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

****

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

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **18AT2005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **TRACTOR SYSTEMS AND CONTROLS** | **Max. Marks :** | **100** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
| **PART- A (20 X 1 = 20 MARKS)** | | | |
| 1. | Identify the basic function of power transmission in a tractor. | CO1 | 1 |
| 2. | What is the purpose of Final Drive? | CO1 | 1 |
| 3. | Assess the advantages of sychronised transmission. | CO3 | 1 |
| 4. | Bigger Crown wheel at Differential will cause ---------------------- effect for braking (less / more). | CO2 | 1 |
| 5. | Mention the standard speeds of PTO shaft of tractor. | CO2 | 1 |
| 6. | List the friction materials used in a clutch plate. | CO3 | 1 |
| 7. | Mention the operations that are accomplished with the adoption of Dual clutch system in certain tractors. | CO2 | 1 |
| 8. | Which part in the steering system gives the angular movement? | CO1 | 1 |
| 9. | Find the gear ratio of   1. 10 teeth gear driving a 30 teeth gear 2. 30 teeth gear driving a 10 teeth gear | CO3 | 1 |
| 10. | To increase the speed, the driver gear should be ---------------- than the driven gear.  To increase the torque, the driver gear should be ----------------- than the driven gear. | CO3 | 1 |
| 11. | Higlight the necessity of Differential in a tractor. | CO1 | 1 |
| 12. | Braking is a mechanism to convert -------------- energy developed by tractor  into --------------- energy. | CO1 | 1 |
| 13. | List the performance functions of control value of Hydraulic system of a tractor. | CO3 | 1 |
| 14. | Define Tractive efficiency. | CO2 | 1 |
| 15. | What is Motion Resistance Ratio? | CO2 | 1 |
| 16. | More ballast to the tractor wheels is added for ------------------. | CO3 | 1 |
| 17. | Track width adjustment is done for ---------------------. | CO3 | 1 |
| 18. | Tractiveability of tractor is determined by ---------------- and stability of tractor is determined by --------------------. | CO1 | 1 |
| 19. | List the factors to be considered in design of workstation layout in a tractor. | CO1 | 1 |
| 20. | The tractor will over turn laterally when the soil reaction on outer rear wheel becomes -------------- in turn. | CO3 | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| **PART – B (10 X 5= 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | List out major types of transmission gear box in Agricultural tractors. | CO1 | 5 |
| 22. | Describe briefly the working components of clutch system. | CO3 | 5 |
| 23. | Enumerate the final drive system of a tractor. | CO3 | 5 |
| 24. | Discuss the classification of brakes used in tractors. | CO1 | 5 |
| 25. | Explain the 5 steering geometry angles. | CO3 | 5 |
| 26. | Explain the working principles and basic components of hydraulic system of a tractor. | CO1 | 5 |
| 27. | Derive the Ackerrman steering equation. | CO3 | 5 |
| 28. | Calculate the braking torque of a tractor with drum brake on the real wheels of drum diameter 0.13m. The force given at pedal is 350 N. Mechanical advantage from pedal is 2.6 and that from the levers is 5. Assume Coefficient of Friction µ as 0.4. | CO3 | 5 |
| 29. | Describe the factors affecting traction. | CO2 | 5 |
| 30. | Determine the traction force developed by a track type wheel 30 cm wide and 150 cm contact length of a tractor weighing 15 kN moving on soil with soil Cohesion = 1.3 N / cm2 and angle of internal soil friction ø = 28deg? Value of tan 28=0.531 | CO2 | 5 |
| 31. | Enlist the methods to achieve maximum drawbar pull of a tractor. | CO2 | 5 |
| 32. | List out the ergonomic considerations needed in the development of a tractor. | CO2 | 5 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | |
| 33. | a. | Design a 3 speed sliding gear box for a tractor to give speed variations of 200 ----- 600 rpm. The input shaft speed of tractor is 1600 rpm. | CO3 | 9 |
| b. | Draw a neat sketch of single drop steering system of a tractor and label the components. | CO3 | 6 |
|  |  |  |  |  |
| 34. | a. | Describe the construction of pneumatic tyres of a tractor. | CO1 | 10 |
| b. | What is the function of PTO and the basic types of PTO used in tractors? | CO1 | 5 |
|  |  |  |  |  |
| 35. | a. | Draw the free body diagram of tractor chassis with external forces drawbar pull and soil reactions on a plain ground. | CO2 | 8 |
| b. | A tractor which weighs 2.5 kN has front and rear wheel reactions of 10 and 15 kN respectively. The wheel base of the tractor is 2000mm. Calculate how far is the center of gravity of the tractor located from its real axle. | CO2 | 7 |