

SEM 1 PHSA CC2 PRACTICAL

F.M : 30

Answer **any one** question from the following

(Symbols bear usual meaning)

1.a) Write down the expression of moment of inertia of a bar pendulum about its point of suspension in terms of radius of gyration (K) and distance (r) between point of suspension and its centre of gravity .

2

b) Write down the equation of motion of the said bar pendulum with necessary diagram and hence find the expression of its time period T

2+2+2

c) What will be the nature of the graph if  $T^2r$  is plotted along y axis and  $r^2$  along x axis and why it is so? Draw the nature of the graph.

2+2+4

d) How can you find 'g' and radius of gyration (K) from this graph?

4+4

e) What is length of equivalent simple pendulum? How can you estimate length of equivalent pendulum of the above bar pendulum?

2+4

2. a) Write down energy equation in case of a fly wheel explaining each term. How can you find frictional energy loss per rotation of a flywheel?

6+4

b) What is  $t_{\text{stop}}$  and how can you measure  $t_{\text{stop}}$  ? Find the relation between maximum angular velocity of the fly wheel and  $t_{\text{stop}}$  .

2+6+4

c) Using all these relations, find an expression for the moment of inertia of the fly wheel about an axis passing through its centre of mass and perpendicular to the plane of the wheel.

6

d) How can you measure the 'fractional no. of rotation' in addition to nearest no. of the full rotation?

2

3. a) If the period of oscillation about the vertical axis, of the cradle alone  $=T_0$ , of the cradle and the body of known moment of inertia  $=T_1$  and of the cradle and the body of unknown moment of inertia  $=T_2$ , Derive the necessary formula for determining the moment of inertia of the unknown body.

6

b) Make the necessary table (blank) for determination of above said periods of oscillation. What would you do to get accurate value of the time periods?

4+2

c) If the known body is a rectangular bar write down the expressions of moment of inertia ( $I_1$ ) about the vertical axis passing through its centre of gravity and perpendicular to its length. Explain each symbol.

2

d) If the unknown body is a cylinder write down the expressions of moment of inertia ( $I_2$ ) about the vertical axis passing through its centre of gravity and perpendicular to its length. Explain each symbol.

2

e) What is rigidity modulus? Derive an expression for the rigidity modulus using above said data for determining the rigidity modulus of the material of the suspension wire of the cradle.

6

f) Make a table for determining the radius of the suspension wire. Why it is to be measured so accurately?

6+2

4. a) Write down the working formula for determination of Young's modulus of the material of a beam by the method of flexure explaining each term.

2

b) Make a table for determination of breadth and depth of the bar

4

c) Make a table for recording of load depression data using travelling microscope

6

d) Draw the nature of the load depression graph.

2

e) What is neutral surface of the bent beam?

4

f) What are geometrical moment of inertia and flexural rigidity?

4+4

g) Now the length of the beam is doubled. 'Y' will increase or decrease or will remain same? Justify your answer.

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