Code No: **R164101G** **R16** Set No. 1

IV B.Tech I Semester Regular Examinations, October/November - 2019
ADVANCED FOUNDATION ENGINEERING
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
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PART–A *(14 Marks)*

1. a) What is general shear failure? [3]
    b) Do you anticipate immediate settlement in clay soil? Write a note. [2]
    c) What is the purpose of isolated footings? [2]
    d) Write why bracings are used in deep excavations. [2]
    e) Write the spacing requirements of piles in pile groups founded in clay for better load carrying capacity. [3]
    f) List the associated damages of structures founded in expansive soils. [2]

PART–B *(4x14 = 56 Marks)*

2. a) Differentiate Meyerhof's bearing capacity theory over Terzaghi's theory. [7]
    b) Calculate the ultimate bearing capacity, according to the Brinch Hansen's method, of a rectangular footing 2.5m × 2.5m, at a depth of 1.5m in a soil for which unit weight 17.5 kN/m^3, *cohesion* 50 kPa, and angle of internal friction is 20°. The ground water table is far below from the footing base. The total vertical load is 1250 kN and the total horizontal load is 50 kN at the base of the footing. Hansen's factors for $\phi = 20°$ are $N_c = 14.83$, $N_q = 6.40$, and $N_\gamma = 3.54$. Determine also the factor safety. Use the following factors:
    $s_c = 1 + 0.2$ (b/L), $s_q = 1 + 0.2$ (b/L), $s_\gamma = 1 - 0.4$ (b/L);
    $d_c = 1 + 0.35$ (D$_f$/b), $d_q = 1 + 0.35$ (D$_f$/b), $d_\gamma = 1.0$;
    $i_c = i_q = [1 - \frac{H}{V + A_f\ c_a\ cot\phi}]^2$, $i_\gamma = (i_q)^2$ [7]

3. a) Discuss the Janbu's method for immediate settlement in clay soil. [7]
    b) Explain the correction for consolidation settlement using Skempton and Bjerrum's methods. [7]

4. a) What is the purpose of combined footings? Discuss how proportioning of combined footing is carried out? [7]
    b) What is compensated raft? Discuss the concept with neat sketch. [7]

5. a) With neat sketches discuss the apparent pressure diagrams for calculating loads in struts of braced cuts for both sand and clay. [7]
    b) What are the differences between free and fixed earth support methods? [7]

1 of 2

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6. It is required to construct a pile foundation comprised of 20 piles arranged in 5 columns at distances of 0.9m c/c. The diameter and lengths of piles are 0.3m and 9m respectively. The bottom of the pile cap is located at a depth of 2m from the ground surface. The details of soil properties are given in below table with reference to the ground level as the datum. The water table was found at a depth of 4m from ground level.

Depth (m)		Soil Properties
From	To	
0	2	Silt, Saturated, $\gamma = 1.6\ kN/m^3$
2	4	Clay, Saturated, $\gamma = 19.2\ kN/m^3$
4	12	Clay, Saturated, $\gamma = 19.2\ kN/m^3$, $q_u = 120\ kN/m^2$, $e_0 = 0.80$, $C_c = 0.23$
12	14	Clay, $\gamma = 18.24\ kN/m^3$, $q_u = 90\ kN/m^2$, $e_0 = 1.08$, $C_c = 0.34$
14	17	Clay, $\gamma = 20\ kN/m^3$, $q_u = 180\ kN/m^2$, $e_0 = 0.70$, $C_c = 0.2$
17	--	Rocky stratum

Compute the consolidation settlement of pile group, if the total load imposed on the pile group is 2500 kN.

[14]

7. a) What are the effective dimensions of under-reamed piles having single and two under- reamed bulbs? Discuss with neat sketches. [7]
   b) Discuss moisture control methods in expansive soils. [7]

Code No: **R164102G**

R16

Set No. 1

IV B.Tech I Semester Regular Examinations, October/November - 2019
SPECIAL ELECTRICAL MACHINES
(Electrical and Electronics Engineering)

Time: 3 hours   **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
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PART–A*(14 Marks)*

1. a) What are the most common types of magnetism?   [2]
    b) What are the advantages of bipolar stepper motor compared to unipolar stepper
        motors?   [2]
    c) Define magnetic Reluctance.   [2]
    d) List the applications of BLDC motors.   [3]
    e) What are the differences between PMSM and BLDC motors?   [3]
    f) What are linear motors?   [2]

PART–B*(4x14 = 56 Marks)*

2. a) Give the classification of permanent magnet materials. Which materials are
        used in permanent magnets?   [7]
    b) Discuss the advantages and limitations of permanent magnet machines.   [7]

3. a) What is a stepper motor? What is its principle? Discuss its applications.   [7]
    b) With a neat block diagram, explain the open loop control of 3-phase VR
        Stepper Motor.   [7]

4. a) What are the advantages of Switched Reluctance Motors?   [5]
    b) Write the equivalent circuit of a Switched Reluctance Motor and derive the
        expression for torque produced by the motor.   [9]

5. a) Explain the operation of a BLDC motor. Also write the expressions for Torque
        and EMF of BLDC motor.   [7]
    b) What are the reasons for ripples in the torque produced by the BLDC motors?
        Suggest any scheme for torque ripple reduction.   [7]

6. a) What are BLDC motors? How are they differ from permanent magnet
        synchronous motors?   [7]
    b) Derive the Torque and EMF equations for permanent magnet synchronous
        motors.   [7]

7. a) Briefly discuss different types of linear motors.   [4]
    b) Discuss the application of single sided linear induction motor for electric
        traction.   [10]

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Code No: **R164102G**

R16

Set No. 2

IV B.Tech I Semester Regular Examinations, October/November - 2019
SPECIAL ELECTRICAL MACHINES
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 70

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
*****

PART–A *(14 Marks)*

1. a) Why steel is preferred for making permanent magnet?   [2]
    b) Why can't the stepper motors run continuously?   [2]
    c) Deduce the relationship between Reluctance and Inductance.   [2]
    d) Write the expression for torque produced by a BLDC motor.   [2]
    e) What are the advantages of permanent magnet machines?   [3]
    f) List various applications of linear motors.   [3]

PART–B *(4x14 = 56 Marks)*

2. a) What is B-H curve? Discuss the characteristics of soft magnetic materials.   [9]
    b) Compare between electronically commutated dc motor and conventional dc
        motor.   [5]

3. a) Explain the principle of operation and construction of Variable Reluctance
        stepper motor.   [9]
    b) Discuss the principle of hybrid type synchronous stepper motor.   [5]

4. a) Explain the constructional details of a 4-phase 8/6 switched reluctance motor.   [7]
    b) Discuss the application areas of switched reluctance motor. Also list the main
        limitations of switched reluctance motors.   [7]

5. a) Discuss the merits and applications of BLDC motors.   [6]
    b) With the help of schematic diagram and necessary waveforms, discuss the
        operation of a square wave brushless DC motors with 120° operation.   [8]

6. a) Discuss the constructional differences between permanent magnet synchronous
        motor and BLDC motors.   [8]
    b) List and discuss the applications of sine wave permanent magnet Brushless
        motors.   [6]

7. a) Discuss the principle of operation of linear induction motors.   [7]
    b) Draw and explain the equivalent circuit of linear induction motor.   [7]

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Code No: **R164102G** **R16** Set No. 3

IV B.Tech I Semester Regular Examinations, October/November - 2019
SPECIAL ELECTRICAL MACHINES
(Electrical and Electronics Engineering)

Time: 3 hours   **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
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PART–A*(14 Marks)*

1. a) Why B-H curve is not linear?   [2]
   b) A hybrid stepping motors have 200 rotor teeth, what is full step angle?   [2]
   c) What is Co-energy?   [2]
   d) Draw and explain the shape of back-EMF of a BLDC motor.   [3]
   e) What are the differences between the stators of PMSM and BLDC motors?   [3]
   f) What are different types of linear motors?   [2]

PART–B*(4x14 = 56 Marks)*

2. a) What is hysteresis loop? Discuss the characteristics of hard magnetic materials. [7]
   b) List the applications of permanent magnets. Also discuss the effect of
      temperature on permanent magnets.   [7]

3. a) List and discuss the applications of stepper motors.   [5]
   b) With the help of a neat block diagram, explain the closed loop control of 2-phase
      hybrid stepping motor.   [9]

4. a) What is the need for rotor passion sensor in switched reluctance motor control? [7]
   b) Explain the torque production mechanism in switched reluctance motors.   [7]

5. a) What are the advantages of BLDC motors? Explain the constructional details of a
      BLDC motor.   [8]
   b) Draw and discuss the Torque-speed characteristics of BLDC motors.   [6]

6. a) Discuss different types of rotors in permanent magnet synchronous machines. [7]
   b) Draw and discuss the phasor diagram of sine wave permanent magnet brushless
      motors.   [7]

7. a) Differentiate between linear motors and rotary motors.   [7]
   b) Draw the constructional details of a linear induction motor.   [7]

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Code No: **R164102G**　　　**R16**　　　| Set No. 4 |

IV B.Tech I Semester Regular Examinations, October/November - 2019
SPECIAL ELECTRICAL MACHINES
(Electrical and Electronics Engineering)

Time: 3 hours　　　　　　　　　　　　　　　　　　**Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
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PART–A(14 Marks)

1.　a)　What is Curie point?　[2]
　　b)　List any four applications of stepper motors.　[2]
　　c)　List main disadvantages of Switched Reluctance Motors.　[3]
　　d)　What is back-EMF of a motor?　[2]
　　e)　List the applications of Sine wave Permanent Magnet Brushless Motors.　[3]
　　f)　List any four applications of linear motors.　[2]

PART–B(4x14 = 56 Marks)

2.　a)　What are the merits of permanent magnet motors? Where are permanent magnet motors used?　[7]
　　b)　How does temperature affect permanent magnets? Discuss in detail.　[7]

3.　a)　Compare between open loop and closed loop control of stepper motors.　[6]
　　b)　Explain how a full-step mode and half-step mode are implemented in stepper motors? Which mode produces more torque output?　[8]

4.　a)　With a neat schematic diagram, explain the operation of any two power converters for a 4-phase 8/6 switched reluctance motor.　[10]
　　b)　List the advantages and applications of switched reluctance motors.　[4]

5.　a)　Draw the constructional details of a surface mounted type permanent magnet BLDC motor.　[7]
　　b)　What is the need for rotor position sensing in the control of BLDC motors? Explain.　[7]

6.　a)　Draw and discuss the Torque-speed characteristics of PMSM.　[7]
　　b)　Make a comparison between square wave and sine wave permanent magnet motors.　[7]

7.　　　Explain the working of linear induction motors. Draw the schematic and discuss the operation of linear induction motor drive for traction application.　[14]

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