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SE-8285

B. E. - III (Sem. V) Examination

May / June – 2011

Electrical Power Utilization & Traction

(Institute Elective -II)

(New Course)

Time :3 Hours] [Total Marks : **100**

Instructions :

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 3 (SEM. 5)**

Name of the Subject :

☛ **Electrical Power Utilization & Traction**

☛ Subject Code No. : **8 2 8 5** ☛ Section No. (1, 2,.....) : **NIL**

Seat No. :

Student's Signature

Instructions: (i) Attempt all questions.
(ii) Figure to the right indicates full marks.
(iii)Make suitable assumptions, whenever necessary.

Q-1(a) Fill in the blanks. **5**

(1) For traction work _____motor is preferred.
(2) In _____ lamp neon gas acts as a shield around the filament.
(3) For normal reading, the illumination level is required around _____lumen/m^2.
(4) _____bond is responsible for formation of inorganic compound.
(5) In _____ motor, speed can be varied by varying brush position.

Q-1(b) True or False **5**

(1) Chemical equivalent is the ratio of weight to valency.
(2) Starting torque in case of centrifugal pump is generally less than running torque.
(3) DC shunt motor has relatively wider speed control.
(4) Battery operated scooter, for breaking uses mechanical braking.
(5) The value of current efficiency lies between 90 to 98%.

Q-1(c) Find the thickness of copper deposited on a plate area of 0.00025m^2 during electrolysis if a current of one ampere is passed for 100 minutes. Density of copper is 8,900kg/m3 and Electro Chemical Equivalent of copper is 32.95×10^{-8}kg/coulomb. **5**

Q-1(d) Explain four quadrant operation of motor carrying hoist load. **5**

Q-2(a) The armature and shunt field resistance of a 500 V shunt motor are 0.1 ohm and 125 ohm respectively. A resistance of 1.5 ohm is connected in series with the armature and it runs at 800 r.p.m taking a current of 60A. What must be the resistance of a diverter connected across the armature to reduce the speed at 600 r.p.m. Assume the armature current to be constant. **8**

Q-2(b) Explain different methods of starting of synchronous motor. **7**

OR

Q-2(a) Discuss the factors governing selection of an electric motor for a particular service. **7**

Q-2(b) Explain dynamic and regenerative braking of dc motors. **8**

Q-3 Attempt any Three. **15**

(1) Give characteristics of dc shunt motors. Why such motors are not suitable for traction purpose?
(2) Why electric drives are preferred over mechanical drives?
(3) Explain Faraday's law of electro deposition.
(4) Explain working of arc lamp with neat sketch.
(5) Which are the factors considered while designing lighting scheme?

Q-4(a) Fill in the blanks. **10**

(1) The trains employing motor coaches and trailer coaches are known as _____trains.
(2) The time during which pressure is applied at the point of welding after the welding current has ceased to flow is call _____time.(squeeze, hold)
(3) _____trains have more than one motor coach.(main line, suburban)
(4) In dielectric heating, heat _____ with increases in frequency.(increase, decrease)
(5) The supply voltage of overhead transmission line used for Bombay-Igatpuri section is _____ V DC.
(6) For constant current heating, the heat is _____ with increase in resistor. (increase, decrease)
(7) When dynamic braking is used, the stored kinetic energy is converted in to _____,(electrical energy, heat)
(8) While moving the down gradient _____ types of breaking is employed for energy saving.
(9) Presence of oil, water, grease and mud on the track _____ the co-efficient of adhesion. (reduces, increases)
(10) The supply conductor is commonly known as _____.(Jumper wire, Contact wire)

Q-4(b) Explain open frame, faiveley and crossed arm type pantograph. **5**

Q-4(c) Write short notes on dielectric heating. **5**

Q-5(a) Explain duty cycle of traction drives for main line train. 7

Q-5(b) A local train uses motor and trailer coaches in the ratio of 1:2. The weight of a motor coach is 40 tonnes and that of trailer 35 tonnes. All the wheels in a motor coach are driving wheels. The train resistance is 30 N/tone. Effective rotating mass is 10% of the dead weight. It the coefficient of adhesion is 0.2, calculate 8

(a) The maximum train acceleration on a level track.

(b) What will be the maximum acceleration if the motor and trailer coaches are used in the ratio of 1:1.

OR

Q-5(a) Classify induction furnace and explain Ajax- Wyatt type induction furnaces. 8

Q-5(b) Explain carbon arc welding and metal arc welding. 7

Q-6 Attempt any Three. 15

(1) Explain electro deposition.

(2) Explain braking used in electric trains.

(3) What is co-efficient of adhesion? Discuss the factors on which the co-efficient of adhesion depends.

(4) A suburban train runs with an average speed of 36 km/hr between two stations 1.8 km apart. Values of acceleration and retardation are 1.8km/hr/sec and 3.6 km/hr/sec. Calculate the maximum speed of the train assuming trapezoidal speed-time curve.