

ZIMBABWE
HIGHER EDUCATION EXAMINATIONS
COUNCIL
NATIONAL DIPLOMA
IN
MECHANICAL ENGINEERING

SUBJECT: APPLIED MECHANICS

PAPER No:539/15/S07

FORMULAE BOOKLET

This paper consists of 5 pages.



1. $w = - \frac{dv}{dx} = - \frac{d^2m}{dx}$
2. $v = \frac{dm}{dx}$
3. $l^2 + m^2 + n^2 = 1$
4. $wd = Fs$
5. $r = \sqrt{a^2 + b^2 + c^2}$
6. $\sum M_0 = 0; \sum F_x = 0; \sum F_y = 0$
7. $m_1u_1 + m_2u_2 = (m_1 + m_2)v$
8. $\frac{1}{2}mv_1^2 = mgh$
9. $\alpha = \frac{w-w_0}{t}$
10. $T = I\alpha$
11. $Impulse = I_w - I_{w_0}$
12. $K = \frac{1}{2}mk^2w^2$
13. $m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$
14. $Ft = m(v - u)$
15. $I = mk^2$
16. $K.E. = \frac{1}{2}I(w^2 - w_0^2)$
17. $\rho = Tw$
18. $P = Fv$
19. $P.E. = KE_T + KE_F + KE_r$
20. $Wd = T\theta$

59. $t = \frac{u \sin \alpha}{g}$
60. $H = \frac{1}{2g} u^2 \sin^2 \alpha$
61. $t = \frac{2u \sin(\alpha - \beta)}{g \cos \beta}$
62. $t = \frac{2u \sin(\beta + \alpha)}{g \cos \beta}$
63. $R = \frac{u^2}{g \cos^2 \beta} \{ \sin(2\alpha - \beta) - \sin \beta \}$
64. $\alpha = \frac{\pi}{4} + \frac{\beta}{2}$
65. $R_{\max} = \frac{u^2}{g(1 + \sin \beta)}$
66. $R = \frac{u^2}{g \cos^2 \beta} \{ \sin(2\alpha + \beta) + \sin \beta \}$
67. $R_{\max} = \frac{u^2}{g(1 - \sin \beta)}$
68. $\bar{x} = \frac{\int x_c dm}{m}$
69. $\bar{y} = \frac{\int y_c dm}{m}$
70. $\bar{x} = \frac{\int x_c dL}{L}$
71. $\bar{y} = \frac{\int y_c dL}{L}$
72. $\bar{z} = \frac{\int z_c dL}{L}$
73. $\bar{z} = \frac{\int z_c dM}{M}$
74. $\bar{x} = \frac{\int x_c dA}{A}$

75. $\bar{y} = \frac{\int y_c dA}{A}$
76. $\bar{z} = \frac{\int z_c dA}{A}$
77. $\bar{x} = \frac{\int x_c dv}{v}$
78. $\bar{y} = \frac{\int y_c dV}{V}$
79. $\bar{z} = \frac{\int z_c dv}{v}$
80. $wd = Rs + \frac{1}{2}mv^2$
81. $KE = \frac{1}{2}mv^2 + \frac{1}{2}mk^2w^2$
82. $A = bd, \quad x_i = \frac{b}{2}, \quad y_i = \frac{d}{2}, \quad I_{GG} = \frac{bd^3}{12}$
83. $A = \frac{bh}{2}, \quad x_i = \frac{b}{2}, \quad y_i = \frac{h}{3}, \quad I_{GG} = \frac{bh^3}{36}$
84. $A = \pi r^2, \quad x_i = r, \quad y_i = r, \quad I_{GG} = \frac{\pi r^4}{4}$
85. $A = \frac{\pi r^2}{2}, \quad x_i = r, \quad y_i = \frac{4r}{3\pi}, \quad I_{GG} = 0.1102r^4$
86. $\bar{x} = \frac{\sum A_i x_i}{\sum A}$
87. $\bar{y} = \frac{\sum A_i y_i}{\sum A}$
88. $I_{xx} = I_{GG1} + A_1 d_1^2 + I_{GG2} + A_2 d_2^2 + \dots$

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