FACULTY OF ENGINEERING

B.E. 4/4 (Civil) I-Semester (Main) Examination, Nov. / Dec. 2016

Subject : Foundation Engineering

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1 A point load of 500 kN is acting on the ground surface. Determine the magnitude and location of the maximum vertical stress ($_z$) on a vertical plane that is radially 0.50 m away from the point of application of the Point load.   2

2 Sketch the formation of plastic zones at failure of foundation soil in shear beneath a shallow foundation, as considered in Terazaghi's theory of bearing capacity.   2

3 "The load carrying capacity of a pile driven in fully saturated cohesionless soils in low relative density, estimated using dynamic formulae will be higher than the actual due to momentary liquefaction". Answer yes or no and justify.   2

4 Name the type of Caisson which is pre-cast with its bottom closed and top open. Comment on its suitability.   2

5 In the construction of a Newmark's Chart, the number of concentric circle were 20 and the influence factor was 0.0025. Determine the number of area units present in this chart.   3

6 The outcome of a standard penetration test conducted at 6m below GL in a site is reported as 10/16/23. Determine the N-value corrected for overburden and dilatancy. Consider the correction factor for overburden as 0.90.   3

7 A pile group in cohesionless soils consists of three piles. If ultimate load carrying capacity of each pile is 240 kN. What is group capacity as per Feld's rule.   3

8 Describe "Box Caissons" and explain when they are preferred.   3

9 Sketch a typical timber braced cut and name the parts.   3

10 What is "resonance"? What is its significance in the design of machine foundations?   2

PART – B (50 Marks)

11 a) Differentiate Boussinesque's theory with Westergaard's theory and comment on their suitability.   3

    b) A ground level service reservoir is provided with a raft foundation of 6m diameter which is transmitting a udl of 3500 kN/sqm. Later, helical stair case with central post is constructed such that it lies at one of the corners of the imaginary square inscribing the raft. If the stair case post is transmitting a load of 900 kN, determine the increment in vertical stress at a point lying 0.50m below centre of the raft before and after construction of the stair case.   7

12 a) Explain the types of shear failure of a shallow foundation. State the criteria on which they type of failure is decided.   3

    b) Determine total settlement of the foundation, for the conditions given below.   7

Ground Level / GWT (+) 0.00 m

SAND with γ = 18.40 kN/cum

2m wide square footing transmitting a contact pressure of 220 kPa

Foundation level (-) 1.80m

FULLY SATURATED COMPRESSIBLE CLAY

γ sat = 21.10 kN/cum, LL = 88%, e0 = 1.06, μ = 0.24, Es = 20800 kPa

Iw = 1.04   (-) 6.00m

    SAND   Use 2V : 1H distribution

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13 a) Estimate the safe load carrying of a single vertical bored cast-in-situ pile of 600mm diameter installed into a medium dense sandy strata to a depth of 15 m. Give the average properties of sand along shaft of the pile as γ = 18.50 kN/cum ; $\Phi = 30^0$;k = 1.80 ; δ = (2/3) Φ. The properties of sand at the tip of pile include γ = 19 kN/cum ; $\Phi = 35^0$; Nq = 94.60. Consider the critical depth factor de/d = 14, FOS = 2.50.   5

    b) Write a detailed note on "Pile Groups" including their necessity, arrangement and procedure for finding the "Group Efficiency".   5

14 a) Critically compare "Pile Foundations" with that of "Caissons". Bring out clearly the circumstances in which each of them are ideal. Substantiate your answer with suitable examples.   5

    b) Describe "Tile and shift" in installation of Caissons. Explain different methods for rectification of tilt and shift, with the help of neatly drawn sketches.   5

15 Write a detailed note on Coffer Dams including their necessity, types of coffer dams, merits and demerits of each and their suitability with the help of neat sketches.   10

16 a) Describe "Grouting" and its applications in foundation engineering.   5

    b) Explain the reinforcement function of geotextiles and the related applications.   5

17 Write a note on any two of the following :
    a) Newmark's Chart
    b) Dewatering Methods
    c) Underpinning methods
    d) Log of bore hole details

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FACULTY OF ENGINEERING
B.E. 4/4 (EEE) I - Semester (Main) Examination, November / December 2016

Subject : Electric Drives and Static Control

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

Note: Answer all questions from Part-A and answer any five questions from Part-B.
PART – A (25 Marks)

1 Draw and explain equivalent motor-load system with torque equation.   (3)
2 Define steady-state stability and transient state stability.   (2)
3 If energy loss at no-load during speed reversal of a dc shunt motor is 600W, then calculate the total energy loss during starting, dynamic braking and plugging.   (3)
4 On what factors, the acceleration time of an electric motor depend?   (2)
5 What are the advantages of non-circulating current mode of operation of a dual converter over circulating current mode?   (3)
6 Draw input and output current and voltage waveforms of a chopper circuit with resistive load, assuming duty ratio is 50%.   (3)
7 Draw the conduction table of a 3-phase inverter showing sequence of firing and angle of conduction of devices in 180° conduction mode.   (2)
8 In cyclo-converters, why harmonic content of output voltage is less at lower frequencies.   (2)
9 In BLDC motors, as load increases the speed _____(increases / decreases / remain constant) and supply frequency _____(increase / decreases/ remain constant) .   (2)
10 List various industrial applications of Switched reluctance motor.   (3)

PART – B (50 Marks)

11 (a) Describe the four-quadrant operation of a motor-hoist system indicating forward and reverse motoring with regenerative braking.   (8)
   (b) Define (i) active loads (ii) passive loads   (2)

12 (a) Draw and explain dynamic braking operation of a 3-phase induction motor with neat circuit diagram and speed-torque characteristics.   (5)
   (b) A 500 V, 45kW, 600 rpm dc shunt motor has full load efficiency of 90%. The field resistance is 200 Ω and armature resistance if 0.2Ω. Find the speed of the motor under regenerative breaking condition at which braking torque equal to rated torque. (5)

13 (a) Derive expressions for energy loss in 3-phase induction motor during the following transient conditions (i) starting (ii) dynamic braking (iii) plugging (iv) speed reversal   (5)
   (b) Explain briefly why load equalization is required and how it is achieved in industrial applications.   (5)

14 (a) Obtain the speed-torque characteristics of single-phase converter fed separately excited dc motor and plot the same at two firing angles.   (5)
   (b) A 220 V, 900 rpm, 150 A separately excited dc motor has the armature resistance of 0.06Ω. It is fed from a single phase fully controlled rectifier with an ac source voltage of 220V, 50Hz. Assuming continuous conduction, calculate (i) speed for a firing angle of 120° for rated motor torque (ii) motor speed for α=160° at twice the rated torque.   (5)

..2

15 (a) Describe the slip energy recovery scheme using static Krammer drive with neat schematic diagram and derive expression for speed-torque characteristic as a function of firing angle. (6)

  (b) Draw any two configuration of VSI fed 3-phase induction motor using block / schematic diagrams. (4)

16 (a) Explain clearly the difference between self control and separate control 3-phase synchronous motors with neat schematic diagrams. (7)

  (b) What are the various industrial applications of BLDC motors? (3)

17   Explain the following: (10)

  (a) Speed control of induction motor by rotor resistance

  (b) Chopper controlled dc motor

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B.E. 4/4 (ECE) I-Semester (Main) Examination, December 2016

Subject : Mobile Cellular Communications

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1 Show that the frequency re-use factor for a cellular system is given by k/S, where k is the average number of channels per cell and S is the total number of channels available to the cellular service provider.

2 What do you mean by Trunking system?

3 If a transmitter produces 50 W of power with a 900 MHz carrier frequency, find the received power at a free space distance of 100 metres from the antenna
[Assume $G_t = G_r = L = 1$].

4 Explain the signal penetration into the buildings.

5 If US AMPS cellular operator is allocated total BW of 12.5 MHz for each simplex band, guard band is 10 KHz and channel BW is 30 KHz. Find the number of channels in an FDMA system.

6 Briefly explain CSMA/CD.

7 Explain GSM air interface specifications.

8 What do you mean by data scrambling?

9 Write short notes on personal communications.

10 Differentiate features of 3 G and 4 G.

PART – B (50 Marks)

11 a) Express the signal-to-interference ratio in terms of co-channel re-use ratio for a cellular system.
   b) Explain various handoff strategies.

12 a) Explain the reflection mechanism for propagation of EM waves in a cellular system.
   b) Explain Log-distance path loss method for Link budget design.

13 a) Explain different types of small scale fading.
   b) If a normal GSM time slot consists of 8 trailing bits, 8 guard bits, 26 training bits and three traffic bursts of 58 bits of data, find frame efficiency.

14 Explain the different types of spread spectrum multiple access techniques.

15 a) Explain GSM system frame structure.
   b) Explain CDMA forward channel modulation process for a single user with a neat block diagram.

16 a) Explain Durkin's model for outdoor propagation model.
   b) Difference Co-channel interference and adjacent channel interference.

17 Write short notes on any two of the following :
   i) TDMA   ii) Factors for improving the coverage of cellular system
   iii) Coherence BW and coherence time.

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B.E. 4/4 (AE) I-Semester (Main) Examination, December 2016

Subject : Vehicle Maintenance

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1 List out the benefits of preventive maintenance of vehicles and write the importance of maintenance records.
2 Name and explain different record forms used in maintenance.
3 Describe inspection procedure of cylinder block.
4 Define engine tune up, draw sequential block diagram of engine tune up procedure.
5 What is break bleeding? Explain hydraulic brake bleeding process.
6 What is clutch pedal free play? Explain adjustment of clutch pedal free play.
7 Explain any four problems experienced in starter motor with their causes and remedies.
8 Discuss the various causes of battery failure.
9 What is the purpose of anti-freezing solutions and name some of them?
10 What is a thermostat and what are the failures you expect in a thermostat?

PART – B (50 Marks)

11 a) List out the types of vehicle maintenance practices and explain preventive maintenance with merits and demerits.
   b) Explain general safety precautions and procedure to be followed in service stations.

12 a) Write the step-by-step procedure of overhauling a multi-cylinder petrol.
   b) Explain how valve clearance is adjusted in a four cylinder engine.

13 a) What are the possible clutch troubles and their main causes?
   b) Discuss the gear box troubles and remedies.

14 a) Why a solenoid is used in the starting circuit of an automobile?
   b) Describe the servicing of starter system of a car.

15 a) Write about maintenance of carburetor and door lock mechanism.
   b) Explain lubrication system maintenance with procedure for oil filter replacement.

16 a) Write about cooling system troubles.
   b) Explain the problems in steering system how they can be rectified.

17 Write short notes on :
   a) Maintenance and servicing of differential system.
   b) Computerised alignment and wheel balancing.

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B.E. 4/4 (CSE / I.T.) I - Semester (Main) Examination, December 2016

Subject : Information Security

Time : 3 hours   Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1	What is the difference between vulnerability and exposure?	2
2	What is Race conditions?	2
3	Describe risk transference.	2
4	What is cost benefit analysis?	2
5	What are the three common methods of risk avoidance?	3
6	What is security blue print?	3
7	List and describe three major steps in executing the project plan.	3
8	What are the two basic functions used in encryption algorithm?	2
9	What are the different Cipher methods?	3
10	What are the requirements of digital signature?	3

PART – B (50 Marks)

11 Difference between threat and attack. Explain different types of attacks.   10

12 a) What is Risk identification? Explain different components of risk identification.   5
   b) Explain risk handling decesion points.   5

13 a) Write briefly about scanning and analysis tools.   5
   b) Discuss in detail different firewall architectures.   5

14 What is IDPS? Explain different types of IDPS in detail.   10

15 a) Explain Bull's-Eye model.   5
   b) Explain about maintenance model.   5

16 a) What is VPN? Briefly discuss the two approaches using which a VPN can be
       implemented?   5
   b) What Is Honey pot? Explain its role.   5

17 Discuss short notes on :   10
   a) Defense in depth
   b) Disaster recovery
   c) NSTISSC security model

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