$$t_1 = \sqrt{\frac{2 \times h}{2g}}$$

$$t_1 = \frac{t_2}{\sqrt{2} - 1}$$

3. (2)

$$V_{\text{max}} = \frac{1}{2} \times 10 \times 11 = 55 \text{ m/s}$$

4. **Correct option is (1)**

**Solution:**

$$\begin{aligned} B &= \frac{\mu_0 I}{4\pi r} [\sin \alpha + \sin \beta] \\ &= \frac{(10^{-7})(2)}{4} \left[ 0 + \frac{3}{5} \right] \\ &= 30 \times 10^{-9} \text{ T} \\ &= 30 \text{ nT} \end{aligned}$$

5. (4)  $\vec{V}_{AB} = \vec{V}_B - \vec{V}_A$

6. (3)

$$15 \cos 30^\circ = \frac{V^2}{R}$$

$$V^2 = 15 \times \frac{\sqrt{3}}{2} \times 2.5 = 5.7 \text{ m/s}^2$$

7. **Correct option is (4)**

**Solution:**

$$I = (F)(\Delta t) = (mg)(2u/g) = 2mu = (2m)(\sqrt{2gh}) = \sqrt{8m^2gh}$$

8. **Correct option is (2)**

**Solution:**

Fraction of length of the chain hanging from the table

$$= \frac{1}{n} = \frac{60\text{cm}}{200} = \frac{3}{10}$$

$$\frac{1}{n} = \frac{3}{10}$$

$$n = \frac{10}{3}$$

work done in pulling the chain on the table

$$W = \frac{mgL}{2n^2} = \frac{4 \times 10 \times 2}{2 \times \left(\frac{10}{3}\right)^2} = 3.6 \text{ J}$$

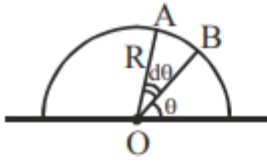
9. **Correct option is (4)**

**Solution:**

90% of the sample is decayed and 10% is undecayed. Fraction of  $(1/10)$  lies between  $(1/2)^3$  to  $(1/2)^4$ ; so the time is less than 4 half-life periods but more than 3 half-life periods, i.e., between 30 to 40 days. The correct choice is 33 days.

10. **Correct option is (2)**

**Solution:**



Mass per unit length of the rod =  $\frac{M}{L}$

Mass of small element AB,

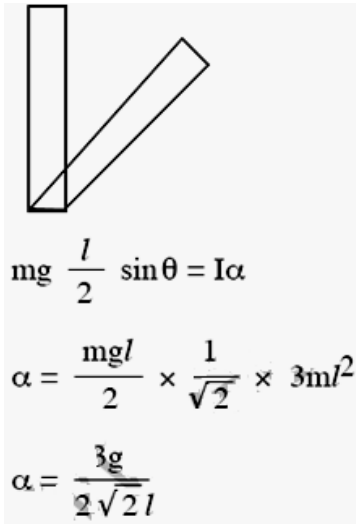
$$dm = \left(\frac{M}{L}\right)R d\theta$$

Potential at O due to this element is

$$dV = -G \cdot \frac{dm}{R} = -\frac{GM R d\theta}{L R} = -\frac{GM}{L} d\theta$$

$$\therefore V = \int dV = -\frac{GM}{L} \int_0^\pi d\theta = -\frac{\pi GM}{L}$$

11. (1)



12. (4)



13. (3)

$$2\pi r T \cos\theta = mg$$

$$m \propto r$$

14. (4)

$$I \propto R^2$$

$$\frac{\Delta T}{I} = 2 \frac{\Delta R}{R} = 2\alpha \Delta t$$

$$= 2 \times 10^{-5} \times 200 \times 100\% = 0.4$$

15. (2)

$$V_P = KV_e \quad (K > 1)$$

Body reaches interstellar space

$$-\frac{Gmm}{R} + \frac{1}{2} mV_P^2 = \frac{1}{2} mV_1^2$$

$$V_e = \sqrt{\frac{2Gm}{R}}$$

$$V_1 = V_e (K^2 - 1)$$

16. Correct option is (1)

**Solution:**

$$W = 8\pi T(r_2^2 - r_1^2)$$

17. (1)

$$\frac{dw}{d\theta} = 1 - \frac{1}{r}$$

$$= 1 - \frac{3}{4} = \frac{1}{4} \times 100 = 25\%$$

18. (1)

$$V_{r.m.s} = \sqrt{\frac{3RT}{M}}$$

$$V_{r.m.s} \propto \sqrt{T}$$

19. (1)

$$\frac{\Sigma l}{K_{\text{ef}}} = \frac{l_1}{k_1} + \frac{l_2}{k_2}$$

$$\frac{2}{K_{\text{ef}}} = \frac{1}{3} + \frac{1}{4}$$

$$K_{\text{ef}} = \frac{2 \times 3 \times 4}{7} = 3.43$$

20. (1)

$Q = ms\Delta t$  ; 'Q' same

$ms\Delta t = \text{constant}$  ; 'S' same

$$\Delta t \propto \frac{1}{m} \quad \alpha = \frac{\Delta l}{u\Delta t} = \frac{\Delta R}{R\Delta t}$$

$$\frac{\Delta R}{\alpha R} \propto \frac{1}{m}$$

$\Delta R \propto R$  Hollow more radius

21. Correct option is (4)

**Solution:**

$$B_1 = \frac{\mu_0 I}{4\pi R} \odot$$

$$B_2 = \frac{\mu_0 I}{4R} \odot$$

$$B_3 = \frac{\mu_0 I}{4\pi R} \odot$$

$$B_4 = 0$$

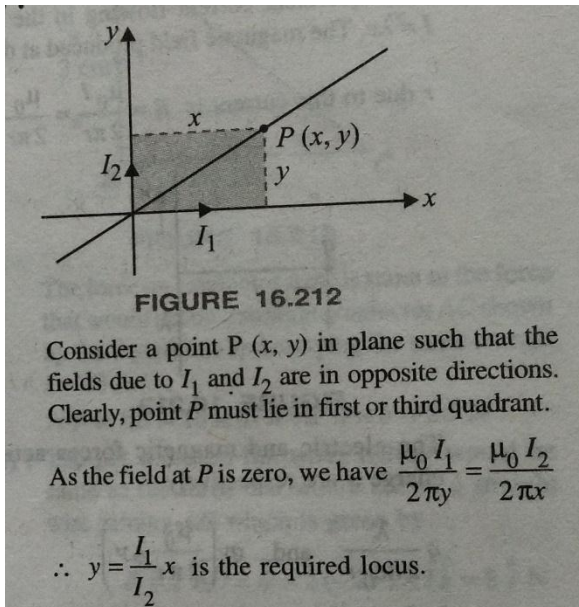
$$B_5 = \frac{\mu_0 I}{4R} \otimes$$

$$B_6 = 0$$

$$B_{\text{net}} = B_1 + B_2 + B_3 + B_4 + B_5 + B_6 = \frac{\mu_0 I}{2\pi R} \odot$$

22. Correct option is (2)

**Solution:**



23. (3) Zero

24. Correct option is (2)

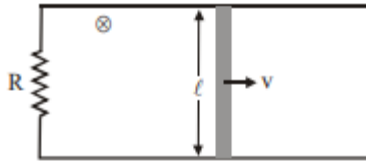
Solution:

$$F_{av} = \frac{0 + F}{2} = \frac{F}{2}$$

$$W = \left( \frac{0 + F}{2} \right) \ell = \frac{F\ell}{2}$$

25. Correct option is (2)

Solution:



induced current  $i = B\ell v/R$

Retarding force  $f = i\ell B$

$$f = \left( \frac{B\ell v}{R} \right) \ell B$$

$$f = \frac{B^2 \ell^2 v}{R}$$

So required force =  $\frac{B^2 \ell^2 v}{R}$

$f \propto v$  so graph is st. line

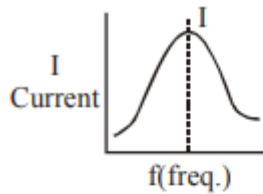
Power =  $f \cdot v$

$$P = \frac{B^2 \ell^2 v^2}{R}$$

$P \propto v^2$  graph is parabola

26. Correct option is (1)

Solution:



$$Z = \sqrt{R^2 + (x_L - x_C)^2}$$

(i)  $I_{\max} = \frac{E}{R}$   $R \downarrow \downarrow I_{\max} \uparrow \uparrow$

(ii)  $Q = \frac{1}{R} \sqrt{\frac{L}{C}}$  If  $R \downarrow \downarrow Q \uparrow \uparrow$

(ii)  $Q = \frac{f_r}{\Delta f}$  If  $R \downarrow \downarrow Q \uparrow \uparrow \Delta f \downarrow \downarrow$  So sharpness of graph will increase.

27. (1) Wheatstone bridge  $10 \square$  and  $10 \square$  are ineffective.



28. (2)

$$\frac{\epsilon_1 + \epsilon_2}{\epsilon_1 - \epsilon_2} = \frac{8}{2} = 4$$

$$\epsilon_1 + \epsilon_2 = 4\epsilon_1 - \epsilon_2$$

$$5\epsilon_2 = 3\epsilon_1$$

$$\frac{\epsilon_1}{\epsilon_2} = \frac{5}{3}$$

29. (1)

$\vec{M}$  and  $\vec{B}$  are parallel

30. (4)

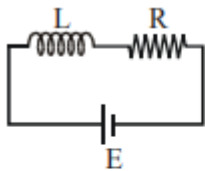
31. (3)

$$F = qVB \quad \frac{1}{2} mV^2 = Vq$$

$$F \propto \sqrt{V}$$

32. Correct option is (3)

Solution:



If cell is replaced by ac source then power factor

$$\cos \phi = \frac{R}{\sqrt{R^2 + \omega^2 L^2}}$$

$$\cos \phi = \frac{1}{\sqrt{1 + \omega^2 \left(\frac{L}{R}\right)^2}}$$

$$\cos \phi = \frac{1}{\sqrt{1 + \omega^2 \tau^2}}$$

33. (2)

$$P_{eQ} = P_1 + P_2 - P_1 P_2$$

$$= 4 + 6 - 4 \times 6 \times \frac{1}{6} = 6D^2$$

34. Correct Option is (3)

**Solution:**

$$I_R = I_{\max} \cos^2 \left( \frac{\phi}{2} \right)$$

$$\phi = \frac{2\pi}{\lambda} \times d \sin \theta = \frac{2\pi}{\lambda} \times \frac{dy}{D}$$

$$\beta = \frac{\lambda D}{d}$$

35. (2)

$$F = mB$$

$$ma = 4 \times 10^{-3} \times 20$$

$$a = \frac{4 \times 10^{-3} \times 20}{10^{-3}} = 80 \text{ m/s}^2$$

36. Correct option is (1)

**Solution:**

Let potential at point E be V and A, B, C are neutral point. (zero potential point)

Apply KCL at point E

$$\frac{V-10}{1} + \frac{V-30}{2} + \frac{V+50}{2} = 0$$

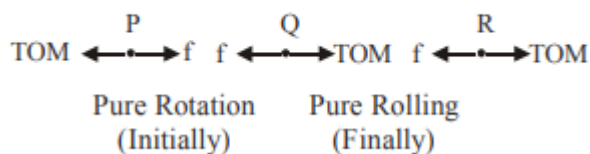
$$2(V-10) + V - 30 + V + 50 = 0$$

$$4V = 0 \quad \Rightarrow \quad V = 0$$

37. Correct option is (2)

**Solution:**

Frictional force act in opposite direction to tendency of motion of contact point.



38. (2)

39. (3)

40. (3)

$$V_A - 5 + 15 + 10^3 \times 5 \times 10^{-3} = V_B$$

$$V_A - V_B = -15$$

$$V_B - V_A = 15 \text{ V}$$

41. (3)

$$F = i l B \quad i = \frac{e}{R} = \frac{B l V}{R_e Q}$$

$$F = \frac{B^2 u^2 \times V}{R_e Q}$$

$$F = \frac{4 \times 1 \times 2}{4} = 2 \text{ N}$$

42. (4)

$$20i_1 = 30 \times 2$$

$$i_1 = 3$$

$$i_{\text{total}} = 5 \text{ A}^2$$

43. (4)

$$\frac{2\pi}{3} = \frac{2\pi}{\pi}$$

$$\lambda = 3$$

$$x = \frac{\lambda}{2} = \frac{3}{2} = 1.5 \text{ cm}$$

44. Correct option is (1)

Solution:

$$F = N = 1000 \text{ N} \quad f_L = 1000 \times 0.1 = 100 \text{ N}$$

$$F_{\text{req}} = 50 \text{ N (mg)} \quad \because f_{\text{req.}} < f_L$$

$$\therefore f_{\text{req.}} = 50 \text{ N}$$

45. (3)

$$2\lambda \cos \theta = x$$

$$\cos \theta = \frac{1}{2}$$

$$\theta = 60^\circ$$

$$\tan 60^\circ = \frac{x}{D}$$

$$x = \sqrt{3} D$$

46.  $\Delta H = (E_a)_{\text{forward}} - (E_a)_{\text{backward}}$   
 $\Rightarrow (E_a)_{\text{backward}} = 20 - (-38) = 58 \text{ kcal}$

52.  ${}_4\text{Be} \Rightarrow 1s^2 2s^2$   
 $\Rightarrow n = 2, \ell = 0, m = 0, s = +\frac{1}{2} \text{ or } -\frac{1}{2}$

56.  $\text{pH} = 3.2 \Rightarrow \text{pOH} = 14 - 3.2 = 10.8$   
 $\Rightarrow -\log [\text{OH}^-] = 10.8$   
 $\Rightarrow [\text{OH}^-] = 10^{-10.8}$

62. To make 0.5 M solution, 0.01 mole KCl i.e. 0.75 gm KCl should be added to 100 ml 0.40 M KCl solution.

70.  $T = \text{constant} \Rightarrow dT = 0$

$$\text{heat capacity (c)} = \frac{dq}{dT} = \frac{dq}{0} = \infty$$

74.  $\Delta E = \Delta H - \Delta n_g RT = -26.4 \text{ kcal} - \frac{1}{2} \times \frac{2}{1000} \times 300 \text{ kcal}$   
 $= -26.7 \text{ kcal.}$

79.  $\Delta H = \sum (\Delta H_{\text{combustion}})_{\text{Reactant}} - \sum (\Delta H_{\text{combustion}})_{\text{Product}}$   
 $= (-3800 - 241) - (-3920) = -121 \text{ kJ mol}^{-1}$

83.  $Q = it = \frac{W}{E} \times F = \frac{0.1 \times 63.5}{63.5} \times 96500$   
 $= 19300 \text{ coulombs}$

84.  $N_3 V_3 = N_1 V_1 + N_2 V_2$   
 $3 \times V_3 = 6 \times 350 + 3 \times 650$   
 $V_3 = 700 + 650 = 1350$   
 volume of added water  
 $= 1350 - (350 + 650)$   
 $= 350 \text{ mL}$

88.  $Q = \frac{W}{E} \times F = \frac{8}{1} \times F = 8 F$

89.  $\text{Rate} = K[A]^3 \Rightarrow K = \frac{5 \times 10^{-2}}{(0.1)^3} = 50 \text{ L}^2 \text{ mol}^{-2} \text{ s}^{-1}$

91. (4) NCERT XI: Pg. no. 10

92. (1) page no.16, 2<sup>nd</sup> paragraph

93. (4) NCERT XII – Pg 22

94. (1) NCERT XI page 34

95. (4) NCERT XI page 38, 39

96. (4) NCERT XII – Pg 10

97. (2) NCERT XII – Pg 39

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

99. (2) NCERT XI, Pg No.166

100. (4) No. of mitotic cells =  $2^n$  where n is the no. of generations. Thus to make 256 cells the cell has to undergo 8 cycles of mitosis

101. (1) NCERT pg no 80

102. (1) NCERT XI -80

104. (2) page no. 94,96 , 6.4.1.3

103. (2)

105. (1) page no 84, 6.1.1 Meristematic tissue

106. (4) 0 and less than zero.
107. (3) NCERT XII – Pg 13
108. (2) Pg. no. 197
109. (1) NCERT XII – Pg 89-90
110. (2) NCERT XII – Pg 92
111. (4) NCERT pg no 219
112. (3) NCERT XII – Pg 34
113. (4) Monosomy is absence of 1 out of a pair of chromosomes i.e.  $2n - 1$  – Principles of inheritance & variation
114. (3) Haploidy :  $n$   
 Monosomy :  $2n - 1$   
 Nullisomy :  $2n - 2$   
 Trisomy :  $2n + 1$   
 Tetrasomy :  $2n + 2$   
 – Principles of inheritance & variation
115. (1) NCERT XII – Pg 232 – Respiration
116. (4) NCERT XI page 250
117. (1) NCERT XI page 248
118. (3) NCERT XI page 245
119. (1) NCERT XII – Pg 79,80,81
120. (4) Flagella has 3 parts- Basal Body,Flagella,Filament
121. (1) 3-celled
122. (2) NCERT XII – Pg 86 – Principles of inheritance & variation
123. (3) page no 83, 5.3.3, Linkage and recombination
124. (2) page no 73
125. (3) Mesosomes has enzymes responsible for respiration.
126. (2) NCERT XII, Pg. no.96, 97
127. (2) UAG is amber
128. (3) NCERT XII PG.122
129. (3) NCERT XII page 174
130. (4) NCERT XII page 176
131. (2) Phosphoglyceraldehyde is changed to biphosphoglyceric acid through Phosphorylation and oxidation
132. (2) NCERT pg no 182
133. (4) RQ of protein is 0.9
134. (3) High birth and low death rate
135. (4) NCERT-XII Pg.no.243
136. (1) Calcitonin secreted by Thyroid gland. JG cells secrete Calcitriol.
137. (2) XI NCERT pg 303. 4th para
138. (4) XI NCERT pg337 ,last para, Glucagon-peptide , hyperglycemic hormone.
139. (2) XI NCERT pg 321, 2<sup>nd</sup> para
140. (2) XI NCERT pg306, 2<sup>nd</sup> para
141. (1) XI NCERT pg 105, 1<sup>st</sup> para, smooth muscle have gap junctions.
142. (3) It does not have collagen, RBCs perform anaerobic respiration. Blood is neither loose, nor dense; rather it is a specialised connective tissue.
143. (1) XI NCERT pg113, 1<sup>st</sup> para
144. (1) Each eye-2000 ommatidia, anal cerci-both male and female cockroach, ootheca-14 to 16 fertilised eggs
145. (3) XI NCERT pg 47 ,last figure
146. (1) XII NCERT pg52, 1<sup>st</sup> para
147. (2) Zona pellucida is made of glycoproteins.

148. (1) XII NCERT pg 147, last para
149. (2) XII NCERT pg 153, 3<sup>rd</sup> para
150. (3) All other diseases except Ringworm are mosquito borne diseases.
151. (1) Pg 48,2<sup>nd</sup> para
152. (1) Pg 54,1<sup>st</sup> para
153. (4) Birds are uricotelic and to reduce body weight, urinary bladder absent.
154. (3) Pg 322, fig 21.5
155. (1) In Myopia ,Eyes cannot focus on objects placed at far distance and hence can be corrected by using concave lens.
156. (3) Tongue movements is controlled by hypoglossal nerve.
157. (1) Pg 336 1stpara
158. (3) pg 332,337
159. (3) Pg 333,2<sup>nd</sup>para
160. (2) Silk is a beta pleated protein which contains central core of fibroin and outer core of sericin.
161. (2) Ends of bones have hyaline or articular cartilage.
162. (3) XI NCERT pg309
163. (4) Amniocentesis for sex determination is banned in India to control female foeticide.
164. (3) Demographic transition is a state of steady population.
165. (2) Origin of life as per Chemical evolution , simple inorganic molecules converted to complex organic molecules and eventually cells.
166. (3)
167. (4) Paul Berg is Father of Genetic Engineering
168. (3) Chimeric DNA= cloning vector DNA+ gene of interest
169. (3) Transgenic cow- Rosie. REN is used for spicing DNA.
170. (1)
171. (2)
172. (2) Inspiration is active process as it involves muscle contraction.
173. (3) Goblet cells are located in the intestinal mucosal epithelium and secrete MUCOUS. Fats are broken down into di- and monoglycerides with the help of LIPASE. Saliva contains enzymes that digest COOKED STARCH.
174. (2) XI NCERT pg 159,
175. (3) XI NCERT pg 299, 1<sup>st</sup> line
176. (3) During ejection of blood the atrial pressure and the aortic pressure both are less than that of ventricles.
177. (4) Respiratory rhythm centre- Medulla
178. (3) Excessive gastrin will stimulate the oxyntic cells to produce more HCl and hence can cause ulcer.
179. (3)
180. (4) Na is not secreted in glomerular filtrate. Conditional reabsorption of Na takes place at DCT.