

## JEE MAIN-2017 PHYSICS Code-C Solution

61. (2)

$\frac{f_0}{f_s} = \sqrt{\frac{c-v}{c+v}}$ , Here v is positive, when moving away and v is negative when approaching

$$f_0 = f_s \sqrt{\frac{c - \left(-\frac{c}{2}\right)}{c + \left(-\frac{c}{2}\right)}}$$

$$f_0 = f_s \times \sqrt{3}$$

$$f_0 = 17.3 \text{ Ghz}$$

62. (1)

$$T = \frac{r h g}{2}$$

$$\frac{\Delta T}{T} \times 100 = \frac{\Delta r}{r} \times 100 + \frac{\Delta h}{h} \times 100$$

after solving = 1.5%

63. (3)

$$-E + \frac{4}{3} E = \left(\frac{1}{3} E = \frac{hc}{\lambda_2}\right) \Rightarrow \lambda_2 = \frac{3hc}{E} \quad \dots (1)$$

$$-E + 2E \Rightarrow E = \frac{hc}{\lambda_1} \Rightarrow \lambda_1 = \frac{hc}{E} \quad \dots (2)$$

$$\frac{\lambda_1}{\lambda_2} = \frac{hc}{E} \times \frac{E}{3hc} = \frac{1}{3}$$

64. (2)

$$\therefore \frac{1}{2} mv^2 = \frac{1}{8} mv_0^2; \quad v = \frac{v_0}{2} = 5 \text{ m/s};$$

$$f = -kv^2; \quad m \frac{dv}{dt} = -kv^2; \quad \int_{10}^5 \frac{dv}{v^2} = -\int_0^{10} \frac{k}{m} dt$$

$$\frac{v^{-2+1}}{-2+1} = \frac{-k}{m} [t]_0^{10}, \quad \left[\frac{-1}{v}\right]_{10}^5 = \frac{-k}{m} \times 10$$

$$-\frac{1}{5} + \frac{1}{10} = -\frac{k}{m} \times 10; \quad -\frac{1}{10} = \frac{-k}{10^{-2}} \times 10$$

$$k = \frac{10^{-2}}{100} = 10^{-4} \text{ kg/m}$$

65. (2)

$C_p - C_v = R$  (does not depend on the nature of gas)

66. (4)

$$I = \frac{mR^2}{2} + \frac{ml^2}{3} = \frac{mR^2}{2} + \frac{m}{3} \times \frac{V^2}{\pi^2 R^4}$$

Volume of cylinder

$$V = \pi R^2 l; \quad l = \frac{V}{\pi R^2}$$

For minima

$$\frac{dI}{dR} = 0; \quad \Rightarrow mR + \frac{mV^2}{3\pi^2} \frac{(-4)}{R^5} = 0; \quad R = \frac{4V^2}{3\pi^2 R^5}$$

After putting the value of V

$$\frac{l}{R} = \frac{\sqrt{3}}{2}$$

67. (1)

At time t

$$\frac{N_B}{N_A} = .3 \Rightarrow N_B = .3 N_A$$

also let initially there are total  $N_0$  number of nuclei  $N_A + N_B = N_0$

$$N_A = \frac{N_0}{1.3}$$

Also as we know

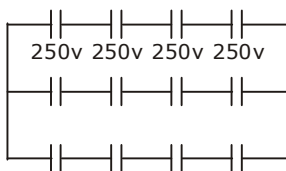
$$N_A + N_0 e^{-\lambda t}; \quad \frac{N_0}{1.3} = N_0 e^{-\lambda t}; \quad \frac{1}{1.3} = e^{-\lambda t} \Rightarrow \ln(1.3) = \lambda t \text{ or } t = \frac{\ln(1.3)}{\lambda}$$

$$t = \frac{\ln(1.3)}{\ln(2)} = \frac{\ln(1.3)}{\ln(2)} T$$

68. (1)

In balanced cond null point will not disturb.

69. (3)



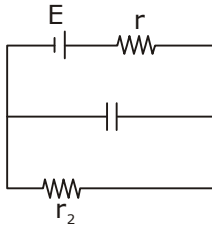
There should be + capacitor in series and voltage across each capacitor =  $\frac{1000}{4} = 250$  V.

capacitance of each capacitor =  $1 \mu\text{F}$ ; capacitance of combination of 4 capacitor =  $\frac{1}{4} \mu\text{F}$

no. of branches =  $\frac{2\mu\text{F}}{\frac{1}{4}\mu\text{F}} = 8$ ; There should be 8 branches and each has 4 capacitor

$\therefore$  Total no. of capacitor required =  $8 \times 4 = 32$

70. (2)



$$i = \frac{E}{r+r_2}; V_c = ir_2; V_c = \frac{Er_2}{r+r_2}; q = \frac{CEr_2}{r+r_2}$$

71. (3)

Applying KVL  $\sum I = 0$

72. (4)

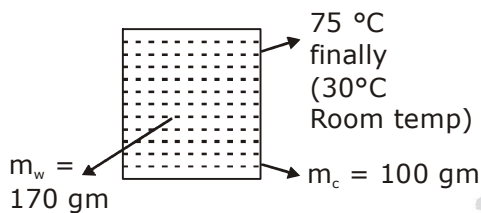
$\omega_m$  does not present in modulated wave.

73. (3)

In npn common input transistor phase difference in input and output voltage is  $180^\circ$ .

74. (1)

$m = 100 \text{ gm (T)}$



$$(ms\Delta T)_{Cu} = (ms\Delta T)_{Cal} + (ms\Delta T)_{Water}$$

$$100 \times 1 \times (T - 75) = 100 \times 1 \times (75 - 30) + 170 \times 1 \times (75 - 30)$$

$$10T - 750 = 450 + 7650$$

$$10T = 8100 + 750$$

$$= 8850$$

$$T = 88.5^\circ \text{C}$$

75. (1)

$$n_1 \lambda_1 = n_2 \lambda_2; n_1 \times 650 = n_2 \times 520$$

$$\frac{n_1}{n_2} = \frac{4}{5}$$

for minimum value of

$$n_1 = 4, n_2 = 5$$

$$y_1 = \frac{n_1 \lambda_1 D}{d} = \frac{4 \times 650 \times 10^{-9} \times 150}{.5 \times 10^{-3}}; y = 7.8 \text{ mm}$$

76. (2)

$$\vec{p} = p \cos\theta \hat{i} + p \sin\theta \hat{j}$$

$$\vec{T}_1 = (p \cos\theta \hat{i} + p \sin\theta \hat{j}) \times (E \hat{i}); \vec{T}_1 = -pE \sin\theta \hat{k}$$

$$\vec{T}_2 = (p \cos\theta \hat{i} + p \sin\theta \hat{j}) \times \sqrt{3} E \hat{i}; = \sqrt{3} p E \cos\theta \hat{k}$$

$$T_1 = -T_2$$

$$-pE \sin\theta = -\sqrt{3} pE \cos\theta$$

$$\tan\theta = \sqrt{3}; \theta = 60^\circ$$

**77. (4)**

$$I\alpha = Mg \times \frac{L}{2} \sin\theta$$

$$\frac{ML^2}{3} \times \alpha = Mg \times \frac{L}{2} \sin\theta$$

$$\alpha = \frac{3g}{2L} \sin\theta$$

**78. (4)**

$$\Delta v = v\gamma \Delta T; \frac{\Delta v}{v} = 3\alpha\Delta T$$

$$K = \frac{P}{\left(\frac{\Delta v}{v}\right)} = \frac{P}{3\alpha\Delta T}; \Delta T = \frac{P}{3\alpha K}$$

**79. (4)**

$$\frac{1}{F} = \frac{1}{-25} + \frac{1}{20} + \frac{15}{25 \times 20}$$

$$F = \frac{-4 + 5 + 15}{100}; F = \frac{16}{100}$$

$$F = \frac{4}{25} = +ve$$

means real for converging lens

$$u = -40 \text{ cm}$$

$$v = ?, f = 20 \text{ cm}$$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}; \frac{1}{20} = \frac{1}{v} - \frac{1}{40}; \frac{1}{v} = \frac{1}{20} + \frac{1}{40}; \frac{1}{v} = \frac{1}{40}; v = 40 \text{ cm}$$

from converging lens.

**80. (4)**

$$ev = \frac{hc}{\lambda}$$

$$\log ev = \log hc - \log \lambda$$

this equation is like

$$y = mx - c$$

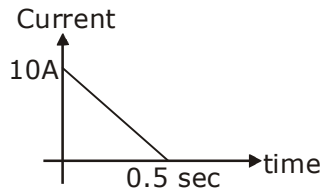
**81. (3)**

$$n_2 - n_1 = \frac{Pv}{R} \left( \frac{1}{T_2} - \frac{1}{T_1} \right) = \frac{10^5 \times 30}{8.31} \left( \frac{1}{300} - \frac{1}{290} \right)$$

No. of molecules

$$(n_2 - n_1) \times 6.23 \times 10^{23} = -2.5 \times 10^{25}$$

**82. (2)**



$$q = \frac{\Delta\phi}{R}; \Delta\phi = \text{change in flux}$$

$$q = \int I dt$$

= Area of current - time graph

$$= \frac{1}{2} \times 10 \times 0.5 = 2.5 \text{ coulomb}$$

$$q = \frac{\Delta\phi}{R}$$

$$\Delta\phi = 2.5 \times 100 = 250 \text{ wb}$$

**83. (4)**

$$10 = 5 \times 10^{-3}(x + 15)$$

$$x = 1.985 \times 10^3 \Omega$$

**84. (4)**

$$F = 6t$$

$$\Delta P = mv$$

$$\left| \frac{6t^2}{2} \right|_0^1 \Rightarrow \frac{3}{1} = v = 3$$

$$W = \frac{1}{2} mv^2 = \frac{1}{2} \times 1 \times 9$$

$$= 4.5 \text{ J}$$

**85. (4)**

$$I\alpha = MB \sin \theta$$

$$I\alpha = MB\theta$$

$$\alpha = \frac{MB}{I}\theta$$

$$\omega = \sqrt{\frac{MB}{I}}$$

$$T = \frac{2\pi}{\omega} = 2\pi\sqrt{\frac{I}{MB}}$$

$$T = 2 \times 3.14 \sqrt{\frac{7.5 \times 10^{-6}}{6.7 \times 10^{-2} \times 0.01}}$$

$$10 T = 2 \times 3.14 \times 10^{-1} \sqrt{1.1194} = 6.64 \text{ sec}$$

86. (3)

Inside the earth

$$g \propto r$$

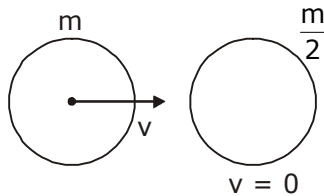
outside the earth

$$g \propto \frac{1}{r^2}$$

87. (2)

At particular time the direction of velocity is opposite which is clear option 2.

88. (1)



$$v_1' = \frac{(m_1 - m_2)}{(m_1 + m_2)} v; \quad v_2' = \frac{2m_1 v_1}{m_1 + m_2}$$

$$v_1' = \frac{\frac{m}{2} v}{\frac{3m}{2}} = \frac{v}{3}, \quad v_2' = \frac{2mv}{3m} = \frac{4v}{3}$$

$$\lambda = \frac{h}{p} \Rightarrow \frac{\lambda_A}{\lambda_B} = \frac{p_B}{p_A}; \quad \frac{\lambda_A}{\lambda_B} = 2$$

89. (3)

Time per of K.E. is  $\frac{T}{2}$  and K.E. is max at  $t = 0$

90. (4)

$$\text{Stress} = \frac{F}{A} = \frac{mg}{A} = \frac{V\rho g}{A} = \frac{A\rho g}{A}$$

stress  $\propto \ell$



# NiveditaClasses

JEE | Medical | Foundation | Board

Head Office: 011-41070321, 8510090321

E-92, South Extension Part-1, New Delhi 110049

E-mail : info@NiveditaClasses.com

Website: www.NiveditaClasses.com



facebook.com/niveditaclasses.india



twitter.com/niveditaclass

You Tube [www.youtube.com/c/Niveditaclasses-IIT-JEE-PMT-Medical-Coaching](http://www.youtube.com/c/Niveditaclasses-IIT-JEE-PMT-Medical-Coaching)