

Roll No.: .....

## SGT UNIVERSITY

### END TERM THEORY EXAMINATION JULY-2022

|                           |                          |                |                          |
|---------------------------|--------------------------|----------------|--------------------------|
| Faculty/College of Study: | Engineering & Technology | Year/Semester: | 6 <sup>th</sup> Semester |
| Program:                  | B.Tech. (ME)             | Duration:      | 03:00 Hrs                |
| Course/Subject:           | Dynamics of Machinery    | Maximum Marks: | 60                       |
| Course/Subject Code:      | 13030688                 | Batch:         | 2018                     |

**Instructions:-**

1. Write Your Roll No. on the Question Paper.
2. Candidate should ensure that they have been provided correct question paper. Complaint(s) in this regard, if any should be made within 15 minutes of the commencement of the exam. No complaint(s) will be entertained thereafter.
3. All Questions are compulsory. Marks are indicated against each question.
4. Illustrate your answer with diagram wherever required.

### SECTION-A

#### (Very Short Answer Type Questions)

Note: All Questions are compulsory: -

[12X1=12 Marks]

| S. No. | Question  | Marks Allotted |
|--------|---|----------------|
| 1      | Differentiate between Inertia Force and Inertia Torque.   | 1              |
| 2      | Draw Klien's construction                                 | 1              |
| 3      | Write expression of crank effort.                         | 1              |
| 4      | Define Variation of traction forces.                      | 1              |
| 5      | Explain Hammer blow.                                      | 1              |
| 6      | What do you mean by swaying couple?                       | 1              |
| 7      | Define Degree of Freedom.                                 | 1              |
| 8      | Differentiate between longitudinal and lateral vibration. | 1              |
| 9      | Explain the Natural frequency of the vibration.           | 1              |
| 10     | What is governor?   | 1              |
| 11     | Define Coefficient of insensitiveness.                    | 1              |
| 12     | Explain the term hunting.                                 | 1              |

**SECTION-B**  
**(Short Answer Type Questions)**

**Note: All Questions are compulsory: -**

**[4X2=8 Marks]**

| S. No. | Question   | Marks Allotted |
|--------|--|----------------|
| 13     | What is the difference between piston effort and crank effort? | 2              |
| 14     | Why is balancing necessary for high-speed engines?             | 2              |
| 15     | What are the causes and effects of forced vibrations?          | 2              |
| 16     | What is the function of the governor?                          | 2              |

**SECTION-C**  
**(Descriptive Answer Type Questions)**

**Note: All Questions are compulsory: -**

**[4X4=16 Marks]**

| S. No. | Question  | Marks Allotted |
|--------|---|----------------|
| 17     | Discuss the method of finding the crank effort in a reciprocating single acting cylinder engine.  | 4              |
| 18     | Explain the method of balancing of different masses revolving in the same planes.   | 4              |
| 19     | What do you mean by whirling of shafts?<br><b>Or</b><br>What is whirling or critical speed?   | 4              |
| 20     | State the different types of governors. Explain any one of them.<br><b>Or</b><br>What is the difference between centrifugal and inertia type governors? | 4              |

## SECTION-D

### (Long Answer Type Questions)

Note: All Questions are compulsory: -

[4X6=24 Marks]

| S. No. | Question  | Marks Allotted |
|--------|---|----------------|
| 21     | <p>Describe the method of finding the inertia torque on the crankshaft of the engine.</p> <p style="text-align: center;"><b>Or</b></p> <p>The crank and connecting rod of a vertical petrol engine, running at 1800 rpm are 60 mm and 270 mm respectively. The diameter of the piston is 100 mm and the mass of the reciprocating parts is 1.2 Kg. During the expansion stroke when the crank has turned <math>20^\circ</math> from the top dead centre, the gas pressure is <math>650 \text{ kN/m}^2</math>. Determine</p> <p>(i) The net force on the piston<br/>           (ii) The net load on the gudgeon pin<br/>           (iii) The thrust on the cylinder walls</p> <p>The speed at which the gudgeon pin load is reversed in direction.</p> | 6              |
| 22     | <p>Four Masses A, B, C and D are completely balanced. Masses C and D make angles of <math>90^\circ</math> and <math>195^\circ</math> respectively with that of mass B in the counter-clockwise direction. The rotating masses have the following properties: <math>m_b = 25 \text{ Kg}</math>, <math>m_c = 40 \text{ Kg}</math>, <math>m_d = 35 \text{ Kg}</math>, <math>r_a = 150 \text{ mm}</math>, <math>r_b = 200 \text{ mm}</math>, <math>r_c = 100 \text{ mm}</math>, <math>r_d = 180 \text{ mm}</math></p> <p>Planes B and C are 250 mm apart. Determine</p> <p>(i) The mass A and its angular position with that of mass B.<br/>           (ii) The positions of all the planes relative to plane of mass A.<br/>           (iii)</p>         | 6              |
| 23     | <p>Describe Dunkerley's Method to find the natural frequency of a shaft carrying several loads.</p>   | 6              |
| 24     | <p>In a Porter governor each of the four arms is 400 mm long. The upper arms are pivoted on the axis of the sleeve, whereas the lower arms are attached to sleeve at a distance of 45 mm from the axis of rotation. Each ball has a mass of 8 kg and the load on the sleeve is 60 kg. What will be the equilibrium speeds for the two extreme radii of 250 mm and 300 mm of rotation of the governor balls?</p> <p style="text-align: center;"><b>Or</b></p> <p>Describe the function of a Porter governor with the help of a neat sketch.</p>  | 6              |