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Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
End Semester Exam
May 2016

Max. Marks: **100**
Class: **B.Tech.** Semester: **VIII**
Name of the Course: **Electric Traction**

Duration: **3 hrs.**
Program: **Electrical**
Course Code : **EE461**
Master file.

Instructions:
Note : (1) Question No. 1 is **compulsory**
(2) Attempt **any four** questions from remaining six questions
(3) Figures to the right indicate full marks.
(4) Assume suitable data if necessary.

Question No		Maximum Marks	Course Outcome Number	Module No.
Q1				
a)	What is specific energy output? Prove that, $E_T = 0.0107 W_e V_m^2 + 27.25 W G D' + 0.2778 W r D'$	10	1	1
b)	Draw and explain schematic chart for Electric traction sub system. Explain in brief motive power sub-circuit.	10	1	5
Q2				
a)	How to save energy with series parallel starting? How to calculate efficiency of starting by using series parallel control for **four** motors?	10	1	3
b)	Compare DC series and shunt motor for traction duties.	5	1	2
c)	Write short note on (a) train resistance due to gradient (b) Curve resistance	5	1	1

Q3				
a)	A locomotive accelerate a 400 ton train of a gradient of 1 in 100 at 0.8 km/hr/s. Assuming the coefficient of adhesion to be 0.25. Determine that minimum adhesive weight of locomotive. Assume the train resistance 40 N/ton and allow 10% for the effect of rotational inertia.	5	1	1
b)	Write short note on "Optimization of design and constructional features for improved power to weight ratio"	5	1	2
c)	Attempt any two i) DC track circuit ii) AC track circuit iii) Electronic track circuit	10	1	6
Q4				
a)	Two motors each of 1500 V and armature resistance 0.2 ohms takes 500 amperes during starting. If effective weight of train is 145 tonne, and dead weight of 130 tonne, specific resistance of 50 newtons /tone, tractive effort / motor 40000 newtons, speed at the end of starting period 40 kmph, Find (a) Duration of starting period (b) Speed of train transition (c) Rheostatic loss	10	1	3
b)	Explain "Electric traction as a viable transport strategy for 21st century."	5	2	1
c)	Write short note on element used in control for traction motor.	5	1	3
Q5				
a)	Write short note on "Application of Induction Motors for Traction purpose"	5	1	2
b)	A train has speed of 80 kmph between two stops 6 km apart. The duration of stoppage 1.5 minute .The acceleration and retardation are 1.5 kmphps and 2.5 kmphps respectively. Calculate the maximum speed of train.	5	1	1
c)	Write short note on overload protection scheme and earth fault protection scheme used for electrical locomotive equipments	10	1	4

Q6				
a)	State different type of protection strategy used in electric locomotive equipment. Explain in detail surge protection scheme used in electric traction?	10	1	4
b)	What is specific energy consumption? An electric train has an average speed of 40 km/hr on a level track between stops 1200 m apart. It is accelerated at 1.8 km/hr/s and it braked at 3.2 km/hr/s. Draw speed time curve and estimate specific energy consumption. Assume tractive resistances 50 N/ton and allow 12% of rotational inertia. Assume efficiency of motor and gear is equal to 92 %.	10	1	1
Q.7				
a)	How to control DC traction system using chopper	5	1	3
b)	What is coefficient of adhesion? Which factors affect on coefficient of adhesion?	5	1	1
c)	Draw and explain schematic layout of overhead equipment.	5	1	5
d)	Write short note on "Modern trends (future scope) of Electric Traction in India"	5	2	7

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Munshi Nagar, Andheri (West), Mumbai – 400058.

End Semester Exam
May 2016

Max. Marks: **100** Duration: **03 Hours**
Class: **B.TECH** Semester: **VIII** Program: **B.TECH**
Name of the Course: **Electrical Drives and Control** Course Code : **EE451**

Master file.

Instructions:

- Question no.1 is compulsory
- Solve any four from remaining questions
- Answers to all sub questions should be grouped together
- Figures to the right indicates full mark
- Assume suitable data if required and justify the same.

Ques. No		Max. Marks	C.O. No.	Mod. No.
Q.1 a)	What is load equalization?	04	2	2
b)	Compare active and passive load torque with suitable examples.	04	2	2
c)	Draw the torque speed characteristics of DC series motor for dynamic braking.	04	1	5
d)	Explain in brief the operation of induction motor for (i) fixed frequency and variable voltage (ii) fixed voltage and variable frequency.	04	3	6
e)	What is permanent magnet dc motor (PMDC). What are its advantages and disadvantages?	04	3	7
Q.2 a)	Describe the power electronics control of separately excited dc shunt motor using DC-DC converter in motoring and regenerative braking mode.	10	2	5
b)	A 3-phase, 100 KW, 6 pole, 960 rpm wound rotor induction motor drives a load whose torque varies such that a torque of 3000 Nm of 10 sec duration is followed by a torque of 500 Nm of duration long enough to attain the steady state speed. Calculate the moment of inertia of the fly wheel, if motor torque should not exceed twice the rated value. Moment of inertia of the motor is 10 kg-m^2. Motor has linear speed-torque curve in the region of interest.	10	2	2
Q.3 a)	What is the slip power recovery scheme used in the control of SRIM drive. Draw the suitable diagram and explain it.	10	2	6
b)	A separately excited DC shunt motor is fed by single phase fully controlled rectifier. Explain the operation of converter for continuous and discontinuous conduction. Draw the source voltage, source	10	2	5

	current, load voltage and load current waveforms. Draw the torque speed characteristics for the same.			
Q.4 a)	A three phase induction motor is fed with non-sinusoidal voltages. Discuss the operation of induction motor with these source voltages. What are the frequency components present in the torque? Justify it.	**12**	**1**	**6**
b)	A 3-ph, 440V, 50Hz, 6-pole, Y-connected induction motor has following parameters, R_S=0.5 Ω, R_r'=0.6 Ω, X_s=X_r'=1.0 Ω. Stator to rotor turns ratio is 2. If the motor is used for regenerative braking determine: (i) Maximum overhauling torque it can hold and the range of the speed in which it can safely operate. (ii) The speed at which it will hold a load with a load torque of 160 Nm.	**08**	**2,3**	**6**
Q.5 a)	What is the need of dual converter in the control of dc drive? What are the different modes of operation? Justify the purpose of inductance in the simultaneous control of this converter	**12**	**3**	**5**
b)	A Y-connected squirrel cage induction motor has the following ratings and parameters: 400V, 50Hz, 4-pole, 1370rpm, R_S=2Ω, R_r'=3Ω, X_s=X_r'=3.5 Ω. Calculate motor breakdown torque for inverter fed induction motor for a frequency of 60Hz as a ratio of its 50 Hz.	**08**	**2**	**6**
Q.6 a)	Draw and explain the block diagram of closed loop control of induction motor using V/F control.	**12**	**2**	**6**
b)	A 220 V, 70 A dc series motor has combined resistance of armature and field of 0.12 Ω is controlled by regenerative braking by chopper with a source voltage of 220 V. (i) Calculate the motor speed for a duty ratio of 0.5 and motor braking torque is equal to the rated motor torque. (ii) Calculate the maximum allowable motor speed for a maximum permissible current of 70 A and maximum permissible duty ratio of 0.95. (iii) What resistance must be inserted in armature circuit for the drive to run at 1000 rpm without exceeding armature current beyond 70 A? The duty ratio of chopper has a range from 0.05 to 0.95. (iv) To what extent the number of turns in the field winding should be reduced to run the motor at 1000 rpm without exceeding the armature current beyond 70 A.	**08**	**3**	**5**
Q.7a)	Draw the neat diagram and explain the closed loop control of dc drive for speed control below and above base speed.	**10**	**3**	**4**
b)	Derive the expression for the calculation of flywheel mounted on the shaft of motor for load equalization	**10**	**2**	**2**

(1)

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KT-exam

Marks: 100

Duration: 1 hour
Class: B.TECH Semester: VIII Program: ELECTRICAL ENGG
Name of the Course: Design & Management of Electrical Systems Course Code :

Instructions: 1) Marks will not be awarded for the answer without any justification.
2) Draw appropriate figures in support of your answer wherever required.
3) Attempt any 5

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Q. No.	Description	Marks
1a	Describe different drawings required in electrical systems.	10
1b	What are different activities of an electrical design engineer?	10
2	Draw a single line diagram for a 11kV side of a 11kV/415V, 1500 kVA delta/star transformer. Show incoming breaker, all metering and protective devices, CT, PT etc. with ratings. Assume fault level of 40 MVA.	20
3a	Explain the concept of power factor, its importance and power factor correction methods.	10
3b	Discuss different types of distribution systems.	10
4a	Write a note on co-ordination and discrimination of protective devices.	10
4b	Explain conductor derating and discuss various reasons of derating.	10
5a	Describe in detail process of estimation and costing of electrical installations.	10
5b	Write a note on energy efficient motor.	10
6a	Explain tendering process.	10
6b	What are different lighting methods?	10

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Sardar Patel College of Engineering

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Munshi Nagar, Andheri (West), Mumbai – 400058.

Re-Examination

June- 2016

Max. Marks: **100** Duration: **03 Hours**

Class: **B.TECH** Semester: VIII Program: **B.TECH**

Name of the Course: **Electrical Drives and Control** Course Code : **EE451**

Master file.

Instructions:

- Question no.1 is compulsory
- Solve any four from remaining questions
- Answers to all sub questions should be grouped together
- Figures to the right indicates full mark
- Assume suitable data if required and justify the same.

Ques. No		Max. Marks	C.O. No.	Mod. No.
Q.1 a)	What is the effect of variation of rotor resistance on torque and speed of three phase induction motor.	05	2	2
b)	Compare active and passive load torque with suitable examples.	05	2	2
c)	Regenerative braking is not possible with DC series motor. Justify it.	05	1	5
d)	What is permanent magnet dc motor (PMDC). What are its advantages and disadvantages?	05	3	7
Q.2 a)	Draw the complete circuit diagram and explain the operation of separately excited dc motor in motoring and regenerative braking operation. Draw the load voltage and current waveform.	10	2	5
b)	A 3-phase, 100 KW, 6 pole, 960 rpm wound rotor induction motor drives a load whose torque varies such that a torque of 3000 Nm of 10 sec duration is followed by a torque of 500 Nm of duration long enough to attain the steady state speed. Calculate the moment of inertia of the fly wheel, if motor torque should not exceed twice the rated value. Moment of inertia of the motor is 10 kg-m^2. Motor has linear speed-torque curve in the region of interest.	10	2	2
Q.3 a)	Discuss the operation of three phase induction for V/F control in three modes: a) Low speed operation b) Moderate speed operation c) Operation above rated speed	10	2	6

b)	A separately excited DC shunt motor is fed by single phase fully controlled rectifier. Explain the operation of converter for continuous and discontinuous conduction. Draw the source voltage, source current, load voltage and load current waveforms. Draw the torque speed characteristics for the same.	10	2	5
Q.4 a)	What are the effects of unbalanced source voltages on the operation of three phase induction motor.	10	1	6
b)	Derive the expression for the calculation of flywheel mounted on the shaft of motor for load equalization	10	2,3	6
Q.5 a)	Draw the suitable torque speed characteristics and explain the constant torque and constant power operation of separately excited dc motor.	12	3	5
b)	A Y-connected squirrel cage induction motor has the following ratings and parameters: 400V, 50Hz, 4-pole, 1370rpm, $R_S=2\Omega$, $R_r'=3\Omega$, $X_s=X_r'=3.5\ \Omega$. Calculate motor breakdown torque for inverter fed induction motor for a frequency of 60Hz as a ratio of its 50 Hz.	08	2	6
Q.6 a)	"Stator voltage control is very popular in I.M. where, $T_L \alpha (\omega_m)^2$" justify	10	2	6
b)	What is steady state stability of a drive? Derive the condition for the same.	10	3	1
Q.7a)	Draw the neat diagram and explain the closed loop control of dc drive for speed control below and above base speed.	10	3	4
b)	What is hoist? Explain the four quadrant operation of a hoist.	10	2	2

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End Term May 2016

Q. P. Code:

Max. Marks: 100 Duration: 3 hr
Class: B.Tech Electrical Semester: VIII Program: B.Tech
Name of the Course: **Communication Network & Security** Course Code : EE 452

Instructions:
Attempt any five from the following seven questions
Draw neat diagrams wherever required
Assumptions any should be specified

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Question No		Max Marks	CON	Module no
Q1a)	Explain the ISO-OSI model of networks with the help of neat diagrams.	15	1	1
b)	Compare TCP and UDP.	05	1	1
Q2a)	What are the benefits of IP security? Give some applications of IP security?	10	1	7
b)	Explain different classes of IP addresses, give their range and usage?	10	1	4
Q3a)	Write short notes on ATM reference model, its architecture and ATM adaptation layers?	10	1	2
b)	Explain in detail Bluetooth architecture and its protocol stack?	10	1,2	3
Q4	What do you understand by Cryptography? Explain different types of symmetric and asymmetric cryptographic mechanisms with examples.	20	2	6
Q5a)	Explain in detail the concept of email security and PGP?	10	2	7
b)	Explain mobile IP in detail with neat diagram? Explain tunneling process in mobile IP?	10	1	1
Q6a)	Explain in detail various functions of Network and Transport layers.	10	1	1
b)	Explain authentication on header?	10	2	7
.Q7	Write short notes on any two i) Wireless sensor network ii) Subnetting in IP address iii) MAC Protocols iv) S/MIME IP security	20	2	5,2,4,7

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End Semester Exam
May 2016

Max. Marks: 100 | Duration: 3 Hours
Class: Final Year BTECH Electrical | Semester: VIII | Program: B.TECH.
Name of the Course: Smart Grid | Course Code: EE463

Master file.

Instructions:
1. Attempt **any five** questions **out of seven.**
2. Draw neat diagrams wherever necessary.

Question No		Max. Marks	C.O. No.	M. No.
Q1 (a)	Define the concept of smart grid through home and building automation.	10	1	2
(b)	Explain the real time pricing mechanism in smart grid. How does it implement using smart meter?	10	1	2
Q2 (a)	Explain about intelligent electronic devices (IED) used in smart grid and state their application in monitoring and protection.	10	1	3
(b)	Explain the need of micro grid and its applications in present distribution system.	10	2	4
Q3 (a)	Describe issues related to interconnection, protection and control of micro grid.	10	2	4
(b)	Explain power quality issues of grid connected renewable energy sources in smart grid.	10	2	5
Q4 (a)	Explain the procedure for power quality audit in smart grid.	10	2	5
(b)	Describe Web Based Power Quality Monitoring in detail.	10	2	5
Q5 (a)	What are power quality conditioners for smart grid? Explain different types of power quality conditioners used?	10	2	5
(b)	Explain role and importance of cyber security for smart grid and hence describe the basics of cloud computing.	10	1	7
Q6 (a)	Explain security issues pertaining to smart grid and their possible solutions.	10	1	7
(b)	What is the role of ICT for smart grid? Hence explain Wide Area Network (WAN) and Wireless mesh network.	10	2	6
Q7	Write short notes on following **(Any Four)**:			
	(a) Advanced Metering Infrastructure (b) Bluetooth & Zigbee	5+5	2	6
	(c) Plastic & organic solar cells (d) Micro turbines	5+5	2	4
	(e) Captive power plants (f) Fuel Cells	5+5	2	4

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End Sem Exam
May 2016

Q. P. Code:
Max. Marks: **100** Duration: **3 hr**
Class: **Final Year** Semester: **VIII** Program: **Electrical Engineering**
Name of the Course: **Elective II - Robotics** Course Code : **EE465**

Master file.

Instructions:

- Attempt any **two** of the following questions.
- Assume suitable data if required.
- Answers to all sub-questions should be grouped together.

Question No.		Maximum Marks	Course Outcome
Q1. a)	Define robot. What is the essential feature that distinguishes hard automation and soft automation? Draw relative cost effectiveness of soft automation.	**10**	**1**
b)	Explain in detail classification of robot.	**10**	**1**
Q2. a)	Write and explain specifications of robot.	**10**	**1**
b)	For what type of robot is the precision uniform throughout the work envelope? For which robots is the vertical precision uniform? Which type of drive technology would be most suitable for the following applications: 1. Unload 1000 kg item from a die casting machine 2. Install integrated circuit on a printed circuit board.	**10**	**4**
Q3. a)	What is direct kinematics? Explain dot and cross product. Define coordinates and orthonormal coordinates.	**10**	**3**
b)	Give the signal output for various sensors. Also explain tactile sensor, inclinometer, gyroscope, GPS module. Write a short note on DC motor actuators.	**10**	**2**
Q4. a)	Write the detailed description of Line follower robot.	**10**	**4**
b)	Write a note on position sensitive devices. Draw and explain camera interface.	10	
Q5. a)	Write a short note on obstacle avoider robot.	10	4
b)	DC motors, H-bridge and pulse width modulation.	10	2
Q.6 a)	Write short note on Pick and Place robots.	10	
b)	Explain On-Off Control, PID Control, Velocity Control and Position Control.	10	2

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End Semester Exam
May 2016

Max. Marks: 100 Duration: 3 Hr.
Class: Final Year (Electrical) Semester: VIII Program: B.Tech
Name of the Course: **Elective – II Industrial Automation** Course Code : EE462

master file.

Instructions:

Please answer any 5 out of 7. Please write to the point answer and elaborate wherever is required.

Question No		Maximum Marks	Course Outcome Number	Module No.
Q1) a)	i) Define Automation?	2	01	01
	ii) What are the types of control loops in control system? Explain with examples.	4	01	02
b)	Explain 5 tier concept of Automation with example.	8	01	05
c)	What is protocol? Provide 2 examples	2	01	05
d)	Draw architecture of Industrial Automation?	4	01	01
Q2 a)	What is PLC & SCADA? Explain with Examples.	4	01	05
b)	Draw system architecture of PLC and explain?	6	01	05
c)	What is the functionality of SCADA?	5	01	05
d)	Explain Communication procedure between PLC & SCADA?	5	02	05
Q3 a)	What are the differences between PLC & DCS?	6	01	05
b)	What are Graphics and Logics? What are the programming languages used for writing logics?	6	01	05
c)	Explain End to End signal flow in DCS?	4	02	05
d)	i) What is Face Plate or Loop Plate?	2	01	05
	ii) What is the dimension of DCS Panels?	2	02	05
Q4 a)	What are the full form of FAT and SAT? Explain FAT & SAT procedure.	6	02	04
b)	Which document is called master document for a project?	2	01	04
c)	What is the importance of Quality in Industrial Automation?	2	01	04
d)	i) Explain the process of total project execution?	4	02	04
	ii) Provide 3 company names of PLC & 3 company names of DCS Manufacturers?	6	02	07

Q5 a)	What is P&I Diagram?	2	02	03
b)	What is Industrial Drives? Provide applications of drive.	4	01	07
c)	i) What is P, I and D control? Explain in details.	6	01	02
	ii) What is Tuning? Explain the Tuning process in details.	6	01	02
d)	Explain Third Party communication with DCS?	2	02	05
Q6 a)	What are the different levels of Automation? Explain in details.	6	01	05
b)	Explain the 7 Layer Communication Model with example	8	02	05
c)	What is IT Infrastructure in Industrial Automation? Explain different types of IT Infrastructure.	4	01	04
d)	What is a sensor?	2	01	05
Q7 a)	Explain the process of Thermal Power Generation with diagram?	8	02	07
b)	What is Response Time?	2	01	06
c)	Define MTTR & MTBF? What is the importance of MTBF in Industry?	4	01	06
d)	i) What is Resolution?	2	01	06
	ii) What is Linearity?	2	01	06
	iii) What is Accuracy?	2	01	06