R22 Regulation *Subject code:4P6BC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VI Semester Supplementary Examinations, November 2025

UTILIZATION OF ELECTRICAL ENERGY

(EEE)

Maximum Marks: 60 Date:13.11.2025 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	List out the types of electric drives.	1M	1	I
b)	What are the factors governing the selection of motors?	1M	1	II
c)	State the applications of induction heating.	1M	2	I
d)	Compare AC and DC welding.	1M	2	II
e)	What is flood lighting? Where is it generally used?	1M	3	I
f)	Define luminous flux.	1M	3	I
g)	Why a series motor is preferred for the electric traction?	1M	4	II
h)	List out various traction systems.	1M	4	I
i)	Indicate the factors which affect the specific energy consumption in electric trains.	1M	5	II
j)	Define Accelerating weight and Adhesive weight.	1M	5	I

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	Explain about the different speed torque characteristics of different machines and give their utility in selection for Industrial loads.	10M	1	III
	OR			
3	a) Discuss the advantages and disadvantages of electric drive over other drives. b) A 200 V shunt motor has an armature resistance of 0.5 Ohm. It takes a current of 16 amps on full load and runs at 600 rpm. If a resistance of 0.5 ohm is placed in the armature circuit, find the ratio of the starting torque to the full load torque.	5M 5M	1	IV
4	a) Distinguish between Direct Resistance heating and Indirect resistance heating. b) Explain the working of Ajax Wyatt vertical core furnace with a neat sketch.	5M 5M	2	IV
	OR			
5	With a neat sketch, discuss the principle of shielded electric arc welding Give its merits and demerits with respect to resistance welding.	10M	2	III

6	a) Describe the construction and working principle of a fluorescent lamp. b) The illumination of a drawing office of 30 m x 10 m is to have a value of 220 lux and is to be provided by a number of 200W filament lamps. If the utilization factor is 0.3 and the depreciation factor is 0.8, find the number of lamps required. The efficiency of each lamp is 12 lumens per watt?	5M 5M	3	IV
	OR			
7	a) State and explain laws of illumination. b) Explain with a neat diagram the operation of a Sodium discharge lamp.	4M 6M	3	III
8	a) Present the significance of speed time curves. b) A train weighting 200 tonnes is to be driven up an incline of 1.8 percent at a speed of 30 Km/h. If the train resistance at this speed is 1.6 kg per tonne, find the current required at 1400 V dc if the efficiency of the motors and gearing is 88 percent. If the current were cut off, how long would the train take to come to rest?	4M 6M	4	IV
	OR			
9	a) Write the requirements of traction motors. b) Describe the concept of rheostat braking.	6M 4M	4	III
10	An electric train weighing 200 tonne has 8 motors geared to driving wheels; each wheel is of 80 cm diameter. Determine the torque developed by each motor to accelerate the train to a speed of 48 km/hr in 30 seconds up a gradient of 1 in 200. The tractive resistance of 50 newtons/tonne, the effect of rotational inertia is 10% of the train weight, the gear ratio is 4 in 1 and gearing efficiency is 80%.	10M	5	IV
	OR			
11	Derive the necessary relation for the total tractive effort for the propulsion of train.	10M	5	III