*Ex/BESUS/ **EE-802/ 06***

B.E. (EE) Part-IV 8th Semester Examination, 2006

Electric Drives & Utilisation

(EE-802)

Time : 3 hours   **Full Marks** : **100**

Use separate answerscript for each half. Two
marks are reserved for neatness in each half.

FIRST HALF

{Answer any THREE questions.)

1. a)   What do you mean by drives? Discuss the merits and demerits of electric drives.

    b)   "It is not possible to comment on stability of drives looking at motor characteristics or load characteristics only" - Justify.   (8+8)

2. a)   Explain why v/f control is preferred for speed control of 3 phase squirrel cage induction motor over other methods.

    b) Develop the speed-torque characteristics of dc series motor under counter current braking condition.   (8+8)

3. a)   "Regenerative braking can be applied only when the motor speed is greater than its ideal no-load speed". - Justify.

    b) Derive the expressions for load torque and inertia of a crank-chaft driven load referred to motor shaft. Then develop the equation of dynamic torque for such load.

                                                                                (6+10)

4. a)   Develop and draw speed-time and current-time curves of a separately excited dc motor during transient period under dynamic braking condition.

    b) Compare 1 -hr rating of a motor with a thermal time constant of 4 hrs with its continuous rating (iron losses are equal to copper losses at full load).   (10+6)

5. a)   Show that energy consumption in stator and rotor circuit of a 3 phase induction motor during counter current braking without load is thrice of that during starting.

    b) Derive the expression for optimum gear ratio for fastest response of a drive

system. **(^{8}+8)**

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SECOND HALF

(*Answer O.No.6 and TWO from the rest.*)

6. a) How does an electronic choke help to develop the ignition voltage in a fluorescent tube, when its rating is in the range of 1 mH?

    b) "A halogen lamp is-a better rendition of the fluorescent lamp". - Explain, mentioning only points.

    c) What is the difference in the nature of the speed time graph of a suburban train and main line train?

    d) Why do sodium vapour lamps have the highest efficacy?

    e) Determine the M.S.C.P. of a lamp emitting 1000 lumens. A surface inclined at an angle of 60° to the rays is kept 5 m away from a 100 c.p. lamp. Find the average intensity of illumination on the surface.   (3+3+2+4+4)

7. a) What do you mean by co-efficient of adhesion? Which motor would you prefer, a.c. or d.c. in respect of this term?

    b) A 250T motor coach having 4 motors, each developing 5000 N-m during acceleration, starts from resl^ If the value for the gradient, G = 25, Gear ratio is 5, gear transmission $r\backslash$ = 88%, wheel radius 44 cm, train resistance 500 N/T, additional rotational inertia = 10%, calculate the time taken to reach a speed of Vm = 45 km/hr. If the supply voltage is 1500 V d.c, and $r\backslash$ of motors is 83.4%, determine the current drawn by each motor during notching period.

                                                                                (6+10)

8. a) What do you mean by the terms dead weight, accelerating weight and adhesive weight. Find a relation between them.

    b) Define the term tractive effort. Derive the expression for total tractive effort developed.

    c) A 400 T goods train is to be hauled by a locomotive up a gradient of 2% with accn. of 1 kmphps. Co-efficient of adhesion is 20%, track resistance 40 N/T, and rotating masses 10% of the dead weight. Find the weight of the locomotive and the no of axles if the axle load is not to increase beyond 22T.   (4+5+7)

9. a) Describe the operation of a gaseous discharge lamp.

    b) "The fluorescent lamp is an example of a gaseous discharge lamp so also is a mercury-vapour lamp". - Do you think, the operating principles and operating conditions remain the same in both cases?

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   c)   The principle of operation of a metal halide lamp is similar to that of a mercury vapour lamp but there is one dissimilarity in performance, which makes the metal halide suitable for use in stadium lighting, but not the mercury vapour. Discuss in points.

   d)   How is specular and diffused reflection brought about in street lighting?

                                                                      (4+4+4+4)

10. a)   What factors are to be considered while designing a good lighting scheme.

   b)   What is light transportation?

   c)   A hall measuring 20m x 50m is to be illuminated by suitable lamps to give an average illumination of 45 lux. The following data may be used :

        Mounting height from the working plane : 3 m

        Utilization Factor = 0.65 Depreciation Factor = 1.3

The lamps are to be chosen from the following groups.

Watts	75	100	150	200
Lumens	800	1200	2000	2800

Calculate the no. of lamps of each type and sketch the disposition of luminaires for an energy efficient design.   (4+2+10)