Seat No: _____ **Enrollment No _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B. Tech. Winter 2019 - 20 Examination

Semester: 5/7 **Date: 09/12/2019**
Subject Code: 03110407 **Time: 10:30am to 01:00pm**
Subject Name: Tractor System and Control **Total Marks : 60**

Instructions:

1. All question are compulsory
2. Figures to right indicate full marks
3. Make suitable assumptions wherever necessary
4. Start ne question on new page

Q.1 Objective type questions (all are compulsory) **(15)**

(A) Fill in the blanks:

1. The brake of tractor is mounted on …….....
2. The clutch is fitted in between …… and the gear box.
3. The more weight transfer is results into …….
4. Ratio of drawbar power to axle power is known as …….
5. The study of man machine system is known as …….

(B) True/False

6. A 21 splined PTO is designed to operate at a rated speed of 540 RPM.
7. Maximum noise level from a tractor near the operator's ear should not exceed 90 dB.
8. The most used and lest efficient power outlet of tractor is PTO Power.
9. A high center of gravity improves lateral stability of tractor.
10. Front axle is also known as dead axle.

(C) M.C.Q.

11. Traction coefficient is maximum in a field when----------
(a) It is wet (b) It is dry (c) It is Cultivated (d) It is Irrigated

12. Idler gear in a gearbox is used to ----------
(a) increase the speed of tractor
(b) decrease the torque of tractor
(c) reduce the power of the tractor
(d) change the direction of rotation of the driving wheels

13. Which of the following pump is most efficient in hydraulic system
(a) Plunger pump (b) Centrifugal pump (c) gear pump (d)All of above

14. Kinetic energy of tractor is
(a)$\frac{1}{2}mv^2$ (b)$\frac{1.1}{2}mv^2$ (c)$\frac{1.1}{4}mv^2$ (d)$\frac{10}{20}mv^2$

15. The ratio of the rolling resistance to normal load on traction device is known as
(a) rim pull
(b) tractive efficiency
(c) traction
(d) motion resistance ratio

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) What are the different components of mechanical type steering system? Explain the working of steering system?
B) Describe with the help of neat sketch the principle of operation of an internal expanding shoe brakes?
C) What is the principle of operation of friction clutch system in tractor?
D) Explain different power outlets of tractor?

Q.3 A) Explain theory behind gearbox in a tractor. **(07)**

B) A single plate clutch with both sides effective has inner and outer radius of friction surfaces 130 mm and 180 mm respectively. The maximum pressure intensity is not to exceed 0.19 N/mm^2**.** The coefficient of friction is 0.39. Considering uniform wear theory, find the Torque and Power transmitted if engine is running at 2100 RPM. **(08)**

OR

B) What do you mean by traction? What are different factors affecting traction? **(08)**

Q.3 A) A tractor with a total weight of 30 kN having wheel base of 2200 mm has CG located 800 mm ahead of center of rear axle. It pulls a drawbar load of 16 kN at drawbar at an angle of 15° with the horizontal. The hitch point is located 400mm above ground surface 300 mm behind the center of rear axle. Calculate the reactions on rear and front wheels of tractor. Also calculated the weight transfer of rear wheel occurring due to above pull developed by the tractor. **(07)**

OR

A) (i) Define Center of Gravity and name three methods of determining C.G. of tractor. **(07)**

(ii) Explain in brief the term 'Ballasting' in reference to tractor traction. Discus any three types of traction aids commonly used in tractors.

B) In the gear train depicted below, gear 1 of the input shaft is in constant mesh with Gear 5 of the counter shaft. Find the "**speed" of rotation of output shaft,** when **gear 3** of output shaft is meshed with **gear 7** of the counter shaft. The Input shaft is rotating at **1400 rpm**. The number of teeth of every gear is shown in the table below: **(08)**

Gear No.	1	2	3	4	5	6	7	8	9	10
Number of Teeth	12	15	24	20	38	35	26	30	12	12