Code No. 5161 / S

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II – Semester (Suppl.) Examination, December 2015

Subject: Soil Mechanics

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 The true specific gravity of a cohesive soil was found to be 2.68 when distilled water was used in the density bottle method. What will be the result ideally when kerosene of specific gravity 0.90 is used? 2

2 In general, whether capillary rise is more in cohesive or cohesion-less soils? Justify your answer with the associated mechanism. 2

3 Sketch the moisture-density curve for same soil compacted as per IS Light and IS Heavy compaction tests and comment on the effect of compaction effort on MDD, OMC. 2

4 Why correction for area is required in a direct shear test? State the expression used for applying correction. 2

5 In a triaxial compression test, a cohesionless soil specimen failed along a plane inclined at 65^o. Determine shear parameters for the soil. 2

6 The in-situ void ratio of a soil mass is found to be 0.80. If its maximum and minimum voids ratios are 1.10&0.50 respectively, determine the relative density of the soil at site. 3

7 On the downstream side of an earthen dam, upward seepage flow under a head of 4m is taking place through a 2m thick soil medium having G=2.70 and e=0.60. Determine factor of safety against quick sand. 3

8 The time required for a consolidating medium with single drainage to undergo 50% of its primary consolidation settlement was estimated as 32 years. All the conditions remaining same, estimate the time required if the medium has double drainage. 3

9 In a direct shear test, a clean dry sand sample failed at a shear stress of 30 kPa when the normal stress was 50 kPa. Determine shear parameters of the soil. 3

10 Estimate the unsupported depth of excavation in $\Phi = 0$ soil having c = 40 kPa and ¥ =20 kN/cum. 3

PART – B (5x10 = 50 Marks)

11 a) Derive the inter-relationship:

$$¥ = \frac{¥_w[G + e.Sr]}{1+e}$$ with standard notations. 5

b) The wet sieve analysis was conducted on a soil mass of dry weight = 600 grams. The results are as given below:

IS Sieve size in (mm)	4.75	2.00	0.425	0.075
Weight retained in grms	24	36	51	66

The liquid and plastic limit are found to be 64% and 48% respectively. Classify the soil as per IS: 1498-1970. 5

12 a) Explain “Capillarity in Soils” and derive the expression for capillary rise. 4

b) The soil profile at a site indicate that from GL up to 9m a sandy strata is present, below which a practically impervious clay strata is present. A bore hole drilled in to the clayey strata indicated static water level in the bore well at 1.5m below GL. The average properties of the sandy strata include G=2.68, ϱ=0.55, $¥_{sat}$ = 19.5 kN/cum.

i) It is proposed to excavate a foundation trench in the sandy strata to a depth of 6m below GL. Estimate the factor of safety against quick conditions.

ii) Also determine the depth to which excavation can safely be carried out without the danger of quick sand. 6

…2.

13 a) Write a note on "Field compaction methods". 5

b) Determine total primary consolidation settlement of the clay layer shown below due to an increment in effective stress of 180 kPa. 5

Ground level

_____ (+) 0.00 m

SAND with ¥ = 19.50 kN/cum

GWT

_____ (-) 2.00 m

FULLY SATURATED COMPRESSIBLE CLAY

¥ SAT = 21.50 KN/cum, LL = 80%, e0 = 1.10

_____ (-) 8.00 m

SAND

14 a) Explain the procedure of "Vane Shear Test" and derive the expression for shear strength. 5

b) The results of a CU bar triaxial compression test are as given below. 5

Sample No.	1	2
Confining stress (kPa)	40	90
Deviatoric stress (kPa)	70	170
Pore Pressure (kPa)	(-) 5	(+) 25

Determine the effective shear parameters c' and Φ'.

15 a) Describe the Active, Passive and at rest conditions of a back fill and derive expressions for coefficient of earth pressure for the respective conditions. 5

b) A 9m high retaining wall with a vertical face is supporting a back fill with horizontal top consisting of two types of soils. The water table is located at a depth of 5m below the top. The properties of soil from 0 to 3m include c=0 kN/sqm; $\Phi = 33^o$; ¥ =17 kN/cum and those for soil from 3m to 9m include c=0 kN/sqm; $\Phi = 40^o$; ¥ =18.50kN/cu.m, $¥_{sub}$=20.50 kN/cum. Plot the distribution of active and passive earth pressure and determine the magnitude and point of application of total active and passive earth pressure acting on the retaining wall. 5

16 a) Explain the "Swedish Slip Circle" method and derive the factor of safety for a slope in cohesive soils. 5

b) It is proposed to construct a highway embankment using a c-Φ soil having c=20 kPa; $\Phi = 10^o$, ¥ =17 kN/cum. Determine the critical height upto which the embankment can be built with an inclination of 29^o with a factor of safety of 1.50. Given the Taylor's stability number for the conditions as 0.0737. 5

17 Write a detailed note on any two of the following: 10

i) Methods to determine In-situ density

ii) Comparison of Rankine's and Coulomb's theories of earth pressure.

iii) Application of Kozeny's parabola

iv) Direct Shear Test and its limitations.

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Code No. 5167 / S

FACULTY OF ENGINEERING

B.E. 3/4 (EEE) II – Semester (Suppl.) Examination, December 2015

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 Determine the fundamental period of the signal x(n) = cos(39® n/7)+sin(23® n/15). (2)
2 Define Energy signal. (2)
3 X(n)={2,1,2,1,2,1,2,1,2,1,2,1}, determine 12 point DFT samples X(0) and X(6). (3)
4 How to determine IDFT using FFT algorithms? (2)
5 X(z)=(z+1)/(z-2)(z-3), determine causal signal using inverse Z transforms. (3)
6 Write stability conditions in Z-domain. (2)
7 Which integral approximation is used in Bilinear transformation? What is prewarping? (3)
8 What are the advantages of FIR filters over IIR filters? (2)
9 What are the applications of DSP in speech processing? (3)
10 Write the steps to find out poles of Chebyshev filter with necessary expressions. (3)

PART – B (50 Marks)

11 (a) Find the convolution of the following signals $x(n)=4^n u(-n-2)$; $h(n)=(1/4)^n u(n)$. (6)
(b) State and prove symmetry properties of DTFT. (4)

12 (a) Solve the following difference equation y(n)-3/2y(n-1)+1/2y(n-2)=x(n) with initial conditions y(-1)=4, y(-2)=10 and $x(n)=(1/4)^n u(n)$. (6)
(b) Impulse response of a system is h(n)=¢ (n)- ¢ (n-1), determine the frequency response of the system. (4)

13 Obtain radix-2 DIFFFT algorithm and find DFT of the following signal x(n) = {1, 2, 3, 4, 4, 3, 2, 1}. (10)

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

$$H(z)=\frac{(1+2z^{-1})(1+3z^{-1})}{\left(1+\frac{1}{2}z^{-1}\right)\left(1+\frac{1}{4}z^{-1}\right)\left(1+\frac{1}{8}z^{-1}\right)}$$

15 (a) Design a Butterworth low pass filter for the specifications given below: (6)
i) -3db cut off frequency of 100 rad/sec
ii) -25db cut off frequency of 250 rad/sec

(b) Determine the digital filter H(z) of the following analog filter $Ha(s)=\frac{1}{(s+1)(s+2)}$ using impulse invariant method. (4)

16 (a) State and prove necessary and sufficient condition for FIR filters to have linear phase characteristics. (5)
(b) Draw the architecture of ADSP processor and explain each block. (5)

17 Write short notes on: (10)
a) Frequency domain sampling – time domain aliasing.
b) Design of FIR filters using window technique.

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Code No. 5172 / S

FACULTY OF ENGINEERING

B.E. 3/4 (Inst.) II – Semester (Suppl.) Examination, December 2015

Subject: Digital Signal Processing & Applications

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	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 Υ(k) = {1, 1, 1, 1}.		3
6	Distinguish between Analog and Digital filter.		3
7	What is prewarping effect.		3
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)	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} suing 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 a short note 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=1 sec.	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. 5176 / S

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) II-Semester (Suppl.) Examination, December 2015

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 What are the advantages of digital over analog communication? (3)
2 What is the transmission bandwidth required to transmit a PCM signal with sampling rate of 10KHz and 512 equally likely quantization levels. (2)
3 What are different types of transmission errors? (2)
4 Distinguish between source and channel coding. (2)
5 Draw bipolar Rz, Manchester coding and differential encoding formats for the 8-bit data 10110011. (3)
6 Define the terms: Information and Entropy. (2)
7 How many errors can be detected and corrected by a linear block code with $d_{min}=5$? (3)
8 Define Weight and distance for a linear block code. (2)
9 A Gaussian channel has 1 MHz band width. If $s/\eta=10^4$W/Hz. Calculate the channel capacity and maximum information transfer rate. (3)
10 What is the significance of 'spread spectrum'? (3)

PART – B (50 Marks)

11 (a) With a neat sketch explain the working of a PCM system. (5)
(b) Explain the necessity of non-uniform quantization in a PCM system. (5)

12 Consider a sequence of letters of English alphabet with their probabilities of occurrence as given below: (10)

Letter	A	B	C	D	E	F	G	H
Probability	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1

Compute Shannon-Fano and Huffman codes for the alphabet. Compare the coding efficiencies.

13 The generate polynomial of a (7, 4) cyclic code is $g(x)=1+x+x^3$. Find the code words in systematic and non-systematic methods for the message vectors 1010, 1100 and 1101. (10)

14 Derive the expression for channel capacity of AWGN channel. What is the significance of Shannon bound? (10)

15 (a) With a neat sketch explain the working of coherent PSK system and derive an expression for probability of error. (5)
(b) Compare ASK, FSK and PSK digital modulation techniques with respect to system complexity, bit rate, transmission BW and area of application. (5)

16 (a) Generate PN sequence using an LFSR (1, 3) with initial shift register status 100. (4)
(b) Discuss acquisition and tracking of Direct Sequencing Spread spectrum signal. (6)

17 Write short notes on the following:
(a) Method of synchronization (5)
(b) Cascaded channels (5)

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Code No. 5181 / S

FACULTY OF ENGINEERING

B.E. 3/4 (M/P) II-Semester (Suppl.) Examination, December 2015

Subject: Machine Design

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

Answer All Questions From PART- A & any Five Questions From Part- B.

Part –A Answer ALL the questions.
(10 x 2 ½ = 25 Marks)

1 Why Wahl's factor is to be considered in the design of helical compression or tension springs?
2 Explain in detail stresses induced in helical compression and tension springs?
3 Sketch the helical gear and show the forces acting in the gear and write equation for dynamic tooth load
4 Sketch the bevel gear and show the forces acting on the gear and write the tangential tooth load.
5 Differentiate between hydrodynamic and hydrostatic lubrication.
6 Sketch the pressure distribution in a journal bearing with thick film lubrication in axial and radial directions.
7 Sketch the crank shaft and show the forces acting in the crank shaft.
8 Describe the whipping stresses in the connecting rod.
9 Write the relationship between moment and curvature for trapezoidal section.
10 Explain the design criteria for C clamps.

PART- B (5 x 10 = 50 Marks)

11 The spring of a small truck is to hold a maximum load of 4000 N each and to have a deflection rate 50 N/mm. The engine develops a maximum torsional moment of 300 N-m. Where the rear axle ratio is 3:1 and the 4-ply tyres are sized 170 mm x 760 mm. The coefficient of friction between the tyre and ground is 0.6. The span length of the spring may be taken as 1.5 times the tyre diameter. Design the leaf spring and make a neat sketch showing all necessary dimensions. Tabulate a satisfactory combination of
(a) Thickness of leaf and width (b) Number of leaves
(c) Camber in free position (d) Radius of curvature
(e) Material used and heat treatment (f) Length of each leaf, and Deflection

12 A pair of spur gears consists of a 20 teeth pinion meshing with a 100 teeth gear. The pinion rotates at 720 rpm. The normal pressure angle is 20^0. The face width is 40 mm, and the module is 4 mm. The pinion as well as gear is made of steel having ultimate strength of 600 MPa, and heat treated to a surface hardness of 300 BHN. Taking factor of safety as 2.5, and assuming that the velocity factor accounts for the dynamic load, calculate the power transmitting capacity of the gears.

13 Design a worm gear drive for an input power of 1 kW, with a transmission ratio of 2.5. The worm speed is 1600 rpm. The worm is made of hardened steel, and gear of phosphor bronze, for which the material combination factor is 0.7 N/mm^2. The static strength of phosphor bronze is 56 MPa. The worm is of double start type, and the centre distance of the drive is 120 mm. The tooth form is 20^0 involute. Check the design for strength, wear, and heat dissipation.

..2

14 A shaft is mounted on two roller bearings, which are 350 mm apart. The shaft carries a bevel gear at the middle. At a shaft speed of 900 rpm; the gear forces are: radial load= 10 kN, and thrust load= 3.5 kN. Determine the rated dynamic capacity of the bearing, for a desired life of 10,000 hours. The service factors are 1.5, thrust factor is 3.7, and radial load factor is 0.67.

15 Design a cast iron piston for a four stoke I.C. engine, for the following specifications:
Cylinder bore = 120 mm
Stroke length = 150 mm
Maximum gas pressure = 5 MPa
Brake mean effective pressure = 0.7 MPa
Fuel consumption =0.25 kg/kW/hr
Speed = 2400 rpm
Assume any other data necessary for the design.

16 An electric motor drives a punching machine. A flywheel fitted to the machine has a radius of gyration of 0.6m, and runs at 300 rpm. The machine can punch 600 holes per hour; each punching operation taking 2.0 seconds, and requiring 20000 N-m of work. Determine the power required to operate the machine and the mass of the flywheel; if the speed of the flywheel should not drop below 220 rpm.

17 A crane hook has a round cross-section with diameter 95 mm. The bed diameter is 125 mm. (a) Determine the load which will produce a maximum stress of 125 N/mm^2 in the inner fibres; and (b) determine the load that will produce the corresponding stress in the outer fibres.

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Code No. 5190 / S

FACULTY OF ENGINEERING

B.E. 3/4 (Automo. Engg.) II – Semester (Suppl.) Examination, December 2015

Subject : Design of Automotive 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 different types of liners and what are their advantages?
2 Enumerate the advantages and disadvantages of aluminum piston.
3 What is the manufacturing method for connecting rod?
4 Differentiate between centre and overhung crank shafts.
5 What are the factors to be considered for selection of spring material?
6 Sketch a gear tooth and name its parts.
7 Why are taper roller bearings used in pairs?
8 What is viscosity index, how it is measured?
9 What are the requirements of a good value?
10 What are the advantages and disadvantages of worm gear drives?

PART – B (50 Marks)

11 a) Explain the following :
i) Piston head ii) Piston ribs iii) Piston barrel
b) Sketch a connecting rod and name its parts.

12 The cylinder of a four stroke diesel engine has the following specifications.
Brake power = 4.5 KW ; speed = 1200 RPM
Indicated mean effective pressure = 0.35 N/mm^2 ; Mechanical efficiency = 80%
Determine the bore and length of the cylinder
(Assume L/D = 1.35 L being in mm)

13 A semi-elliptic multi leaf spring is used for the suspension of the rear axle of a truck. It consists of two extra full-length leaves and ten graduated-length leaves including the master leaf. The centre to centre distance between the spring eyes is 1.2m. The leaves are made of special spring steel (Syt = 1500 N/mm^2 and E = 207000 N/mm^2) and the factor of safety is 2.5. the spring is to be designed for a max. force of 30 KN. The leaves are pre-stressed so as to equalize stresses in all leaves.
Determine i) the cross section of leaves ii) the deflection at the end of the springs.

14 Determine the power capacity of a pair of helical turing gears having a transmission ratio of 10:1. The teeth are 20 full depth involute, 6 mm module. The opinion has 25 teeth and rotates at 5000 RPM. The active face width is 76mm and the material is C-40 steel untreated. (Take f_b = 210 MPa , helix angle = 20^0).

..2

15 A ball bearing has a radial load of 5 KN acting on it and the expected life for 90% of the bearing is 8000h. Calculate the dynamic load carrying capacity of the bearing, when the shaft rotates at 1450 RPM.

16 The following data is given for a connecting rod :
Engine speed = 1800 rpm ; Length of connecting rod = 350 mm
Length of stroke = 175 mm, Density of material = 7800 KG/m^3

Thickness of web or flanges = 8 mm ;

Assume the cross section to be 'I" A = 11 t^2 ; $I_{xx} = \left[\frac{419}{12}\right] t^4$ and $y = \left[\frac{5t}{2}\right]$

Calculate whipping stresses in the connecting rod.

17 Write short notes on :
a) Dynamic load carrying capacity
b) Standard systems of gear tooth
c) Design requirements of a Piston
d) Sketch a poppet valve and name its parts

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Code No. 5198 / S

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) II – Semester (Suppl.) Examination, December 2015

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	Define the following terms: a) Internetwork b) Protocol c) Port	3
2	Distinguish between congestion and flow control?	3
3	What is tunneling?	2
4	What are the different timers that TCP uses?	3
5	What are the applications of UDP?	2
6	What is a reserved port? Give its range?	3
7	State Nagle's algorithm?	2
8	What is a firewall?	2
9	What is a proxy server?	2
10	What is ICMP? Give any two ICMP message types?	3

PART – B (5x10 = 50 Marks)

11	a) Compare and contrast between ISO-OSI and TCP/IP?	6
	b) What are the design issues of network layer?	4
12	Discuss about link state routing algorithm with a suitable example?	10
13	a) What are the different techniques that are used for achieving good quality of service?	8
	b) List the parameters that are used to measure the quality of service(QOS)?	2
14	a) What is IP? Draw and explain about the header format IP packet?	8
	b) A network on the internet has a subnet mask of 255.255.240.0.What is the maximum number of hosts it can handle?	2
15	a) List and explain about any three advanced socket system calls?	6
	b) What is asynchronous I/O? How it can be implemented?	4
16	a) List and explain the services given by email system?	5
	b) Explain the operation DNS?	5
17	Write short notes on: a) Remote Procedure Call b) Multimedia	(2x5=10)

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Code No. 5200 / S

FACULTY OF INFORMATICS

B.E. 3/4 (IT) II – Semester (Suppl.) Examination, December 2015

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 List the various error recovery strategies for a lexical analysis. 2

2 What is a Regular expression? 3

3 Define recursive descent parsing. 2

4 Define lest recursion removal, remove left recursion from. 3

$exp \rightarrow exp + term \mid exp - term \mid term$

5 Draw the DAG for the expression a: = b*-c+b*-c. 3

6 What is an attributed grammar? 3

7 What is an Activation record? What are its contents? 3

8 Define optimizing compiler. 2

9 What is an absolute loader? 2

10 List out the machine dependent loader features. 2

PART – B (50 Marks)

11 a) Explain the different phases of a compiler with a neat diagram, showing the output of each phase, with an example. 6

b) How input buffering can increase the efficiency of compilation? Explain. 4

12 a) Compute the FIRST and FOLLOW sets for the following grammar. 4

$S \rightarrow iEtSS' \mid a$

$S' \rightarrow eS \mid E$

$E \rightarrow b$

b) Construct recursive descent parser for the following grammar 6

$E \rightarrow E + T \mid T$

$T \rightarrow TF \mid F$

$F \rightarrow F^* \mid a \mid b$

13 Construct SLR parser for the following grammar 10

$E \rightarrow E * B \mid E + B \mid B$

$B \rightarrow 0 \mid 1$

14 What is a syntax tree? Write syntax directed definition for constructing a syntax tree for an expression. The grammar for an expression is given below. 10

$E \rightarrow E + T \mid E - T \mid T$

$T \rightarrow T * F \mid F$

$F \rightarrow (E) \mid id \mid num$

15 Explain the principal sources of optimization with examples. 10

16 a) Explain the design of absolute loader. 6

b) Discuss about a simple bootstrap loader. 4

17 Write short notes on :

a) Syntax directed translation 5

b) Data flow analysis frame work 5

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