Code No. 3160

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II - Semester (Suppl.) Examination, Nov. / Dec. 2016

Subject : Soil Mechanics

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 What do you understand index properties? What is their importance?
2 Discuss the importance of Atterberg's limits in soil engineering.
3 Explain the capillary tension during drying and wetting of soils.
4 How would you determine the average permeability of soil deposit consisting of number of layers?
5 What are the factors that effect on compaction? Discuss in brief.
6 Define the
   (i) Coefficient of volume change
   (ii) Recompression index
   (iii) Compression index.
7 A vane 11.25 cm long and 7.50 cm in diameter was pressed in to the clay at the bottom of bore hole. Torque was applied to cause failure of soil. The shear strength of clay was found to be 37 kN/m^2 . Determine the torque that was applied.
8 Describe the effective stress in partially saturated soils. Explain with neat ketches.
9 Explain the mode of application of shear force.
10 Determine the factor of safety with respect of cohesion for a submerged embankment 25m height and having a slope of 40°. c=40kN/m^2 ,ϕ = 10° and Υ_{sat} = 18 kN/m^2 .

PART – B (50 Marks)

11 (a) Derive the relationships involving between unit weight, grain specific gravity, void ratio and degree of saturation
   (b) The porosity of soil sample is 35% and specific gravity of its particles is 2.70. Calculate its void ratio, dry density, saturated density and submerged density.

12 (a) Define and explain the following:
   i) Uniformly coefficient, ii) Relative density, iii) Stocke's law, iv) Flow index, v) Consistency index.
   (b) The following data relative to five soil samples.

L.L (%)	25	45	50	60	80
P.L (%)	15	23	25	35	36

   Plot these on Cosagrande's A-line chart and classify the soils.

13 (a) Explain the meaning of the term "seepage pressure", and write a short notes on Quicksand condition, Laplase system.
   (b) A pumping test was made in a previous gravels and sands extending to a depth of 15.24 m, where a bed of clay was encountered. The normal ground water level was at the ground surface. Observation wells were located at distances of 3.05 m and 7.62 m from the pumping well. At a discharge of 216 litres per minute from the pumping well, a steady state was attained in about 24hr. The draw-down at a distance of 3.05 m was 1.68m ad at 7.62 m was 0.37m. Compute the coefficient of permeability.

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14 (a) Explain two laboratory methods that are common use for the determination of the coefficient of consolidation.

(b) Two points on curve for a normally consolidated clay have the following coordinates.

Point 1: $e_1 = 0.70$ $p_1 = 1.0$ kg/cm^2

Point 2: $e_2 = 0.60$ $p_2 = 3.0$ kg/cm^2

If the average overburden pressure on a 6 m thick clay layer is 1.50 kg/cm^2 ,how much settlement will the clay layer experience, due to additional load intensity of 1.60 kg/cm^2.

15 (a) What are the advantages and disadvantages of a triaxial compression test in comparison with a direct shear tests?

(b) A cylindrical sample of saturated clay 4 cm in dia. And 8 cm height was tested in an unconfined compression apparatus. Find UCC strength, if the specimen failed at a an axial load of 360 N, when axial deformation was 8 mm. Find the shear strength parameters if the angle made by the failure plane with the horizontal plane was recorded as 50°.

16 (a) Explain (i) the unit, in which the compaction is measured, (ii)95% Proctor density (iii)zero air voids line, and (iv) effect of compaction on the shear strength of soil.

(b) A Proctor compaction test was conducted on a soil sample, and the following observations were made

Water content%	8.00	12.50	16.00	17.50	20.00
Mass of weight of soil gm.	1650	1900	2080	2000	1900

If the volume of mould used was 1000 cm^3 and the G = 2.70, make necessary calculations and draw, (1) compaction curve and (ii) 85% and 100% saturated lines.

17 (a) What do you understand by the 'state general plastic equilibrium'? Explain the concept of active and passive earth pressures with the help of Mohr circle and shear strength envelope.

(b) A grid retaining wall 5 m height supports of a backfill of cohesion less soil with ϕ = 30°, The water table is below the base of the wall. The backfill is dry and has a unit weight of 18 kMm^3, Determine Rankine's passive earth pressure per meter length of the wall.

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Code No. 3166

FACULTY OF ENGINEERING

B.E. 3/4 (EEE) II - Semester (Suppl.) Examination, November / December 2016

Subject : Digital Signal Processing

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 x(n)= {1,2,-1,3}, represent x(n)as sum of scaled, delayed unit sample sequences. (2)

2 What is the fundamental period of the discrete time signal
x(n) = cos (39πn/7) + sin(23π/5) (2)

3 What is meant by bit reversed order? Where do we need to take input or output in bit reversed order? (3)

4 Why do we need to sample in frequency domain even though already we sampled the signal
in time domain? (2)

5 X(z)= z/(z-2)(z-3), determine causal signal x(n) using inverse Z transform. (3)

6 For the given digital filter
H(z)= $0.006+0.049z^{-1}+0.173z^{-2}+0.25z^{-3}+0.173z^{-4}+0.049z^{-5}+0.006z^{-6}$,
realize it in linear phase realization. (3)

7 What is the difference between chebyshev type 1 and type 2 filters?. (2)

8 Find the digital filter H(z) from given analog filter below using step invariant method

$$H(s)=\frac{1}{(s+1)(s+2)}.$$ (3)

9 Why dos FIR filter always be stable? (2)

10 Write some applications of DSPs in our day to day life. (3)

PART – B (50 Marks)

11 (a) Find the convolution of the following signals
$x(n)=4^n u(-n-2);h(n)=(1/4)^n u(n-1)$ (7)

(b) Let e(n) be an exponential sequence i.e $e(n)=\alpha^n$ for all n and let x(n) and y(n) denote two arbitrary sequences. Show that
$[e(n)x(n)]*[e(n)y(n)]=e(n)[x(n)*y(n)]$ (3)

12 (a) Draw the butterfly diagram for DITFFT for N=6. (5)

(b) Determine DFT of the following discrete time signal using DIFFFT
X(n)={1,2,3,2,1,2,3,2} (5)

13 Obtain the direct form II, cascade and parallel from realizations for the following transfer function. (10)

$$H(z)=\frac{(1+z^{-1})(1+2z^{-1})}{\left(1+\frac{1}{2}z^{-1}\right)\left(1+\frac{1}{4}z^{-1}\right)\left(1+\frac{1}{8}z^{-1}\right)}$$

..2

14 (a) Write the design procedure for band pass Butterworth filter for the given specifications. (5)

(b) What is warping effect in Bilinear transformation? How to avoid it? (5)

15 Explain the architecture features of TMS 320F/2047 processor. (10)

16 Design a digital FIR low pass filter using rectangular window by taking 9 samples of w(n)and with a cutoff frequency of 1.2rad/sec. (10)

17 (a) For the given causal LTI system represented by difference equation
$y(n) - 3y(n - 1) - 4y(n - 2) = x(n) = 2x(n - 1)$
Determine impulse response of the system. (5)

(b) For the given impulse response of a system $h(n)=\delta(n)-\delta(n-1)$, determine the Frequency of the system (5)

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Code No. 3171

FACULTY OF ENGINEERING

B.E. 3/4 (Inst.) II - Semester (Suppl.) Examination, November / December 2016

Subject : Digital Signal Processing and Applications

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 Define (a) Causality (b) Stability (3)
2 Determine the fundamental period of x(n)= cos (0.5Πn) (2)
3 What are the properties of convolution? (2)
4 Compute the DFT of a Sequence $(-1)^n$ for N=3. (3)
5 Find the IDFT of Y(k)= { 1, 1,1,1}. (3)
6 Distinguish between Analog and Digital Filter. (3)
7 What is warping effect? (2)
8 Mention the properties of ROC. (2)
9 Compare Hamming and Kaiser Window. (3)
10 Draw the architecture of ADSP. (2)

PART – B (50 Marks)

11 (a) Find the Forced response of the system described by difference equation.
y(n)+ 2y(n-1)+y(n-2)=x(n)+x(n-1) (6)
(b) (b) Determine convolution sum of two sequences
x(n)={ 3, 2, 1, 2} ; h(n) ={ 1, 1, 1, 1} (4)

12 (a) State and Prove Symmetry properties of DFT. (5)
(b) Calculate the time sequence x(n) for given DFT components
{ 2, 1+j , 0, 1-j}. (5)

13 (a) What is FFT and why it is needed? What are the differences and similarities between DIF and DIT algorithms. Distinguish between DTFT, DFT and FFT**.** (5)
(b) Find the DFT of a sequence x (n)= { 1, 2, 3, 4, 4, 3, 2, 1} using DIT algorithm. (5)

14. Obtain the cascade and parallel form realization for the system
y(n)= -0.1y(n-1)+0.2y(n-2)+3x(n)+3.6x(n-1)+0.6x(n-2). (10)

15 Write short notes on Harvard architecture and pipelining . (10)

16 (a) What are the popular windows functions used for computing the coefficients of FIR filters. (4)
(b) For the analog Transfer function H(s) = 2/(s+1)(s+2). Determine H(z) using Impulse invariance method. Assume T=1sec. (6)

17 (a) Design a Chebyshev Filter with a maximum pass-band attenuation of 2.5dB at Ωp=20rad/sec and the stop-band attenuation of 30dB at Ωs=50rad/sec . (5)
(b) Write short notes on application of DSP. (5)

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Code No. 3175

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) II - Semester (Suppl.) Examination, November / December 2016

Subject : Digital Communication

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 Distinguish between PCM and DPCM (3)

2 What is the necessity of companding in PCM system. (2)

3 Define Entropy of a source. (2)

4 What is source coding? What is its importance? (3)

5 Mention various types of errors caused by noise in communication channel? (3)

6 What are cyclic codes? Why are they called subclass of block codes? (3)

7 Brief the characteristics of MSK signal. (2)

8 What are the assumptions made in deriving probability of error in various schemes? (3)

9 Define processing gain and jamming margin. (2)

10 Explain the properties of PN sequence (2)

PART – B (50 Marks)

11 (a) Derive an expression for quantization error and SNR of PCM system. (6)

In a delta modulation, the voice signal is sampled at 64KHz. The maximum signal Amplitude is 1V. (4)

(b)
i) Determine the minimum values of step size to avoid slope overload.
ii) Determine the granular noise power if the voice signal bandwidth is 3.5KHz.
iii) Assume the voice signal is sinusoidal. Determine the signal power and SNR.
iv) Determine the minimum transmission bandwidth.

12 Explain Huffman coding. Consider a sequence of letters of English alphabet with their probabilities of occurrence as given here. (6)

letter	a	l	j	m	n	o	P	Y
probability	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1

Find the variance of average code-word length over the ensemble of letters.

A voice grade channel of telephone network has a bandwidth 3.4KHz.

(a) Calculate information capacity of the telephone channel for a SNR of 30dB.

(b) Calculate the minimum SNR ratio required to support information transmission through the telephone channel at the rate of 9600 b/s. (4)

..2

13 (a) Explain the decoding process for convolution codes using exhaustive search method. (6)
(b) Discuss the advantages of convolution codes. (4)

14 (a) Derive the bit error probability of a QPSK System. (6)
(b) Write the comparisons among ASK, PSK, FSK and DPSK (4)

15 (a) Discuss the frequency hopping spread spectrum technique. (6)
(b) Discuss the applications of frequency hopping technique. (4)

16 (a) Write a note on synchronization methods for Digital carrier modulation schemes. (6)
(b) Explain error detection capabilities of block codes. (4)

17 (a) Explain delay locked loop (DLL) used to track a direct sequence signal. (6)
(b) Discuss ideal sampling and reconstruction of low pass signals. (4)

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Code No. 3180

FACULTY OF ENGINEERING

B.E. 3/4 (M/P) II - Semester (Suppl.) Examination, November / December 2016

Subject : Machine Design

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 Explain Wahl's correction factor in helical springs design?
2 Write about Nipping of Leaf springs?
3 Define the Terms a) Base circle b) Pressure angle c) Backlash as applicable to Spur gears
4 What are the limits on helix angle of helical gears? Define formative number of teeth as applicable to helical gears.
5 Compare journal bearing with antifriction bearings.
6 Define Hydrostatic & Hydrodynamic lubrication.
7 What type of cross section is preferred for a crane hook and why?
8 Explain various stresses induced in curved beams?
9 What are the functions of the following parts of a piston of an I.C. engine
i) skirt ii)piston rings and iii)piston or gudgeon pin
10 What is meant by whipping of a connecting rod and what is its effect?

PART – B (50 Marks)

11 A bumper consisting of two helical steel springs of circular section brings to rest, a railway wagon of mass 1500 kg and moving at 1.2 m/s. While doing so, the springs are compresses by 150 mm. The mean diameter of coils is 6 times the wire diameter. The permissible shear stress is 400 Mpa.
Determine :
(a) Max. Force on each spring (b) Wire diameter of the spring
(c) Mean diameter of coils and (d) Number of active coils.
Take G = 0.84×10^5 Mpa.

12 A pair of helical gears consists of 18 teeth pinion meshing with a 45 teeth gear. An electric motor of 75 KW running at 200 r.p.m is supplying power to pinion. The helix angle is 23^0 and normal pressure angle is 20^0. Determine tangential, radial and axial loads between the meshing teeth, if module is 6 mm in normal plane to the teeth.

13 A bearing 50 mm in diameter and 75 mm long supports an overhanging shaft, running at 900rpm.The room temperature is 30^0 C, and the bearing temperature is 75^0C.The viscosity of the oil used is 0.012 Kg/ms at the operating temperature of 120^0C.The diametral clearance is 0.05 mm and the bearing is to operate in still air, without any artificial cooling. Calculate the permissible load on the bearing and the power lost in friction. The heat dissipation coefficient may be assumed as 300 W /m^2-^{0}C.

..2

14 a) What are the advantages and disadvantages of Rolling contact bearings over Sliding contact bearings?

b) A ball bearing is subjected to a radial force of 2500 N and an axial force of 1000 N. The dynamic load carrying capacity of the bearing is 7500 N. The values of X and Y factors are 0.58 and 1.8 respectively. The shaft is rotating at 800 rpm. Calculate the life of the bearing in million revolutions and hours.

15 Why I sections are used in connecting rods? Design an I-section connecting rod for four stroke diesel engine having 160 mm bore and 200 mm stroke running at 1440 rpm. The maximum explosion pressure is 5.25 N/mm^2. The allowable stress for the material is 340 N/mm^2. The l/r ratio is 4 and factor of safety is 5. The allowable bearing pressures at the small end and big end are 10 N/mm^2 and 6 N/mm^2 respectively. The material for the cap bolts has an average stress of 34 N/mm^2 and the weight of reciprocating parts is 1.1 Kg.

16 Find the load carrying capacity of the crane hook having an approximate trapezoidal cross-section with radius of curvature of inner fiber 50 mm. Distance between parallel sides is 120 mm with sides of 30 mm and 90 mm. It is made of plain carbon steel 45C8 (S_{yt} = 380 N/mm^2) and the factor of safety is 3.5.

17 Write short notes on

a) Design of Worm gears.

b) Types of crankshafts with neat sketches.

c) Stresses induced in a flywheel.

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Code No. 3189

FACULTY OF ENGINEERING

B.E. 3/4 (AE) II-Semester (Supplementary) Examination, Nov. / Dec. 2016

Subject : Design of Automative Components

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 are the materials used for IC engine pistons?
2 What is meant by crippling load? Explain briefly its importance?
3 What is a fly wheel and what for it is used? Mention any two applications.
4 What are the steps involved in the design of crank shaft?
5 Define the following terms
  i) Spring index ii) Spring rate iii) Active coils
6 What is nip? Express its importance in leaf springs.
7 What is meant by "self-contained" bearing?
8 What is an antifriction bearing?
9 What is learning bone gear?
10 List out the advantages of worm fearing.

PART – B (50 Marks)

11 The cylinder of four stroke diesel engine has the following specifications : Brake power : 7.5kN, speed : 1400 rpm, indicated mean effective pressure : 0.35 MPa, mechanical efficiency : 80%, maximum gas pressure : 3.5 MPa, the cylinder liner and head are made of grey cast iron of ultimate tensile strength of 260MPa and Poisson's ratio 0.25, calculate i) Bore length and thickness of cylinder liner ii) thickness of cylinder head, take reboring allowance as 3.2mm and factor of safety as '6'.

12 Design a connecting rod for a single cylinder four stroke diesel engine with following specifications ; power : 7.5kW, mechanical efficiency : 80%, weight of reciprocating parts : 20N, length of connecting rod : 0.3m, dia of piston : 120mm, speed : 1500 rev/min, stroke length : 120mm, max explosion pressure : 2.5 N/mm^2, the allowable stress for the material is 300MPa. The rod of I-section, with width 4t and depth 5t, where 't' is thickness of the web and flanges.

13 A semi elliptical leaf spring uses for automobile suspension consists of three extra full length leaves and 15 graduated leaves, including master leaf. The centre to center distance between two eyes of the spring is 1.2m. The maximum force that can act on the spring is 75 kN. For each leaf, the ratio of width to thickness is 9 : 1, the modulus of elasticity of the material is 2.07×10^5 MPa. The leaves are pressed in such a way that when the force is maximum. The stress induced in all leaves are 450MPa. Determine a) cross section of leaves b) The initial Nip c) The initial preload required to close the nip d) The deflection of spring at maximum load.

..2

14 Design a helical compression leaf spring for a maximum load of 1000N for a deflection of 25mm using the value of spring index as '5'. Take the maximum permissible shear stress for the spring wire as 420MPa and modulus of rigidity as 84 KN/mm^2. Find a) dia of wire and coil b) number of turns of the spring coils c) Free length d) Pitch of the coils.

15 A pair of straight bevel gears has a velocity ratio of 2 : 1. The pitch circle diameter of the pinion is 800mm. A 5kW power is supplied to the pinion, which rotates at 800 rpm. Face width is 40mm and pressure angle is 20'. Calculate the tangential, radial and axial components of the resultant tooth force acting on the pinion.

16 Design a journal bearing for a centrifugal pump from the following data : Load on the journal bearing is 20,000 N ; speed of the journal is 900 rpm, type of oil is SAE 10, for which the absolute viscosity is 0.017 kg/m.s at 55^0C ; ambient temperature of oil is 15^0C; maximum bearing pressure is 1.5 N/mm^2. Calculate mass of the lubricating oil required for artificial cooling. If line of temperature of oil is limited to 10^0C. Heat dissipation co-efficient is 1234 w/m^2/c^0, the specific heat of oil is 1900 J/kg/c^0.

17 A single row deep groove ball bearing No : 6002 is subjected to an axial force of 1000N and radial load of 2200N. Find the expected life that 50% of the bearings complete under this condition. Assume the bearing subjected to light shock loads and outer race is rotating while inner race is stationary.

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Code No. 3197

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) II – Semester (Suppl.) Examination, November / December 2016

Subject: Computer Networks

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 purpose of Layering in Networks?	(2M)
2	What is Routing?	(2M)
3	What is Digital Signature?	(3M)
4	What is a Socket?	(2M)
5	What are the differences between Networking and Internetworking?	(3M)
6	What is purpose of Subsetting?	(2M)
7	What is Jitter?	(2M)
8	What is the difference between Leaky Bucket Algorithm and the Token Bucket Algorithm ?	(3M)
9	What are the factors of Congestion Control?	(3M)
10	How is the secret key different from private key? Justify.	(3M)

PART – B (5x10 = 50 Marks)

11		Draw and Explain TCP/IP Reference Model.	(10M)
12	a)	Why is adaptive routing superior to non-adaptive routing?	(3M)
	b)	Explain how a Link State routing Algorithm works with an example.	(7M)
13	a)	List and explain about Socket System Calls.	(7M)
	b)	Discuss about out of band data.	(3M)
14	a)	Explain about OSPF in detail.	(5M)
	b)	Write the TCP header format.	(5M)
15		Write about DES Algorithm in detail with a neat diagram.	(10M)
16.		Explain DNS in detail.	(10M)
17		Write short notes on:	
	a)	Tunneling	(3M)
	b)	IP Protocol	(3M)
	c)	Secure Socket Layer in web security	(4M)

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Code No. 3199

FACULTY OF INFORMATICS

B.E. 3/4 (I.T.) II – Semester (Suppl.) Examination, November / December 2016

Subject: Compiler Construction

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 a compiler?	2
2	Define the terms Token, Pattern and Lexeme.	3
3	Define Context Free Grammar.	2
4	Write about Recursive Descent Parsing.	3
5	What is an L-attributed definitions.	2
6	Write the following expression in Quadruple and Triple notation **A := b * c + b * c / d**	3
7	What is an activation record?	2
8	What is a Basic Block? How is it recognized?	3
9	Define Data Reuse.	2
10	What are the basic Loader functions?	3

PART – B (5x10 = 50 Marks)

11	a) Explain the translation Process with a neat diagram.	5
	b) Give a brief description about Lex.	5
12	a) Construct Predictive parsing table for the following grammar and also Construct the behavior of the parser on the sentence **(a,a)** **S -> (L) / a** **L -> L , S / S**	10
13	Write the syntax directed definition for the following grammar and also draw the annotated parse tree for the input string **3 * 5 + 4 n** **L -> E n** **E -> E + T / T** **T -> T * F / F** **F -> (E) / digit**	10
14	a) Explain Peephole optimization.	5
	b) Discuss about Heap Management.	5
15	a) Explain the synchronization between parallel Loops.	5
	b) Discuss about a simple bootstrap Loader.	5
16	Construct LALR parsing table for the following grammar. **S -> A a** **S -> b A c** **S -> d c** **S -> b d a** **A -> d**	10
17.	Write short notes on:	
	a) Bootstrapping and Porting	5
	b) Input buffering	5

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