

Code No: **R42024**

R10

Set No. 1

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016
SPECIAL ELECTRICAL MACHINES
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Why rotor position sensor is essential for the operation of switched reluctance motor? Explain. [8]
b) List out the advantages and disadvantages switched reluctance motor. [7]
- 2 a) Explain the construction details of stepper motors. [8]
b) A stepper motor has a step angle of 1.8° and is driven at 400pps. Determine i) Resolution, ii) Motor speed and iii) number of pulses required to rotate the shaft through 54° . [7]
- 3 a) Explain the principle of operation of Brushless DC Motor. [8]
b) Mention the different applications of BLDC motors. [7]
- 4 a) Discuss the constructional details of Linear Induction Motor. [8]
b) List out the various applications of Linear Induction Motor [7]
- 5 a) Why Permanent Magnet machines have high torque/weight ratio? Explain. [8]
b) Write short notes on electrically commuted DC motor. [7]
- 6 Explain closed loop control of stepper motor with the help of schematic block diagram. [15]
- 7 a) Describe the control of Switched Reluctance Motor for fraction type load. [8]
b) Write short notes on switching logic for brushless dc motor. [7]
- 8 Explain how the single sided linear induction motor is used for traction drive applications. [15]



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Set No. 2

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016
SPECIAL ELECTRICAL MACHINES
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- 1 Explain the procedure of designing stator and rotor pole arc for switched reluctance motor. [15]
- 2 a) Explain the principle of operation of stepper motors. [8]
b) Calculate the pulse rate required to obtain a rotor speed of 2400 rpm for a stepper motor having a resolution of 250 steps/rev. [7]
- 3 a) Explain the constructional details of BLDC motor with the help of neat sketch. [9]
b) What are the relative merits of the brushless dc motor drives? [6]
- 4 a) Mention advantages and disadvantages of Linear Induction Motors. [7]
b) Describe the working principle of Linear Induction Motors. [8]
- 5 a) Draw and explain the equivalent circuit for Permanent Magnet Motors. [7]
b) Explain B-H loops of different Permanent Magnets. [8]
- 6 Compare open loop and closed loop control of stepper motor. [15]
- 7 Explain briefly different types of rotor position sensing schemes of brushless dc motor. [15]
- 8 a) Discuss the selection criterion of motors for electric traction application. [8]
b) What are the merits and demerits of AC and DC traction systems? [7]



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Set No. 3

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

SPECIAL ELECTRICAL MACHINES

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 Explain in detail the construction and working principle of SRM. [15]
- 2 a) Write short notes on torque production in stepper motors. [8]
b) A four stack Variable Reluctance stepper motor has a step angle of 1.5° , find the number of its rotor and stator teeth. [7]
- 3 a) Explain the theory of brushless DC motor as variable speed synchronous motor. [9]
b) What are the advantages and disadvantages of BLDC Machines compare to conventional DC motors. [6]
- 4 a) Describe the construction of Linear Induction Motors. [7]
b) List out the advantages and disadvantages of LIM. [8]
- 5 a) Draw the B-H hysteresis loop of permanent magnet material. [7]
b) Mention the various reasons why the permanent magnets used in DC machines. [8]
- 6 Explain open loop control of stepper motor with the help of schematic block diagram. [15]
- 7 Explain different control techniques of brushless dc motor. [15]
- 8 Explain the different AC motors is more suitable for traction application. Explain it clearly. [15]



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R10

Set No. 4

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016
SPECIAL ELECTRICAL MACHINES
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Explain different power converter configurations for Switched Reluctance Motor. [8]
b) What are the effects of saturation in SRM? [7]
- 2 a) Describe hybrid stepping motor. [8]
b) List out areas of applications and suitability of stepping motors. [7]
- 3 a) Explain the operating principles of Brushless DC motor with the help of diagrams. [8]
b) What are the advantages of BLDC motors over AC motor? Explain. [7]
- 4 a) Explain the operation of short stator linear induction motor. [8]
b) Discuss the application of Linear Induction Motors for electric traction. [7]
- 5 a) Explain the principle of operation of Permanent Magnet DC motor. [8]
b) Write short notes on hysteresis loop in Permanent Magnet Motors. [7]
- 6 Explain the characteristics of stepper motor in open loop drive. [15]
- 7 a) Describe the switching logic of a 3-phase 4-pole BLDC. [8]
b) Discuss how the hall sensors can be used for position sensing of BLDC. [7]
- 8 Discuss the differences between open loop and closed loop control of stepper motor. [15]



IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016**AUTOMATION IN MANUFACTURING****(Mechanical Engineering)****Time: 3 hours****Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) What are the various types of automation? Explain them. [8]
b) What are the various pneumatic and hydraulic components used in automated industry. [7]
- 2 a) What are the various types of automatic loading methods used in practice and explain mechanical feeding method? [8]
b) What are the various functions involved in automation and how can they reduce cost of production? [7]
- 3 a) What are the various factors influence manufacturing lead time (MLT) and explain the methods to reduce transfer time? [8]
b) What are the objectives of use of flow lines in automation and explain various types of flow lines and their advantages? [7]
- 4 a) How the transfer lines are analysed in continuous and intermittent transfer machines? [8]
b) What is manual single station assembly and 'manual assembly line'? Enumerate the differences between them [7]
- 5 a) A manual production flow line is arranged with six stations and a conveyor system is used to move parts along the line. The belt speed is 1.8 m/min and the spacing of raw workparts along the line is one for every 1.35 m. The total line length is 13.5 m, hence each station length equals 2.25 m. Determine the following [8]
i) Feed rate. ii) Tolerance time. iii) Theoretical cycle time.
b) Explain the applications of automated storage and retrieval system. [7]
- 6 a) Explain the various problems encountered in interfacing handling and storage systems with manufacturing units. [8]
b) What are the special features of AS/RS components? Discuss briefly. [7]
- 7 a) With the help of a neat block diagram, discuss the Adaptive Control with Optimization for drilling process to obtain the optimal process parameters [8]
b) Discuss the application of Adaptive Control in Machining operations. [7]
- 8 a) Explain the constructional features of coordinate measuring machine. [8]
b) Discuss the basic functions of machine vision system. [7]



Code No: R42034

R10

Set No. 2

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

AUTOMATION IN MANUFACTURING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Enumerate the principles of automation in manufacturing industry [8]
b) Enumerate the importance reasons for adopting automation by the companies with respect Indian scenario. [7]
- 2 a) What are the different methods of work part transport? Explain them. [8]
b) Explain rotary transfer mechanism. [7]
- 3 a) Compare manual and automated methods of production in terms direct labour material and over head costs. [8]
b) With a block diagram, explain various levels of automation. [7]
- 4 a) What is line balancing and explain largest candidate rule is adopted in Line-balancing of operations. [8]
b) What is manual single station assembly and 'manual assembly line'? Enumerate the differences between them. [7]
- 5 A 16-station transfer line can be divided into two stages by installing a storage buffer between station 8 and 9. The probability of failure at any station is $p = 0.01$. The ideal cycle time is 1.0 min, and the downtime per line stop is 10.0 min. These values are both the one stage and two stage configurations. The downtime should be considered constant, and the upper bound approach should be used in the analysis. The cost of installing the storage buffer is a function of its capacity. This cost function is $C_b = Rs0.6 b/hr$, where b is the buffer capacity. However, the buffer can only be constructed to store increments of 10. The cost to operate the line itself is Rs120 / hr. Ignore material and tooling cost. Based on cost per unit of production, determine the buffer capacity 'b' that will minimize unit production cost.. [16]
- 6 a) Discuss the features of parts classification and coding systems. [8]
b) With the help of a line diagram explain the layout of a machine cell with semi integrated handling. [7]
- 7 a) What is the objective of Adaptive Control with Constraints? Draw the block diagram of a typical computerized Adaptive Control with Constraints system for drilling operation and explain in detail [8]
b) Explain the three phases involved in shop floor control system. [7]
- 8 a) Explain the constructional features of coordinate measuring machine. [8]
b) Discuss the basic functions of machine vision system. [7]



IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016
AUTOMATION IN MANUFACTURING
(Mechanical Engineering)

Time: 3 hours**Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

- 1 a) Discuss the important categories of machine tool control strategies [8]
b) What are the basic elements of an automated system? Explain. [7]
- 2 a) List out the requirements of a plant layout for automation. [8]
b) What are the three basic control functions used in automated flow lines? Explain their features. [7]
- 3 a) Define the following:
i) Average production time. ii) Line efficiency iii) Cost per work piece [8]
b) Draw the neat sketches of the following mechanisms and discuss briefly
i) Ratchet and Pawl mechanism. ii) 'Over and Under' type chain drive mechanism [7]
- 4 a) Briefly explain ranked position weights method of line balancing with suitable example. [8]
b) Explain the following methods of AGUS.
i) Frequency select method. ii) Path switch select method [7]
- 5 A 16-station transfer line can be divided into two stages by installing a storage buffer between station 8 and 9. The probability of failure at any station is $p = 0.01$. The ideal cycle time is 1.0 min, and the downtime per line stop is 10.0 min. These values are both the one stage and two stage configurations. The downtime should be considered constant, and the upper bound approach should be used in the analysis. The cost of installing the storage buffer is a function of its capacity. This cost function is $C_b = Rs0.6 b/hr$, where b is the buffer capacity. However, the buffer can only be constructed to store increments of 10. The cost to operate the line itself is Rs120 / hr. Ignore material and tooling cost. Based on cost per unit of production, determine the buffer capacity 'b' that will minimize unit production cost. [16]
- 6 a) Explain various reasons for using the storage buffers on the automated production lines [8]
b) Discuss the features of parts classification and coding systems. [7]
- 7 a) What is the objective of Adaptive Control with Constraints? Draw the block diagram of a typical computerized Adaptive Control with Constraints system for drilling operation and explain in detail [8]
b) Explain the three phases involved in shop floor control system [7]
- 8 a) Discuss the features of generative computer aided process planning [8]
b) Write about coordinate measuring machine and its types and benefits. [7]



Code No: R42034

R10

Set No. 4

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

AUTOMATION IN MANUFACTURING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) What are the different types of automation? Discuss them briefly. [8]
b) What are the various types of automated systems used in practice and explain their relative merits and applications [7]
- 2 a) Explain the fundamentals of automated production lines. [8]
b) Explain the reasons for the use of storage buffers in automation [7]
- 3 a) Discuss the working of Geneva mechanism used in rotational indexing motion [8]
b) In a 10-station transfer line, the probability breakdown will occur for a given work part is equal to 0.01. This probability is the same for all 10 stations. Determine the frequency of line stops per cycle on this flow line using the upper-bound approach. [7]
- 4 a) How the transfer lines are analyzed in continuous and intermittent transfer machines [8]
b) List out the characteristics of automated assembly systems. [7]
- 5 a) Explain the design principles of automated guided vehicle system. [8]
b) Explain the applications of automated strong and retrieval system. [7]
- 6 a) What are the benefits of automated production lines. [8]
b) Explain various reasons for using the storage buffers on the automated production lines. [7]
- 7 a) With the help of a neat block diagram, discuss the Adaptive Control with Optimization for drilling process to obtain the optimal process parameters [8]
b) Discuss the application of Adaptive Control in Machining operations [7]
- 8 a) Explain the constructional features of coordinate measuring machine [8]
b) Discuss the basic functions of machine vision system. [7]



Code No: **R42043**

R10

Set No. 1

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

SATELLITE COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) List the applications of satellites. [8]
b) Discuss the satellite development in India. [7]
- 2 a) Discuss the procedure for launches and launch vehicles for spacecrafts. [8]
b) Write notes on Orbital effects in communication systems performance. [7]
- 3 a) Discuss in detail Attitude and orbit control system for a spacecraft. [8]
b) Explain the communication sub-system for the spacecraft. [7]
- 4 a) Derive the power received from the satellite at the earth station from the basic transmission theory. [8]
b) Write short notes on design of satellite links for specified C/N. [7]
- 5 a) Compare FDMA, TDMA and CDMA techniques. [8]
b) Write notes on Satellite Switched TDMA Onboard processing. [7]
- 6 a) Draw and explain the block diagram of transmitter for the earth station. [8]
b) Write short notes on the Low noise amplifier used in the receiver of an earth station. [7]
- 7 a) What is a geo stationary satellite and list the system considerations for the same. [8]
b) Write notes on Delay & Throughput considerations for a geo stationary satellite. [7]
- 8 a) Explain in detail GPS Position Location principles. [8]
b) Write notes on Differential GPS. [7]



Code No: **R42043**

R10

Set No. 2

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

SATELLITE COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Discuss in detail about the development of Satellite communication in the world scenario. [8]
b) The orbital period of a satellite is 650 minutes. Determine the semi major axis of the elliptical orbit. [7]
- 2 a) Explain the various Orbital perturbations for a satellite. [8]
b) Discuss in detail Orbital effects in communication systems performance. [7]
- 3 a) Explain the Tracking, telemetry and Command sub system of a spacecraft. [8]
b) Write short notes on the power systems used in the spacecraft. [7]
- 4 a) What is G/T ratio and explain its significance for the quality of communication. [8]
b) Write short notes on Design of down links and Up link of a spacecraft. [7]
- 5 a) Explain using neat diagrams about the Frequency division multiple access (FDMA) system. [8]
b) Compare the TDMA and CDMA systems. [7]
- 6 a) Draw and explain the block diagram receiver for the earth station. [8]
b) Write short notes on the various antennas used for the spacecraft. [7]
- 7 a) What are the coverage and frequency considerations for a Geo stationary satellite. [8]
b) Prove that the distance between the center of the earth to the Geo synchronous Satellite is 42,242 KM. [7]
- 8 a) Explain in detail about the GPS receiver operation. [8]
b) Write short notes on GPS Receivers and codes. [7]



Code No: R42043

R10

Set No. 3

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

SATELLITE COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) List the Orbital elements. Explain the effect of eclipse on the satellite with neat diagrams. [8]
b) The apogee and perigee of an elliptical satellite orbits are 3000 Km and 200 Km. Determine the eccentricity, semi-major axis and semi-minor axis. [7]
- 2 a) Explain the mechanism of launching a satellite. [8]
b) A satellite is moving in an elliptical transfer orbit with apogee and perigee at a distance of 35000 km and 500 km. If the radius of the earth is 6360 km, determine the velocity of a satellite at any point on its orbit. [7]
- 3 a) Explain the communication subsystems of a spacecraft using a block diagram. [8]
b) Write short notes on Equipment reliability and Space qualification. [7]
- 4 a) Explain the concept of system noise temperature in satellite communication using block diagram. [8]
b) Define G/ T ratio and give its importance in satellite communication. [7]
- 5 a) Compare between FDMA and CDMA systems. [8]
b) Explain in detail about the Time division Multiple Access (TDMA) Frame structure. [7]
- 6 a) List the earth station design requirements. [8]
b) Write short notes on earth station antennas. [7]
- 7 a) Define a Geostationary satellite and explain the frequency considerations for the same. [8]
b) Discuss the Delay & Throughput considerations for a Geo stationary satellite. [7]
- 8 a) Write short notes on GPS receiver operation. [8]
b) Explain the working of a Differential GPS. [7]



Code No: **R42043**

R10

Set No. 4

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

SATELLITE COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Define Keplers laws and list the orbital elements of a satellite. [8]
b) Calculate the velocity of an artificial satellite orbiting the earth in a circular orbit at an altitude of 200 Km above the earth's surface. [7]
- 2 a) Write notes on Orbital effects in communication systems performance. [8]
b) What are Orbital perturbations in satellite communication. [7]
- 3 a) Explain the Attitude and orbit control system for a spacecraft. [8]
b) Explain the working of telemetry, tracking, Command and monitoring sub system of a spacecraft. [7]
- 4 a) Derive the power received from the satellite at the earth station from the basic transmission theory. [8]
b) Write short notes on Design of satellite links for specified C/N. [7]
- 5 a) Compare FDMA, TDMA and CDMA techniques. [8]
b) Explain in detail about the Time division Multiple Access (TDMA) Frame structure. [7]
- 6 a) Draw and explain the block diagram of transmitter for the earth station. [8]
b) Write short notes on earth station antennas. [7]
- 7 a) Define a Geostationary satellite and explain the frequency considerations for the same. [8]
b) Write notes on Delay & Throughput considerations for a geo stationary satellite. [7]
- 8 a) Write short notes on GPS receiver operation. [8]
b) Write notes on GPS Navigation Message and GPS signal levels. [7]



Code No: **R42052**

R10

Set No. 1

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

HUMAN COMPUTER INTERACTION

(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Define human computer interaction. Explain goals of human computer interaction. [8]
b) What are the different factors the human computer interaction designers must consider? Explain. [7]
- 2 a) Explain the graphical system advantages and disadvantages. [7]
b) Explain the characteristics of graphical user interface. [8]
- 3 a) Explain why people have trouble with computers in brief. [7]
b) Explain briefly the important human characteristics in design. [8]
- 4 a) Discuss the technical considerations in interface design. [7]
b) List and explain the factors that distract the screen user. [8]
- 5 a) Discuss different window presentation styles. [7]
b) List the screen based controls and explain how to choose proper screen based controls with example. [8]
- 6 a) Differentiate system messages and instructional messages. Explain with example. [8]
b) List and explain the factors that influence icon usability in detail. [7]
- 7 a) Explain transition diagram and state charts with suitable example. [7]
b) Explain the windowing system layer, the GUI tool kit layer, the application framework and specified language layer in brief. [8]
- 8 a) List and explain different direct control pointing devices in detail. [7]
b) Why speech recognition still does not match the fantasy of science fiction? Explain. [8]

Code No: **R42052**

R10

Set No. 2

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

HUMAN COMPUTER INTERACTION

(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Explain the importance of user interface. [8]
b) Explain the history of screen design with suitable example. [7]
- 2 a) Discuss the popularity of graphics in detail. [7]
b) Compare and contrast graphical user interface and web page design. [8]
- 3 a) Discuss the typical psychological and physical responses to poor design. [7]
b) Discuss guidelines for designing a conceptual model in detail. [8]
- 4 a) Explain the ordering of screen data and content in detail. [7]
b) What is statistical graph? Explain the types of statistical graphs in brief. [8]
- 5 a) Explain the difference between primary window and secondary window with suitable examples. [8]
b) Explain the selection of proper device based controls. [7]
- 6 a) List the characteristics of icons and explain the factors that influence icon usability. [8]
b) Explain the good icon design guidelines in detail. [7]
- 7 a) Compare and contrast transition diagram with state chart. [7]
b) What is the criterion for finding the right interface building tools? Explain. [8]
- 8 a) Compare and contrast direct control pointing devices and indirect control pointing devices. [8]
b) Discuss different interactive novel devices in detail. [7]



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R10

Set No. 3

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

HUMAN COMPUTER INTERACTION

(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Explain the benefits of good design. [8]
b) Compare the present screen the design with 1970's screen design with suitable example. [7]
- 2 a) Compare and contrast direct manipulation and indirect manipulation system. [7]
b) Discuss the popularity of web user interface. [8]
- 3 a) List the ten most common usability problems in graphical systems and explain. [7]
b) Explain human interaction speeds in brief. [8]
- 4 a) What are the techniques used to focus a person's attention in screen navigation and flow? Explain. [7]
b) How to present the information simply and meaningfully in screen design? [8]
- 5 a) Explain different navigation scemes of windows, structures of menu's with example. [7]
b) Explain property sheets and property inspectors with suitable examples. [8]
- 6 a) Explain how to use the proper words for creating acceptable messages and texts. [7]
b) The proper use of colour in screen design suggests something to avoid, what are they explain. [8]
- 7 a) Discuss different specification methods with examples. [7]
b) Discuss the user interface mockup tools in detail. [8]
- 8 a) Explain different keyboard layouts for big and small devices. [7]
b) Explain the advantages and disadvantages of voice information system. [8]

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R10

Set No. 4

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016

HUMAN COMPUTER INTERACTION

(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours

Max. Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Explain the importance of good design. [8]
b) Why is human computer interaction is important explain. [7]
- 2 a) Explain the popularity web user interface. [7]
b) Discuss the principles of user interface design. [8]
- 3 a) Explain how perception, memory, sensory storage influence on interface and screen design. [8]
b) Explain design standards or style guide documents in detail. [7]
- 4 a) What are the qualities that are require to provide visually pleasing composition of screen design? [8]
b) Explain how to group screen elements meaningfully explain with example. [7]
- 5 a) List and explain components of windows. [7]
b) Explain the selection of proper device based controls. [8]
- 6 a) How to write message box text and explain message box controls. [7]
b) Explain the factors required for choosing colours for web pages. [8]
- 7 a) Explain transition diagram and state chart with suitable example. [7]
b) Explain the features interface building tools. [8]
- 8 a) Explain the six types of interaction tasks that are applicable by pointing devices. [8]
b) List and discuss the different display technologies. [7]



Code No: K0224

R07

Set No. 1

IV B.Tech II Semester Supplementary Examinations, April/May - 2016

OPTIMIZATION TECHNIQUES

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

- 1 a) Explain with the help of examples, how optimization problems are classified based on: i) Single value objective function ii) Multi value objective function. [8]
b) Explain the formulation of any engineering problem. Include objective functions and constraints. [8]
- 2 a) State and explain Kuhn-Tucker Conditions for non-linear programming problem. [8]
b) Explain the condition for single variable optimization with and without constraints. [8]
- 3 a) State and explain the standard form of LPP. [8]
b) Find the optimum integer solution to the following LPP Maximize
 $Z = 5X_1 + 10X_2 + 8X_3$
Subject to $2X_1 + 5X_2 + X_3 \leq 10;$
 $X_1 + 4X_2 + 2X_3 \leq 12;$
 $X_1, X_2 \text{ and } X_3 \geq 0;$ [8]
- 4 a) Compare transportation problem with simplex method [6]
b) Solve the following transportation problem [10]

				Availability
9	16	15	9	15
2	1	3	5	25
6	4	7	3	20
Requirement	10	15	25	10



- 5 Show that the function $f(x)=x^2, 0 \leq x \leq 1$, $f(x)=2-x, 0 \leq x \leq 1$, is unimodal in $(0,2)$. Use the Fibonacci method to find its maximal point with in an interval of uncertainty 0.1. [16]
- 6 Draw the flowchart for the univariate method, explain about each block in the flowchart. [16]
- 7 Explain an exterior penalty function to solve a constrained nonlinear programming problem. [16]
- 8 Derive an expression for Linear programming problem as a case of Dynamic programming. [16]

