1003B

Answer key

Qn No.		Value points	Marks	
I	1	Definition	2	2
	2	Explanation of quantities/ differentiate	2	2
	3	Statement	2	2
	4	Compressibility	1	
		Unit	1	2
	5	Explanation/definition	2	2
II	1	Eqns under gravity	3	
		Eqns against gravity	3	6
	2	Statement of second law	2	
		Eqn (Force α change in momentum)	2	
		$F = ma$	2	6
	3	Theorem	2	
		$P/\sin\alpha = Q/\sin\beta = W/\sin\gamma$	2	
		$W = \dfrac{P \times \sin\gamma}{\sin\alpha}$ or similar eqn	2	6
	4	Searle's method		
		Diagram	1	
		Explanation	3	
		Eqn of young's modulus	2	6
	5	Stokes formula	1	
		Explanation (weight = upthrust + viscous force	3	
		Viscosity $= 2r^{2}(\rho-\sigma)g/9v$	2	6
	6	Production	3	
		Three Applications	1 mark for each application	6
	7	Diagram	2	
		$F = v/\lambda, \lambda = 2l$	2	
		Eqns of overtones	2	6
III	a)	Definition	2	
		Unit	1	3
	b)	$S_1 = un + 1/2\, an^{2}$, $S_2 = u(n-1) + 1/2\, a(n-1)^{2}$	1	
		$S_n = S_1 - S_2$; ; Steps	3	
		Solve $S_n = U + a(n-1/2)$	2	6
	c)	Eqn $S_n = U + a(n-1/2)$		

		50=u+a (3-1/2)		
		60=u+a(5-1/2)	2	
		Solving a = 5 m/s^2; u = 37.5 m/s	2	
		Sn = 37.5 = 5(7-1/2); Sn = 70 m	2	6
IV	a)	Law	2	
		Example	1	3
	b)	Diagram	1	
		Action	1.5	
		Reaction	1.5	
		Action = -Reaction	1	
		Eqn of conservation of momentum	1	6
	c)	V = -mv/M	2	
		Substitution	2	
		V = 5 m/s	2	6
V	a)	Statement	2	
		Diagram	1	3
	b)	Resolution	2	
		Diagram	2	
		Rectangular components	2	6
	c)	$R^2 = R^2 + R^2 + 2R^2 \cos\theta$	1.5	
		$R^2 = R^2 (1+ \cos\theta)$	1.5	
		$\cos\theta = -1/2$	1.5	
		$\theta = 120^0$	1.5	6
VI	a)	Definition	2	
		Couple increases	1	3
	b)	Diagram	1	
		Eqn. of Work	1	
		Description	2	
		W = Cθ	1	
		N rotation; W = 2πNC	1	6
	c)	Power P = 2πNC	1	
		N = 600/60	1	
		substitution	2	
		C = 50 N m	2	6
VII	a)	Elastic limit	2	
		No	1	3
	b)	Three modulus of elasticity.	2 marks for each modulus	6
	c)	$Y_1 = F_1L_1/A_1l_1$; $Y_2 = F_2L_2/A_2l_2$	1	
		$F_1=F_2$, $L_1=L_2$, $Y_1/Y_2 = 3/2$	1	

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		substitution $l_1:l_2 = 2:3$	2 2	6
VIII	a)	statement / difference	3	3
	b)	brief description of Bernoulli's theorem diagram working of atomizer	3 2 1 3	6
	c)	discharge $Q = 6\,m^3/s$ $A_1v_1 = A_2v_2 =$ discharge Q substitution $v_1 = 764.3\ m/s;\ v_2 = 191.08\ m/s$	2 2 2	6
IX	a)	definition differential equation	2 1	3
	b)	Diagram Description Eqn. of displacement To prove projection is SHM	1 2 1 2	6
	c)	$V = f\lambda$ Substitution $\lambda = .035\ m$	2 2 2	6
X	a)	Differentiate/ statements	3	3
	b)	Description about Air column experiment $l_1 + e = \lambda/4$ $l_2 + e = 3\lambda/4$ $\lambda = 2(l_2 - l_1)$ $v = 2f(l_2 - l_1)$	1 1 1 1 2	6
	c)	closed tube $\lambda = 4l;\ f = V/\lambda = 191Hz$ Open tube $\lambda = 2l;\ f = V/\lambda = 383\ Hz$	3 3	6