AVIRAL CLASSES
CREATING SCHOLARS
JEE (ADVANCED), PMT & FOUNDATIONS

UTS- NEET -2020
MOCK TEST-03 SOLUTION

ANSWER KEY

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

1.

Component of $\vec{x}$ on $\vec{y}$ = $x\cos\theta$

$$= \frac{\vec{x}\cdot\vec{y}}{y} = \frac{(\vec{a}-\vec{b})\cdot(\vec{a}+\vec{b})}{|\vec{a}+\vec{b}|}$$

$$= \frac{a^2-b^2}{\sqrt{a^2+b^2}}$$

2.

$$KE = \frac{J^2}{2I}$$

3. (3)
4. (2)

5.

$x = 5.0\cos(2\pi t + \pi) = -5.0\cos 2\pi t$

$$\text{Velocity} = \frac{dx}{dt} = 10\pi\sin 2\pi t$$

$$\text{Acceleration} = \frac{d^2x}{dt^2} = 20\pi^2\cos 2\pi t$$

$\therefore$ At t = 1.5 sec,

$x = -5.0\cos 3\pi = -5.0(-1) = 5$

$$\text{Velocity} = \frac{dx}{dt} = 10\pi(\text{zero}) = 0$$

$$\text{Acceleration} = \frac{d^2x}{dt^2} = 20\pi^2(-1) = -20\pi^2$$

6.

According to work energy theorem

$W_{mg} + W_F = \Delta K$

$Mg(h + S) - FS = 0 \qquad [K_i = K_f = 0]$

$FS = Mg(h + S)$

$$\boxed{F = Mg\left(1+\frac{h}{S}\right)}$$

7.

$\vec{v}_B = 2\vec{v}_A$

$\vec{v}_{CA} = x\hat{i} \Rightarrow \vec{v}_C - \vec{v}_A = x\hat{i} \qquad \ldots (1)$

$\vec{v}_{CB} = x\hat{j} \Rightarrow \vec{v}_C - \vec{v}_B = x\hat{j}$

$\Rightarrow \vec{v}_C - 2\vec{v}_A = x\hat{j} \qquad \ldots(2)$

Multiply eq. (1) by (2) and subtract eq. (2) from it

$2\vec{v}_C - 2\vec{v}_A - (\vec{v}_C - 2\vec{v}_A) = 2x\hat{i} - x\hat{j}$

$\vec{v}_C = 2x\hat{i} - x\hat{j}$

$$\text{dir}^n. = E\tan^{-1}\left(\frac{x}{2x}\right)S = E\tan^{-1}\left(\frac{1}{2}\right)S$$

8.

$u = -25 \qquad v = -50$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{50}$$

$\therefore \quad P = 2D$

9. (3)

10.

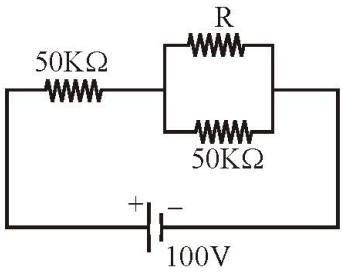
No conduction is found between P & Q so both P & Q will be n-type or p-type. Therefore R will be base.

11.

$$a_{\text{after 50 s}} = \frac{F}{M_{\text{after 50 s}}} = \frac{v\frac{dm}{dt}}{1500 - 10\times 50}$$

$$= \frac{5000\times 10}{1000} = 50 m/s^2$$

12.



$$V_2 = \frac{R_2}{R_1 + R_2}\times V$$

$$\frac{100}{3} = \frac{\frac{50\times R}{50+R}}{\frac{50\times R}{50+R} + 50}\times 100$$

$\Rightarrow R = 50\ K\Omega$

13.

$$\Delta x = \frac{5\lambda}{2}$$

$$\frac{\Delta x}{\lambda} = \frac{\Delta\phi}{2\pi}$$

$\Delta\phi = 5\pi$

14.

$T_{1/2} = 0.7\ RC$

$$R = \frac{T_{1/2}}{0.7C} = \frac{70\times 10^{-3}}{0.7\times 2\times 10^{-6}} = \frac{10^5}{2} = 5\times 10^4$$

$R = 50 \times 10^3\ \Omega = 50\ k\Omega$

15.

$$\frac{5V}{4L} = \frac{2V}{2L} + 100$$

$$\frac{V}{2L}\left(\frac{5}{2} - 2\right) = 100$$

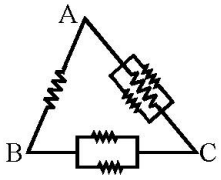
$$\frac{V}{2L} = 200$$

16. (4)

17.

$$F_{avg} = \frac{\Delta p}{\Delta t} = \frac{2M(u+v)}{t}$$

18.



$$R_{AB} = r, \quad R_{BC} = \frac{r}{2}$$

$$R_{AC} = \frac{r}{3}$$

19.

$$R_F \propto \frac{A}{MS} \propto \frac{1}{\rho s} \text{ [T, } T_0, e_r, r = \text{same]}$$

20.

$$\vec{F}_{net} = 0$$

$$\vec{F} + \vec{F}_{remaining} = 0$$

$$\vec{F}_{remaining} = -\vec{F}$$

21.

$$T_P = M_{below} \times (g + a) = (3 + 5)(10 + 10) = 160N$$

22. (3)

23.

$$a_r = \frac{g\sin\theta}{1 + K^2/r^2}$$

For shell $\frac{K^2}{r^2} = \frac{2}{3}$

$$a_r = \frac{3}{5} g \sin\theta \qquad \text{------- (1)}$$

but $a_S = g \sin\theta$ -------- (2)

dividing the two equations

$$\frac{a_r}{a_S} = \frac{3}{5}$$

24. (3)

25.

For isothermal process

$$P \propto \frac{1}{V}$$

Volume expends to double so pressure will be halved for adiabatic process

PV^r = const

$$\frac{P_1}{P_2} = \left(\frac{V_2}{V_1}\right)^{\frac{5}{3}}$$

$$\frac{P/2}{P_2} = \left(\frac{16V}{2V}\right)^{\frac{5}{3}}$$

$$P_2 = \frac{P}{64}$$

26.

$$8 = I_B R_B + V_{BE}$$

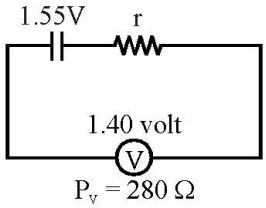
$$\Rightarrow 8 = \left(\frac{4\times10^{-3}}{100}\right) R_B + 0.6$$

$$\Rightarrow R_B = 185\ k\Omega$$

27.

Thermal Tension F = YA α $\Delta\theta$

28.



1.40 = 1.55 – ir ...(i)

but $i = \frac{1.55}{280 + r}$ ...(ii)

On solving we get

r = 30 Ω

29.

$$v_{rms} \propto \frac{1}{\sqrt{M_W}} \Rightarrow \frac{v_1}{v_2} = \sqrt{\frac{M_{W_2}}{M_{W_1}}}$$

$$\Rightarrow \frac{v}{\sqrt{2}v} = \sqrt{\frac{M_{W_2}}{32}} \Rightarrow M_{W_2} = 16(CH_4)$$

30.

$$\frac{dQ}{dt} = \frac{KA\Delta T}{\ell} \qquad (\because A \propto r^2)$$

$$\frac{dQ}{dt} \propto \frac{r^2}{\ell}$$

31. (4)

32.

$$\frac{\phi_1}{\phi_2} = \frac{\lambda_2}{\lambda_1} = \frac{2}{1}$$

33.

Total distance covered by two wheels is same

$2\pi r_1 n_1 = 2\pi r_2 n_2$

or $0{\cdot}5 \times 200 = 0{\cdot}1 n_2 \Rightarrow n_2 = 1000$ rpm

34.

$$\text{Phase diff.} = \frac{\pi}{3} - \frac{\pi}{6} = \frac{\pi}{6}$$

$$Z = \frac{200}{2} = 100\,\Omega \qquad \sin\phi = \frac{X}{Z}$$

$$X = \sin\left(\frac{\pi}{6}\right) \times 100 = 50\,\Omega$$

I leads E so reactance is capacitive.

35.

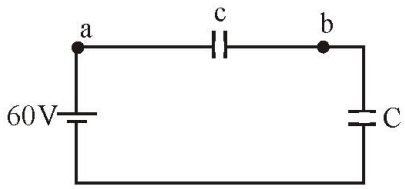
Volume remains same $\Rightarrow$ AL = A'(2L)

$$A' = \frac{A}{2}\,;\ R_i = \frac{\rho L}{A}$$

$$R_f = \frac{\rho(2L)}{(A/2)} = 4R_i$$

$$\%\text{change} = \frac{4R_i - R_i}{R_i} \times 100 = 300\%$$

36.



$$V_{ab} = \frac{60}{2} = 30V$$

37.

Since $P' = n^3P$

$\because$ n = 3 $P' = 27P$

38.

Apply energy conservation

Energy at surface = Energy at height

$$\frac{-GM_em}{R_e} + \frac{1}{2}m\left(\frac{v_e}{2}\right)^2 = \frac{-GM_em}{(R_e+h)}$$

but $v_e^2 = \frac{2GM_e}{R_e}$

Hence $$\frac{-GM_em}{R_e} + \frac{1}{4}\frac{GM_em}{R_e} = \frac{-GM_em}{R_e+h}$$

Hence $R_e + h = \frac{4}{3}R_e$

$$\boxed{h = \frac{R_e}{3}}$$

39.

$$n' = n\frac{V+V_c}{V-V_c}$$

$$n' = 700\left(\frac{352+2}{352-2}\right)$$

n' = 708 Hz

40.

near A $\longrightarrow$ +ve potential

near B $\longrightarrow$ –ve potential

$a_A = (+)$

$a_B = (-)$

Also potential at both $-\infty$ & $+\infty$ are +ve

$\Rightarrow$ a_A dominates a_B

So $|a_A| > |a_B|$

41.

$$\frac{2u_y}{g} = \frac{2u_x u_y}{g} = \frac{\sqrt{3}}{g}$$

$$\therefore\ u_x = 1\ \&\ u_y = \frac{\sqrt{3}}{2}$$

$$\therefore\ \tan\theta = \frac{u_y}{u_x} = \frac{\sqrt{3}}{2} \Rightarrow \theta = \tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$$

42.

$$M = \frac{f_o}{f_e} = 5 \qquad \therefore\ f_o = 5f_e$$

$$f_o + f_e = 24 \qquad 6f_e = 24$$

$$\boxed{f_e = 4} \qquad \text{and} \qquad \boxed{f_o = 20}$$

43.

sol. $PV^{\gamma} = \text{const.} \Rightarrow v^{\gamma} \propto \frac{1}{P}$

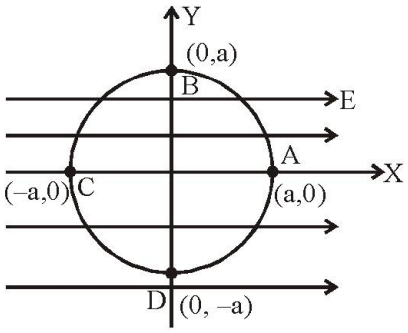
$TV^{\gamma-1} = \text{constant} \Rightarrow V^{\gamma-1} \propto \frac{1}{T}$

44.

$$e = -L\frac{di}{dt}$$

$$= -6\times10^{-3}\left(-\frac{(7-5)}{(5-2)\times10^{-3}}\right) = 4V$$

45.



$V_B = V_D$

in direction of electric field potential will be decreased

So $V_C > V_B = V_D > V_A$

46. (3)

47. (3)

48.

2–amino pyridine is not present in nucleic acid

49. (2)

50.

$M_1\ V_1 = M_2\ V_2$

$$V_2 = \frac{M_1V_1}{M_2} = \frac{0.25\times40}{0.1} = 100\ \text{cc}$$

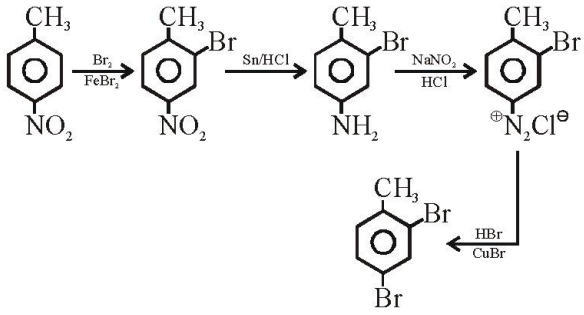
$\therefore\ V_2 - V_1 = 100 - 40 = 60$ cc

51. (4)

52. (3)

53. (2)

54.



55.

H_3PO_4 n = 2 $\frac{48}{2} = 49$

NaOH n = 1 $\frac{40}{1} = 40$

56. (1)
57. (3)
58. (4)
59.

$$V_1^H = 2.18 \times 10^6 \times \frac{z}{n} = 2.18 \times 10^6 \text{ m/s}$$

$$\Delta V = 2.18 \times 10^6 \times \frac{0.1}{100} = 2.18 \times 10^3 \text{ m/s}$$

$$\Delta x \times m \times \Delta V = \frac{h}{4\pi}$$

$$\Delta x \times 9.1 \times 10^{-31} \times 2.18 \times 10^3 = \frac{6.62 \times 10^{-34}}{4 \times 3.14}$$

$$\Delta x = 2.66 \times 10^{-8} \text{ m.}$$

60.

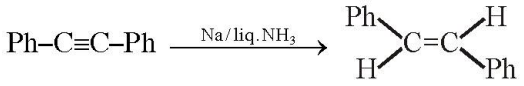
$$\alpha = \frac{\wedge_M}{\wedge^\circ_M}$$

$$\alpha = \sqrt{\frac{K_a}{C}} = \sqrt{\frac{1.75 \times 10^{-5}}{0.01}} = \sqrt{1.75 \times 10^{-3}} = 4.2 \times 10^{-2}$$

$$\wedge_M = \alpha \wedge^\circ_M = 4.2 \times 10^{-2} \times 390.6 \times 10^{-4}$$

$$K = \frac{\wedge_M \times M}{1000} = \frac{4.2 \times 10^{-2} \times 390.6 \times 10^{-4} \times 0.01}{1000}$$

61. (3)
62. (3)
63.



(Birch Reduction)

64.

$$K_1 = \frac{[CO]^2[H_2O]^2}{[CO_2]^2[H_2]^2}$$

$$K_2 = \frac{[CH_4][H_2O]}{[CO][H_2]^3}$$

$$K_3 = \frac{[CO_2][H_2]^4}{[CH_4][H_2O]^2}$$

$$K_3 = \frac{1}{K_2 \times K_1^{1/2}}$$

65. hcp and ccp both have same C.N. = 12.
66. (1)
67. (2)
68.

Chlorobenzene on hydrolysis gives phenol.

69.

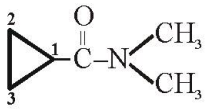
$$K_h = \frac{K_w}{K_a}$$

$$K_a = \frac{K_w}{K_h} = \frac{10^{-14}}{3 \times 10^{-7}}$$

70.

$$\Delta H = E_{af} - E_{ab}$$
$$O = E_{af} - E_{ab}$$
$$E_{af} = E_{ab}$$

71. (4)
72.



N,N–Dimethyl Cyclopropane Carboxamide

73.

Reactivity of halide $\propto$ stability of carbocation

74.

$$FCH_2COOH + BOH \rightarrow FCH_2COOB + H_2O$$

10m mol	5m mol	0	0
5m mol	0m mol	5m mol	

For acidic buffer $pH = PK_a + \log \frac{[Salt]}{[Acid]}$

$PK_a = -\log Ka$

75.

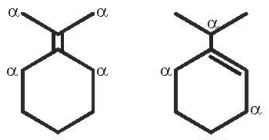
$\Pi = CST$
$= 1.0 \times 10^{-3} \times 0.0821 \times 298$ atm.
$= 18.6$ mm

76. (3)
77. (1)
78. (1)
79.

$C_{graphite} + O_2(g) \rightarrow CO_2(g)$

It represent enthalpy of combustion of graphite as well as enthalpy of formation of $CO_2(g)$

80. (4)
81. (4)
82.



(I) (II)

α-H ⇒10 α-H ⇒5

⇒ 10 + 5 = 15 α–Hydrogen

83. (3)
84.

In HIO_4 and H_3BO_3 central atom present in highest oxidation state so act as oxidant only.

85. (3)
86. (4)
87.

Q and R shows aromatic character due to Huckle rule.

88. (1)
89. (3)
90. (4)