Roll No. | | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(Automation & Robotics) (2012 & Onward) (Sem.–4)

DESIGN OF MACHINE ELEMENTS

Subject Code : BTPE-401

M.Code : 63017

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Answer briefly :

1. Write the scope of machine design.
2. Write the sources of design data.
3. Draw un-symmetric welded sections.
4. Define pitch and lead.
5. What is the function of keys?
6. Write different types of couplings.
7. What are the main indications of a complete welding symbol?
8. What are the factors to be considered for designing the fulcrum pin of the lever?
9. What are the uses of foot lever?
10. Write types of friction clutches.

SECTION-B

11. Why gibs are used in a cotter joint? Explain with the help of a neat sketch the use of single and double gib.

12. Discuss the various types of shafts and the standard sizes of transmissions shafts.

13. A square key of 10 × 10 × 75 mm is required to transmit 1100 N-m torque from a 60 m diameter solid shaft. Determine whether the length is sufficient or not if the permissible shear stress and crushing stress intensities limited to 60 and 170 MPa respectively.

14. State how a bolt of uniform strength is produced.

15. Write short note on design of hand lever.

SECTION-C

16. Discuss the design procedure while considering the economic, aesthetic and ergonomics aspect.

17. Draw and explain the construction, working, application and design process of split muff coupling.

18. A vehicle of mass 1200 kg is moving down the hill at a slope of 1:5 at 72 km / h. It is to be stopped in a distance of 50 m. If the diameter of the tyre is 600 mm, determine the average braking torque to be applied to stop the vehicle, neglecting all the frictional energy except for the brake. If the friction energy is momentarily stored in a 20 kg cast iron brake drum, what is average temperature rise of the drum? The specific heat for cast iron may be taken as 520 J / kg°C. Determine also the minimum coefficient of friction between the tyres and the road in order that the wheels do not skid, assuming that the weight is equally distributed among all the four wheels.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.