

# Exam PCAD-31-02 Answers | PCAD-31-02 Actual Test Answers

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**MECHANICAL ENGINEERING**

**PAPER - I**  
**SECTION A**

1. Answer any four of the following (each answer should conform to a limit of around 150 words).

(a) Mention the conditions required for a two mass system to be dynamically equivalent to a rigid mechanical component. Why sometimes is a hypothetical correction couple applied on the two mass system to make it dynamically equivalent to a rigid body? Find the position of centre of percussion of a compound pendulum from its centre of gravity. What is the significance of the concept of centre of percussion for a batsman playing a cricket ball? (6 + 4 = 10)

(b) What is meant by hunting of governor? Explain briefly the causes of its occurrence. Justify with reasons, whether it is more severe in case of uniform, governor or isochronous governor (10)

(c) (i) A connecting rod in I.C. engine is designed as a column, with an I-section. Designers take moment of inertia of the cross-section about one axis equal to 4 times that taken about the perpendicular axis. Why? (6 + 4 = 10)

(ii) Why is it considered that the hollow shaft under torsion is lighter than a solid one, if other parameters are the same?

(d) (i) Draw a Mohr's circle of stress for a round bar which is shrunk fit by a hub, with brief explanation. (5 + 5 = 10)

(ii) A cantilever is loaded and the bending moment diagram is rectangular as shown in Figure. What will be the shape of the shear force diagram? (5 + 5 = 10)



(e) With reference to figure, neglect the weight of the bar and stopper. A load  $W$  is dropped from a height  $h$ . Given  $W = 1.0 \text{ kN}$ , area of cross-section of the bar =  $20 \text{ mm}^2$ . Find the instant tensile stress developed in the bar when the weight  $W$  is dropped from a height  $h = 0$ . (10)



2. (a) A machine weighing 68 N is mounted on a set of springs, whose equivalent spring stiffness,  $K = 1070 \text{ N/cm}$  and damping factor,  $\xi = 0.2$  arranged vertically on a rigid foundation. A piston within the machine weighing 2.0 N has a vertical reciprocating motion, with a stroke of 8.0 cm and a crank shaft with a speed of 3000 rpm. Assuming the motion to be simple harmonic, determine:

(i) The amplitude of vibration in the vertical direction of the machine. (5)

(ii) The transmissibility ratio and the force transmitted to the foundation. The phase lag between the transmitted force and the exciting force. (15)

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## Python Institute Certified Associate Data Analyst with Python (PCAD-31-02) Sample Questions (Q70-Q75):

### NEW QUESTION # 70

What is one potential risk of dynamically constructing SQL queries using string concatenation in Python scripts?

- A. Slower database performance
- B. Increased memory usage
- C. **Exposure to SQL injection attacks**
- D. Missing foreign key constraints

**Answer: C**

### NEW QUESTION # 71

Which Python feature allows the reuse of logic in different data processing steps, reducing duplication and improving maintainability?

- A. **Custom functions**
- B. Tuple unpacking
- C. Lambda functions
- D. Global variables

**Answer: A**

### NEW QUESTION # 72

What is the recommended Python library to connect and extract tabular data directly from an Excel file?

- A. sqlite3
- B. **openpyxl**
- C. csv
- D. matplotlib

**Answer: B**

### NEW QUESTION # 73

What is the primary role of the pandas library in the Python data science ecosystem?

- A. Performing statistical tests
- B. **Manipulating labeled data structures**
- C. Reducing execution time of compiled code
- D. Visualizing large datasets

**Answer: B**

### NEW QUESTION # 74

Which techniques are commonly used to manage type conversion between SQL and Python when importing database values?  
(Choose two)

- A. Ignoring data types and treating everything as strings
- B. **Using a mapping function to convert SQL types into Python objects**
- C. **Defining column types in Python using sqlite3.register\_converter()**
- D. Automatically casting Python variables to SQL column types without validation

**Answer: B,C**

## NEW QUESTION # 75

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