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DECEMBER 2021 - ENDSEM EXAM**B. TECH. (E&TC) (SEMESTER - I)****COURSE NAME: Power Electronics for Electric Vehicle****COURSE CODE: ETUA40182B (PATTERN 2018)**

Time: [1Hr]

[Max. Marks: 30]

Instructions to candidates:

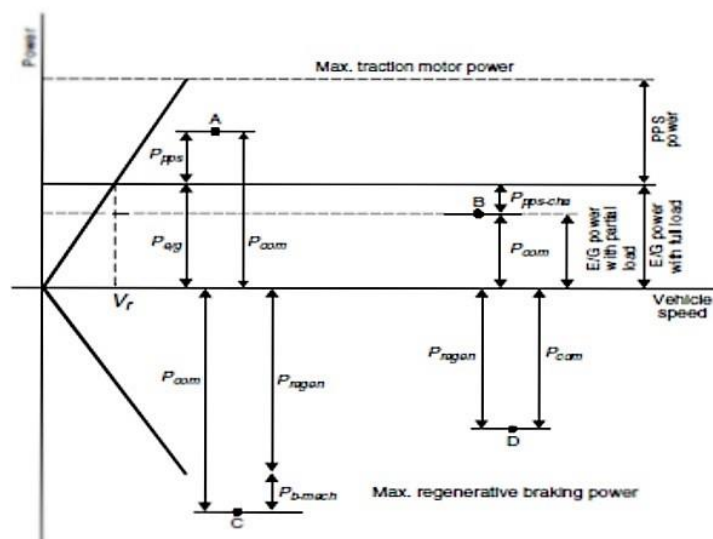
- 1) Answer Q.1 OR Q.2, Q.3 OR Q.[4], Q.5 OR Q.[6].
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q.1 a Argue on using active DC-DC converter in place of dissipative converters, in terms of RoI and long term usage of the system. [4]

Q.1 b Design a Boost Converter to deliver 120 V, 500mA to feed a resistive load. Source is of 2[4]V, 5A. Estimate Duty cycle and size of Inductor. [6]

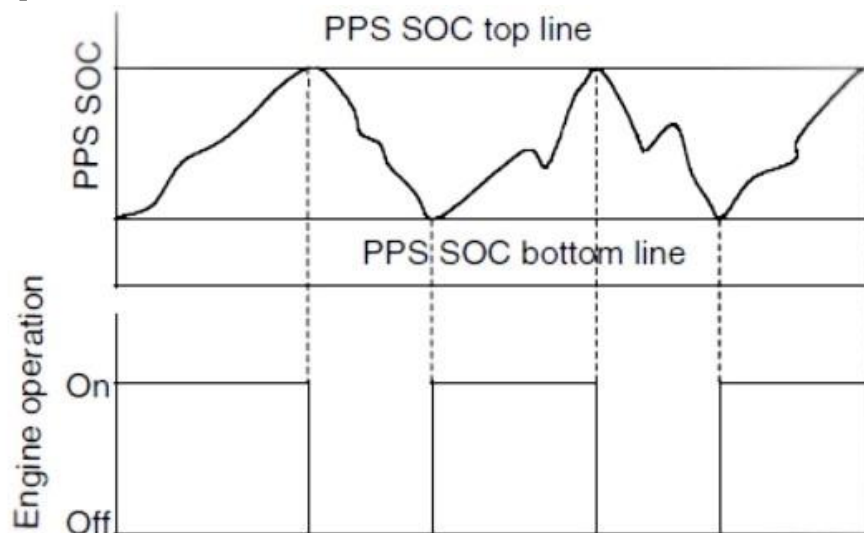
OR

Q. 2 a Examine the Speed-Power diagram below and determine driving mode of the vehicle on point A,B,C,D [4]



Q2 b Compare performance of Inverter based drives to Chopper drives in terms of efficiency, controllability, Peak Power ratings and control scheme [6]

- Q.3 a Differentiate BLDC motors in EVs to SRM or Induction motors for 1. Load dynamics 2. Torque, 3. Commutation and [4]. Back EMF [4]
- Q.3 b Formulate the strategy for Max SOC-of-PPS based on following requirement. Illustrate with control flowchart [6]



OR

- Q.4 a Design a LPF four reduction of Fifth and higher order harmonics for a system having fundamental freq of 50 Hz. Comment on THD reduction after implementing LPF in Inverter based drive. [4]
- Q.4 b Support with proper justification: 'Receptive nature of sources and bi-directionality of block elements in propulsion system' considering EV propulsion as a case. [6]
- Q.5 a 'Energy management systems play key role in performance of EV' Appraise the statement with suitable example [4]
- Q.5 b Design a Charging station up to Gray Box for delivering 12V - 10A, 2[4]V-30A and [4]8V-30A outlets, with required protection of charge station and Vehicle. [6]

OR

- Q.6 a Investigate different configurations of BMS (Master and Slave) with pros-cons of each arrangement. [4]
- Q.6 b 'Charging stations will be next generation fuel stations,. Justify with facts and figures in 2020 and projections in 2025 and 2030, in context with Indian EV industry. [6]