

**GANPAT UNIVERSITY**  
**B.TECH SEM-VI (ELECTRICAL)**  
**REGULAR EXAMINATION MAY JUNE-2014**  
**2EE604: ELECTRICAL DRIVES**

Time: 3 Hours

Total Marks:-70

- Instructions:** - 1. Attempt all questions.  
 2. Make suitable assumptions wherever necessary.  
 3. Figures to the right indicate full marks.

**SECTION-I**

- Q:1 (A) Draw and explain the block diagram of electric drive system. Narrate advantages of electrical drive system. (6)
- (B) Based on rms torque, estimate the kW rating of a 750 rpm motor used for driving an equipment having the following load torque curve: (6)
- (i) For first 10 seconds, the torque is constant at 40 kg-m;  
 (ii) For next 30 seconds, the torque varies linearly with time from 35 kg-m to 15 kg-m,  
 (iii) For the last 50 seconds, the torque is constant and equal to 10 kg-m.
- OR
- Q:1 (A) From basic principles of heat transfer, develop an expression for temperature rise of an electric motor delivering fixed rated power at fixed rated speed. and also state the assumptions made.. (6)
- (B) A single-phase half-wave converter is operated from 120V, 60 Hz supply. if the load is resistive  $R=10 \Omega$  and delay angle  $=\pi/3$ , determine (i) the efficiency (ii) the form factor (iii) the ripple factor (iv) transformer utilization factor. And (v) peak inverse voltage of the thyristor. (6)
- Q:2 (A) With the help of the proper circuit diagram explain the dynamic braking of dc shunt motor. How the same is different from plugging? (5)
- (B) A 200 V, 875 rpm, 150 A, separately excited dc motor has an armature resistance of 0.06  $\Omega$ . it is fed from a single phase fully controlled rectifier with an ac source of 220 V, 50 Hz. Assuming continuous conduction mode calculate the firing angle for rated motor torque at 750 rpm (6)
- OR
- Q:2 (A) Explain working principle of single phase half controlled bridge converter fed separately excited dc motor and draw waveforms of motor terminal voltage motor current and supply current. And also compare its merits and demerits with respect to when fed by fully controlled bridge converters. (5)
- (B) Draw the block diagram for chopper fed separately excited dc motor drive. Also explain its working for first quadrant with suitable wave forms. (6)
- Q:3 **Attempt any two:** (12)
- (A) List out Starters used for induction Motor? Explain them
- (B) Define continuous, short time and intermittent duty. Draw typical variations of output power losses, temperature rise w.r.t time in each case.
- (C) Derive the equivalent values of electric drive parameters for the loads with rotational motion and translational motion.

## SECTION-II

- Q:4 (A) A weight of 500kg is being lifted up at uniform speed of 1.5M/S by a winch driven by a motor running at speed of 1000rpm, The moment of inertia of a motor and winch are 0.5 and 0.3 kg-m<sup>2</sup> respectively. Calculate the motor torque and equivalent moment of inertia referred to motor shaft .in the absence of weight ,motor develops a torque of 100N-m when running at 1000rpm (6)
- (B) Which are different components of Torques? Explain. (6)

OR

- Q:4 (A) Nature and Classification of of Load Torques? (6)
- (B) A Motor drives a two loads. One has rotational motion, it is coupled to motor through a reduction gear with  $a=0.1$  and efficiency of 90%. The load has a moment of inertia of 10 kg-m<sup>2</sup> and torque of 10N-m .other load has translational motion and consist of 1000kg weight to be lifted up at uniform speed of 1.5 M/S . Coupling between this load and motor has an efficiency of 85% .Motor has has inertia of 0.2 kg-m<sup>2</sup> and runs at constant speed of 1420rpm. Determine equivalent inertia of referred to motor shaft and power developed by the motor (6)

- Q:5 (A) 2.8 KW, 400V, 50Hz, 4 pole, 1370 RPM, Delta connected Squirrel cage induction motor has following parameters referred to the stator :  $R_s = 2\Omega$  ,  $R'_r = 5\Omega$  ,  $X'_r = X_s = 5\Omega$  ,  $X_m = 80\Omega$ , Motor Speed control by stator voltage control. When driving a fan load it runs at rated speed at rated voltage. Calculate (1) Motor terminal voltage, current and torque at 1200rpm. (6)
- (B) Explain Operation with unbalanced source voltage and single phasing of induction motor. (5)

OR

- Q:5 (A) Draw and explain VSI base Induction Motor Drive? (6)
- (B) Explain the V/f control method of AC drive with neat sketches. (5)

- Q:6 Attempt any two: (12)
- (A) With neat sketches explain BLDC motor drive.
- (B) Briefly explain Principle of vector control With the necessary block diagram.
- (C) Explain the four quadrant operation of motor applicable for hoist.

**END OF PAPER**  
**Best of Luck**