Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **18ME2004** | **Duration :** | **3hrs** |
| **Sub. Name :** | **MACHINE DESIGN** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | |
| 1. | List some factors that influence machine design. | CO1 | 1 |
| 2. | Define Design. | CO1 | 1 |
| 3. | Define factor of satety. | CO1 | 1 |
| 4. | Why normal stress theory is not suitable for ductile materials? | CO1 | 1 |
| 5. | What are the various theories of failure? | CO2 | 1 |
| 6. | State the various methods of finding stresses concentration factors. | CO2 | 1 |
| 7. | Explain size factor in endurance strength. | CO2 | 1 |
| 8. | What are the methods used to improve fatigue strength? | CO2 | 1 |
| 9. | Why a hollow shaft has greater strength and stiffness than solid shaft of equal weight? | CO2 | 1 |
| 10. | What are the tpes of key? | CO3 | 1 |
| 11. | What is the function of a coupling between two shafts? | CO3 | 1 |
| 12. | What are the types of shaft? | CO3 | 1 |
| 13. | Define Tee joint and corner joint. | CO4 | 1 |
| 14. | What is a stud? | CO4 | 1 |
| 15. | Why are welded joints preferred over riveted joints? | CO4 | 1 |
| 16. | What are the end condition of the spring? | CO4 | 1 |
| 17. | What is load rating? | CO5 | 1 |
| 18. | List any six types of bearing materials. | CO5 | 1 |
| 19. | What are the types of journal bearings depending upon the nature of contact? | CO5 | 1 |
| 20. | List any four advantages of rolling contact bearings over sliding contact bearings. | CO5 | 1 |

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| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | Explain the selection of materials for engineering purposes. | CO1 | 5 |
| 22. | Write short notes on manufacturing considerations in machine design. | CO1 | 5 |
| 23. | Explain the types of fit. | CO2 | 5 |
| 24. | Briefly explain the factor of safety. | CO2 | 5 |
| 25. | A wrought iron bar 50 mm in diameter and 2.5 m long transmits shock energy of 100N-m. Find the maximum instantaneous stress and the elongation.  Take E = 200 GN/m. | CO3 | 5 |
| 26. | Discuss about Design of Shafts on the basis of Rigidity. | CO4 | 5 |
| 27. | List the design procedure for knuckle joint. | CO5 | 5 |
| 28. | Explain the advantages and disadvantages of Welded Joints over Riveted Joints. | CO5 | 5 |
| 29. | A journal of nominal or basic size of 75 mm runs in a bearing with close running fit. Find the limits of shaft and bearing. What is the maximum and minimum clearance? | CO6 | 5 |
| 30. | Write short notes on important terms used in Screw Threads. | CO6 | 5 |
| 31. | Explain the fatigue and endurance limit. | CO3 | 5 |
| 32. | What is cotter joint? Explain the types of cotter joint. | CO5 | 5 |

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| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | |
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| 33. | a. | A circular bar of 500 mm length is supported freely at its two ends. It is acted upon by a central concentrated cyclic load having a minimum value of 20 kN and a maximum value 50 kN. Determine the diameter of bar by taking a factor of safety of 1.5, size effect of 0.85 surface finish factor of 0.9. The material properties of bar are given by: ultimate strength of650 MPa, yield strength of 500 MPa and endurance strength of 350 MPa. | CO1 | 8 |
| b. | Calculate the tolerances, fundamental deviations and limits of sizes for the shaft designated as40 H8 / f7. | CO2 | 7 |
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| 34. | a. | Design and draw a cotter joint to support a load varying from 30 kN in compression in tension. The material used is carbon steel for which the following allowable stresses may be used. The load is applied statically  Tensile stress = compressive stress = 50 MPa Shear stress = 35 MPa and crushing stress = 90Mpa. | CO5 | 8 |
| b. | Explain the mechanical properties of Engineering materials. | CO1 | 7 |
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| 35. | a. | A steel bar 2.4 m long and 30 mm square is elongated by a load of 500 kN. If poisson's ratio is 0.25, find the increase in volume. Take E= 0.2x106N/mm2. | CO2 | 7 |
| b. | A shaft is transmitting 100 kW at 160 r.p.m. Find a suitable diameter for the shaft, if the maximum torque transmitted exceeds the mean by 25%. Take maximum allowable shear stress as 70 MPa. | CO3 | 8 |