**FIRST YEAR HIGHER SECONDARY IMPROVEMENT EXAMINATION JULY 2019**

**SUBJECT: PHYSICS** **CODE. NO: FY 24**

| Qn No | Sub Qns | Answer Key/Value Points | Score | Total |
|---|---|---|---|---|
| 1. | | moment of inertia / rotational Inertia | 1 | 1 |
| 2. | | water | 1 | 1 |
| 3 | | heavy body | 1 | 1 |
| 4 | | Electro magnetic force | 1 | 1 |
| 5 | | Figure<br>Derivation<br>$V = r\omega$<br>OR<br>figure not necessary, $V = r\omega$ only give ① score | ½<br>1<br>½ | 2 |
| 6 | a. | A / slope of A greater than slope of B | 1 | |
| | b. | $\frac{V_A}{V_B} = \frac{\tan 60}{\tan 30} = 3$ (final answer not necessary)<br>OR<br>$\frac{\text{slope of A}}{\text{slope of B}}$ / ratio greater than One give ① score | 1 | 2 |
| 7 | | $I = I_{CM} + Ma^2$ / Parallel axes theorem | 1 | |
| | | $I = \frac{Ml^2}{12} + M\left(\frac{l}{4}\right)^2 = \frac{Ml^2}{3}$<br>OR<br>final answer only give full score | 1 | 2 |

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|---|---|---|---|---|
| 8 | | Derivation<br>$g' = g\left(1 - \frac{2h}{R}\right)$<br>OR<br>final answer only give (1) Score | 1½<br>½ | 2 |
| 9 | | Equation at Constant Pressure<br>$C_p = \frac{\Delta U}{\Delta T} + R$<br>Equation at Constant Volume<br>$C_V = \frac{\Delta U}{\Delta T}$<br>Difference<br>OR<br>$\Delta Q = \Delta U + \Delta W$ / $C_p \Delta T = C_V \Delta T + R\Delta T$<br>give (1) Score | ½<br>½<br>1 | 2 |
| 10 | a.<br>b. | Definition<br>$l = \frac{1}{\sqrt{2}\, n \pi d^2}$ / $l = \frac{1}{n \pi d^2}$<br>If any one part is Correct give (2) Score | 1<br>1 | 2 |
| 11. | | $\frac{1}{2} m\omega^2 (A^2 - y^2) = \frac{1}{2} m\omega^2 y^2$<br>$y = \frac{A}{\sqrt{2}}$<br>OR Equation of KE OR Equation of PE give (1) Score each<br>OR final answers only give (2) Score | 1<br>1 | 2 |

| Qn No | Sub Qns | Answer Key/Value Points | Score | Total |
|---|---|---|---|---|
| 12 | a. | Ns or kg m/s | 1 | |
| | b. | Impulse = change in momentum | 1 | 3 |
| | | $= 0.05\,(6-\bar{6}) = 0.6$ kgm/s | 1 | |
| 13 | a. | displacement | 1 | |
| | b. | derivation | 2 | 3 |
| 14 | | Rate of cooling $\propto$ mean difference of temp. over the surrounding | ½ | |
| | | $\frac{80-50}{5} \propto \frac{80+50}{2} - 20$ | ½ | |
| | | $\frac{30}{5} \propto 45$ ——— ① | ½ | |
| | | $\frac{60-30}{t} \propto \frac{60+30}{2} - 20$ | ½ | 3 |
| | | $\frac{30}{t} \propto 25$ ——— ② | ½ | |
| | | $\frac{①}{②}$ $t = 9$ minutes | ½ | |
| | | OR | | |
| | | Statement of Newton's law of cooling | | |
| | | OR | | |
| | | $\frac{dT}{T-T_0} = kdt$ give ① score | | |
| 15 | | figure (Horizontal or Vertical) | ½ | |
| | | Derivation | 2 | |
| | | $T = 2\pi\sqrt{\frac{m}{k}}$ | ½ | 3 |
| | | OR final answer only give ① score | | |

| Qn No | Sub Qns | Answer Key/Value Points | Score | Total |
|---|---|---|---|---|
| 16 | a. | Statement OR Hooke's Law | 1 | |
| | b. | A | 1 | 3 |
| | c. | A | 1 | |
| 17 | | Moment of inertia of a Solid cylinder $= \frac{1}{2}MR^2$ | 1 | |
| | | $KE = \frac{1}{2}I\omega^2$ | ½ | |
| | | $KE = 3125$ J | ½ | |
| | | $L = I\omega$ | ½ | 3 |
| | | $L = 62.5$ Js | ½ | |
| | | OR $KE = \frac{1}{2}I\omega^2$ give ① Score | | |
| | | $L = I\omega$ give ① Score | | |
| 18 | a. | Four Processes ($4 \times ½$) | 2 | |
| | b. | No / Yes | 1 | 3 |
| | | If @ past is only correct give ③ Score | | |
| 19. | a. | Derivation of Max. Height | 1½ | |
| | | Derivation of Time of Flight | 1½ | 4 |
| | b. | $45^0$ | 1 | |
| | | OR | | |
| | | $H = \frac{u^2\sin^2\theta}{2g}$ give ① Score | | |
| | | $T = 2u\sin\theta/g$ give ① score | | |

| Qn No | Sub Qns | Answer Key/Value Points | Score | Total |
|---|---|---|---|---|
| 20 | a. | After collision the two particles move together / ~~only~~ momentum, TE are conserved<br>KE is not conserved | 2 | |
| | b. | Equation for law of Conservation of Momentum<br>Figure<br>Equation for law of Conservation of Kinetic Energy<br>Balance Derivation | 2 | 4 |
| 21 | a. | Statement of $T^2 \propto a^3$ | 1 | |
| | b. | $T_E^2 \propto R_E^3$ —— ①<br>$T_S^2 \propto R_S^3$ —— ②<br>$\frac{②}{①}$ $R_S = 1.432 \times 10^{13}\ m$ | ½<br>½<br>1 | 4 |
| | c. | Law of Conservation of Angular Momentum | 1 | |
| 22 | a. | $V = \frac{2}{9} \frac{a^2(\rho - \sigma)g}{\eta}$ OR definition of terminal velocity | 1 | |
| | b. | Equation<br>Substitution<br>$\eta = 9.9 \times 10^{-1}\ kg\ m^{-1} s^{-1}$ | 1<br>1 | 4 |
| | c. | Rain drops acquire terminal velocity | 1 | |

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| 23 | a. | Statement of the Principle<br>OR dimension of LHS = dimension of RHS | 1 | |
| | b. | dimensions of f, l and g | 1½ | |
| | | Equation is wrong | ½ | |
| | c. | $A - LT^{-3}, MS^{-3}$ $B = LT^{-2}, MS^{-2}$ | 2 | 5 |
| | | OR<br>for (b) part Equation is wrong give (1) score<br>for (c) part unit / dimension give (2) score | | |
| 24 | a. | $F \leq \mu_s N$ / $(f_s)_{max} = \mu_s mg$ | 1 | |
| | b. | $ma = \mu_s mg$ | 1 | 5 |
| | | $a = 1.5\ ms^{-2}$ | 1 | |
| | c. | Two laws / any one law | 2 | |
| 25 | a. | Resonance | 1 | |
| | b. | Closed pipe / one end Open | 1 | |
| | c. | Figures | 1½ | 5 |
| | | Derivations | 1 | |
| | | $f_1 : f_2 : f_3 = 1 : 3 : 5$ | ½ | |
| | | OR $f_1 : f_2 : f_3 = 1 : 3 : 5$ give (1) score | | |

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|---|---|---|---|---|
| 26 | a. | Streamline flow (Definition) | 1 | |
| | | Turbulent flow (Definition) | 1 | |
| | | OR any Relevant Difference give (2) score | | 5 |
| | b. | Statement of Bernoulli's Theorem | 1 | |
| | | Proof | 2 | |
| | | OR | | |
| | | Final Equation only give (1) Score | | |

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|---|---|---|---|---|
| | 1. | Ratheesh kumar. R. - Alappuzha 9447492562 | | |
| | 2 | Jayakumar. L.S Boys HSS Karunagappally 9447211191 | | |
| | 3 | RAJESH. M 9447646382 Tagore Memorial H.SS, Vellore, Kannur | | |
| | 4 | Sohman Joseph SH HSS ARAIKULAM | | |
| | 5. | Ravi. KB GHSS Kumarapuram Palakkad 9495093148 | | |
| | 6 | SANDHYA BHASKAR, St. Ignatius VHSS, Kanjirampara 9847323017 | | |
| | 7. | ANEESHAMOL P.A, HSS & VHSS BRAHMAMANGALAM 9446563407 | | |
| | 8. | SHEEBA. K.S. VHSS KARALAM, THRISSUR (Dt) | | |
| | 9. | Caro Jose Dayan. J. Leo XIII HSS Pullurile 9349712978. 9445867994 | | |
| | 10. | Muralikrishnan. T, HST, GHSS Kuttematt, Kolayad 9446165773 | | |
| | 11 | Shaju Cherian, Nirmala HSS Erumamda | | |
| | 12. | Anjeliha Nair. S, SVGV HSS Kidangannur | | |
| | 13 | Benny Freeman SNHSS, Poothadi | | |
| | 14 | V. J. Sunil. SUITES. Edamai. Kollam. | | |
| | 15. | Sasi. M, NVT Physics, BHKV HSS Valavannur 9447111606 | | |
| | 16. | Vipin. R, GHSS South Eyippuram | | |
| | 17. | Latha. P.C. NVT Physics, Calicut Girls' VHSS | | |
| | 18 | Reegha Sreedharan P.D.S.S Pavandoor | | |