140

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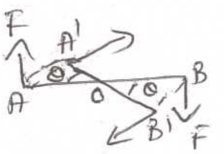
page. No. 7

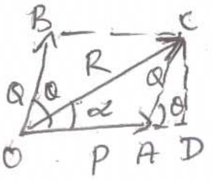
Revision:-2015

Course Title :-Engineering Physics 1 Course Code: TED(15) 1003

Qst. No.	Scoring Indicator	Split up score	Sub Total	Total
I	**PART - A**			
1	Statement.	2		
2	Statement.	2		
3	Statement.	2		
4	Definition	2		
5	Explanation	2	10	10
	PART - B			
1A	$V = u + at$ $S = ut + ½ at^2$ $V^2 = u^2 + 2as$	3		
B	3 advantages.	3	6	
2	Statement.	3		
	Rate of change of momentum of first body due to collision = $m_1v_1 – m_1u_1/t$ ” ” second body ” $= m_2v_2 – m_2u_2/t$ Appling second law of Newton , then third law , Action = - Reaction $m_1v_1 + m_2v_2 = m_1u_1 + m_2v_2$	3	6	
3	like ,unlike parallel	3		
	2 conditions	3	6	
4	Explanation and equation P.E = mgh, K.E = ½ mv^2, Pressure Energy = pv	3		
	Bernoulli’s theorem	3	6	
5	Stress, strain	3		
	Elastic fatigue	3	6	30

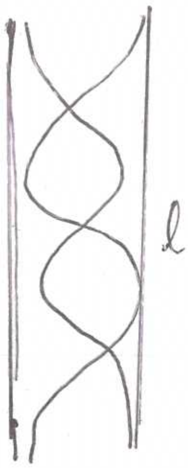
6.	waves of sound above frequency 20,000Hz	2	2	
	~~Four~~ Advantages	1×4	4	
7.	statement	2		
	$A_1 V_1 = A_2 V_2$	2	6	
	$\pi r_1^2 v_1 = \pi r_2^2 v_2$			
		2		
	$V_2 = \dfrac{0.1^2 \times 3}{(0.05)^2} = 12\, m/s$			
	PART - C			
		3		
111 a.	seven quantities, units			
b.	$S = ut + \frac{1}{2}at^2$			
	$S_1 = un + \frac{1}{2}an^2$ in n second	3		
	$S_2 = u(n-1) + \frac{1}{2}a(n-1)^2$ in $(n-1)$ second			
			6	
	during n^{th} second $S_n = S_1 - S_2$			
	Simplifying $S_n = u + a(n - \frac{1}{2})$	3		15
c.	$S_n = u + a(n - \frac{1}{2})$	1		
	$20 = u + a(6.5)$	2		
	$24 = u + a(8.5)$		6	
		$1\frac{1}{2}$		
	$2a = 4$			
	$a = 2\, m/s^2$			
		$1\frac{1}{2}$		
	$u = 20 - 13 = 7\, m/s$			

IVa	Definition with formula $I = F\cdot t$	3	3	
b.	Explanation momentum before firing = after firing	3		
	$0 = MV + mv$ 0 = momentum of gun + momentum of bullet		6	
	$V = \frac{-mv}{M}$	3		15
c.	$v^2 = u^2 + 2as$	2		
	$0 = 100 + 2a\cdot 20$ $a = \frac{-100}{40} = -2.5$	2	6	
	$F = ma = 1000 \times -2.5 = 2500N$	2		
Va	Turning effect of force	1	3	
	$\tau = F\cdot r$ clockwise & anticlockwise according to line of action of force	2		
b.	Definition	2		
	 angle = $\frac{arc}{radius}$ $\theta = \frac{AA'}{AO} = \frac{BB'}{BO}$		6	15
	Workdone = F. displacement $W = F\cdot AA' + F\cdot BB' = F\,AO\theta + F\,BO\cdot\theta$ $= F\theta(AO+BO)$ $= F\theta\, AB = C\theta$	4		

V c	$P = 2\pi NC$	2		
	$N = \frac{1200\ \text{rps}}{60}$	4		
	$P = 2\times 3.14\times 50 \times \frac{1200}{60} = 2000\pi$ watt			
VI a	Statement	3	3	
b.	figure and explanation	2		
				
	$OC^2 = OD^2 + CD^2$			
	$= (OA + AD)^2 + CD^2$			
	$= OA^2 + 2.OA.AD + AD^2 + CD^2$			
	$OC^2 = OA^2 + 2.OA.AD + AC^2$	3		15
	from $\angle CAD$, $\cos\theta = \frac{AD}{AC}$ $\quad \sin\theta = \frac{CD}{AC}$		6	
	$\cos\theta = \frac{AD}{Q}$ $\quad CD = AC\sin\theta$			
	$AD = Q\cos\theta$ $\quad CD = Q\sin\theta$			
	$R^2 = P^2 + 2PQ\cos\theta + Q^2$			
	$R = \sqrt{P^2 + 2PQ\cos\theta + Q^2}$			
	$\tan\alpha = \frac{CD}{OD} = \frac{CD}{OA+AD} = \frac{Q\sin\theta}{P+Q\cos\theta} = \frac{Q\sin\theta}{P+Q\cos\theta}$	1		
	$\alpha = \tan^{-1}\left[\frac{Q\sin\theta}{P+Q\cos\theta}\right] = \tan^{-1}\left[\frac{Q\sin\theta}{P+Q\cos\theta}\right]$			

c.	$R = \sqrt{P^2 + 2PQ\cos\theta + Q^2}$	2		
	$= \sqrt{(20)^2 + 2 \times 20 \times 10 \cos 60 + (10)^2}$	2	6	
	$= 26.457\ N$			
	$\alpha = \tan^{-1}\left[\frac{Q\sin\theta}{P + Q\cos\theta}\right] = \tan^{-1}\left[\frac{Q\sin\theta}{P+Q\cos\theta}\right]$	1		
	$= 19.106^{\circ}$	1		
vii a	Definition	3	3	
b.	Diagrams and explanation	2		
	downward force = upward force gravitational Pull = viscous force + buoyant force $mg = 6\pi\eta r v + \frac{4}{3}\pi r^3 d_0 g$ $\frac{4}{3}\pi r^3 d g - \frac{4}{3}\pi r^3 d_0 g = 6\pi\eta r v$ $\eta = \frac{\frac{4}{3}\pi r^3 g (d - d_0)}{6\pi r v} = \frac{2r^2 g (d-d_0)}{9v}$	4	6	
c.	$V = \frac{\pi h d g r^4}{8\eta l}$	1		15
	$= \frac{3.14 \times 0.9 \times 1000 \times 9.8 \times (0.5 \times 10^{-3})^4}{8 \times 8.9 \times 10^{-4} \times 0.3}$		6	
	mass in 1 sec = Volume x density	4		
	mass in 5 minutes = mass in 1 sec X 5x60.			
	= 2431 kg	1		

VIII a.	Explanation volume stress/Volume strain	1½	3	
	$k = \frac{PV}{dV}$ or $\frac{FV}{AdV}$ with terms explanation	1½		
b.	With diagram explanation, considering one experimental wire attached with vernier scale - reference wire attached with main scale.		6	
	Noting the extensions for each load.	4		15
	$Y = \frac{mgL}{\pi r^2 l} = \frac{gL}{\pi r^2}\left(\frac{m}{l}\right)$	2		
c.	$Y = \frac{mgL}{\pi r^2 l}$			
	$\therefore l = \frac{mgL}{\pi r^2 Y}$	2	6	
	$= \frac{10\times9.8\times3}{12.5\times10^{10}\times3\cdot4\times(0\cdot5\times10^{-3})^2} = 2.996$ mm	4		
IX a	wave velocity $= V = \frac{\text{wave distance}}{\text{time}}$ $V = \frac{\lambda}{T} = f\lambda$	3		
b.	Description with diagram  $l_1 + e = \frac{\lambda}{4}$ — ① $l_2 + e = \frac{3\lambda}{4}$ — ②	3		

	② − ① $l_2 - l_1 = \frac{\lambda}{2}$ $\lambda = 2(l_2 - l_1)$ velocity of sound $v = f\lambda = 2f(l_2 - l_1)$	3	6	15
c.	$f = \frac{V}{4l} = \frac{340}{4 \times 0.4} = 212.5\ Hz$	3	6	
	$f_1 = \frac{3V}{4l} = \frac{3 \times 340}{4 \times 0.4} = 637.5\ Hz$	3		
X a.	any one method. piezoelectric or magnetostriction description	3		
b.	   $l = \frac{\lambda}{2}$, $\lambda = 2l$, $v = f\lambda$, $f = \frac{v}{2l}$ fundamental $l = \lambda$, $v = f\lambda$, $f = \frac{v}{l}$ first harmonic $l = \frac{3\lambda}{2}$, $\lambda = \frac{2l}{3}$, $v = f\lambda$, $f = \frac{3v}{2l}$ second harmonic	2 mark each	6	15
c.	$\frac{V_{T_1}}{V_{T_2}} = \frac{\sqrt{T_1}}{\sqrt{T_2}}$	2	6	
	$\frac{348}{V_{60}} = \sqrt{\frac{303}{333}}$, $V_{60} = \sqrt{\frac{333}{303}} \times 348 = 364.82\ m/s$.	4		