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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING  
END TERM EXAMINATION - JUN 2023**

**Semester :** Semester VI - 2020

**Course Code :** MEC4007

**Course Name :** Sem VI - MEC4007 - Design of Machine Elements-II

**Program :** MEC

**Date :** 14-JUN-2023

**Time :** 9.30AM - 12.30PM

**Max Marks :** 100

**Weightage :** 50%

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**Instructions:**

- (i) Read all questions carefully and answer accordingly.
  - (ii) Question paper consists of 3 parts.
  - (iii) Scientific and non-programmable calculator are permitted.
  - (iv) Do not write any information on the question paper other than Roll Number.
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**PART A**

**ANSWER ALL THE QUESTIONS**

**(10 X 2 = 20M)**

1. Define static load carrying capacity of a bearing?  
(CO5) [Knowledge]
2. Name the theories used for clutch design.  
(CO4) [Knowledge]
3. Define module in a gear and identify the unit of module.  
(CO3) [Knowledge]
4. Identify any 4 gear tooth failures.  
(CO2) [Knowledge]
5. Enlist any 2 advantages and disadvantages of belt Drives.  
(CO1) [Knowledge]
6. Power transmission in belt drives happens due to friction. Support the statement with explanation.  
(CO1) [Knowledge]
7. What is dry lubrication and full film lubrication?  
(CO5) [Knowledge]
8. Define NIP in a leaf spring design.  
(CO2) [Knowledge]
9. Explain creep phenomenon in belt drives with a suitable diagram.  
(CO1) [Knowledge]
10. Define Clutch. Identify the advantages and disadvantages of a positive clutch.  
(CO4) [Knowledge]

## PART B

### ANSWER ALL THE QUESTIONS

(5 X 10 = 50M)

11. Tata motors are developing the helical spring for their new range of electric vehicles, as a design engineer list the sequence of procedure for the design.  
(CO2) [Comprehension]
12. The lubrication phenomenon is not successful in spite of coating a layer of dry lubricant without an objective. Identify the objectives of lubrication considering the ball bearing in a bike handle.  
(CO5) [Comprehension]
13. A worn out clutch has come for redesign and the engineer illustrates that it has multiple conical surfaces. Identify the type of clutch and enlist the design procedure for the same.  
(CO4) [Comprehension]
14. Brijesh is a senior design Engineer at Mercedes Benz and is struck with a problem of length of open belt in one of the cross belt design. As a colleague help him to obtain correct relation of belt length and also derive the same.  
(CO1) [Comprehension]
15. A simple block brake design is to be carried out and the different conditions for the criteria are to be calculated for locking and energizing the brakes. Identify any 3 criteria for design and explain the same.  
(CO4) [Comprehension]

## PART C

### ANSWER ALL THE QUESTIONS

(2 X 15 = 30M)

16. A single plate clutch is used to connect or disconnect a machine to the source of 30 kW power running at 1200 rpm. The outer diameter of the friction lining used in clutch is 1.5 times the inner diameter. The friction lining material is woven asbestos and opposing plate material is steel. The shaft is made up of C40 steel having yield point strength 324 MPa and take  $f_{os} = 2.5$ . Determine some of the main design parameters considering uniform wear criteria.  
(CO4) [Application]
17. A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 40 teeth gear. The helix angle is  $25^\circ$  and the normal pressure angle is  $20^\circ$ . The normal module is 3 mm. Identify the parameters that can be calculated by the above data and calculate any 4 parameters.  
(CO3) [Application]