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**

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| | | | |
|---|---|---|---|
| 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] |

Code No: **R42024** **R10** **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**

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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]

Code No: **R42024** **R10** **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**
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| | | | |
|---|---|---|---|
| 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] |

Code No: **R42024** **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] |