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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION - JULY 2024

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| **Semester : IV** | **Date : 11-07-2024,** |
| **Course Code : MEC2015** | **Time : 09.30am to 12.30pm** |
| **Course Name : Metrology and Mechanical Measurements** | **Max Marks : 100** |
| **Program : B.TECH.** | **Weightage : 50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 4 QUESTIONS 4Q X 5M=20M** | | | |
| 1 | Define the terms 'addendum' and 'dedendum' in the context of screw threads. | (CO 5) | [Knowledge] |
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| 2 | What is the significance of the "best wire size" in the measurement of effective diameter using the three-wire method? | (CO 5) | [Knowledge] |
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| 3 | What is the purpose of using a Coordinate Measuring Machine (CMM) in metrology? | (CO 4) | [Knowledge] |
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| 4 | Plain gauges are used to check the dimensions of a hole or shaft. How would you categorize plain gauges, which are utilized for verifying the dimensions of a hole or shaft? | (CO 3) | [Knowledge] |
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| 5 | Distinguish between accuracy and precision, which are both methods of assessing the proximity of a measurement to the true or accepted value, or the closeness of multiple measurements of the same item to each other. | (CO 1) | [Knowledge] |
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| 6 | Explain the distinguishing features of Line and End standards. | (CO 1) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 7 | Draw the possible outcomes of the drawing shown below. | (CO 4) | [Comprehension] |
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| 8 | Explain with a neat diagram MMC & LMC for hole and shaft. | (CO 3) | [Comprehension] |
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| 9 | Explain the significance of Datum in GD&T and its role in establishing a reference framework for dimensional measurements. Also explain its types. | (CO 4) | [Comprehension] |
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| 10 | Explain the different types of pitch errors that can occur in screw threads, their causes, and how they manifest in the thread profile. Also, discuss the impact of these errors on the functionality and mating of the threaded components. | (CO 5) | [Comprehension] |
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| 11 | For a medium force fit on a 75 mm shaft, where both the hole tolerance and shaft tolerance are 0.225 mm, and the maximum interference is 0.0375 mm, calculate the appropriate dimensions for the hole and shaft using the basis hole standard. | (CO 2) | [Comprehension] |
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| 12 | Given a 75 mm shaft rotating in a bearing, with tolerances of 0.075 mm for both the shaft and the bearing, and a required allowance of 0.10 mm, calculate the dimensions of the shaft and the bore of the bearing using the basis hole standard. | (CO 2) | [Comprehension] |
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| 13 | The NPL, or National Physical Laboratory, is the UK's metrology institute. Can you identify and describe a tool endorsed by the NPL for inspecting the flatness between gauge surfaces? | (CO 1) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** | | | |
| 14 | A mechanical engineering company is designing a precision assembly that requires a hole and shaft fit. The hole, which has a basic size of 85 mm, will be prepared using broaching and honing processes. The shaft, which needs to be fitted into the hole, will be manufactured using a capstan lathe and requires an F-type fit. | (CO 5) | [Application] |
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| 15 | Using a hole and shaft with a base size of 25 mm, and aiming for a clearance fit with a maximum clearance of 0.02 mm and a minimum clearance of 0.01 mm, determine:  (a) the limits for both the hole and shaft using a hole basis system,  (b) the limits for both the hole and shaft using a shaft basis system. | (CO 2) | [Application] |
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| 16 | An Engineer wants to employ a gauge to measure the fit of shaft, help him by identifying the same, draw a neat diagram and label the same. | (CO 4) | [Application] |
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