FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II – Semester (New) (Suppl.) Examination, December 2017

Subject: Soil Mechanics

Time: 3 Hours   **Max.Mark s: 75**

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (25 Marks)

1   What are the commonly used soil designations?
2   What is block diagram? What is its use?
3   The porosity of a soil sample is 45% and specific gravity of its particles is 2.50. Calculate its void ratio, dry density, saturated density and submerged density.
4   What do you understand index properties? What is their importance?
5   Describe the effective stresses in partially saturated soils.
6   Write choice of appropriate earth pressure theory.
7   What are the drainage conditions in shear tests?
8   A direct shear test was conducted on soil and the following results were obtained:

Normal stress (kN/m^2)	55	105	145
Shear stress (kN/m^2)	30	36	41

9   Differentiate between consolidation and compaction.
10 Explain the stability of finite slopes.

PART – B (5x10 = 50 Marks)

11 a) Derive the relationship involving porosity, void ratio, degree of saturation, water content, percent air voids and air content.

   b) The results of laboratory tests conducted on two soils 'A' and 'B' are as follows:

	Soil A	Soil B
% Passing 0.075 mm sieve	14	75
% Passing 4.75 mm sieve	02	100
(D_{10})	0.14	--
(D_{30})	0.33	--
(D_{60})	1.00	--
Liquid limit	16	58
Plastic limit	8	14

   Classify the two as per the Indian Standard Classification.

12 a) What are the variations of effective stress with shift in ground water table and shift in ground surface.

   b) A soil sample of 90 mm high and 600 mm^2 in cross section was subjected to a falling head permeability test. The head fell from 500 mm to 300 mm in 1500 seconds. The permeability of soil was 2.4x10^{-3} mm/s. Determine the diameter of the stand pipe.

13 a) What are the different cases of flow of water through soil?

b) In a container filled with each of the following material, at a porosity of 40%, determine the upward gradient required to cause quick condition.
i) Lead shot with a specific gravity of 11.35.
ii) Fibre beads with a specific gravity of 1.55,
iii) Sand with a specific gravity of 2.65.

14 a) What do you understand on normally consolidated soil and over consolidated soil.

b) The following results were obtained from consolidated test.

Pressure in kN/m²	0.00	13	27	54	108	214	480	960	1500
Dail reading in mm	0.00	0.00	0.04	0.16	0.44	1.04	2.18	3.40	4.20

Plot the pressure void ratio cure and determine the compression index. Initial height of sample H_1 = 25 mm, height of solids H_s = 12.50 mm.

15 a) For which type of soils, will be unconfined compression test give reliable results? Draw Mohr circle for this test. How do you consider the change in the area of the specimen which takes place during the test in the final results?

b) The following results were obtained at failure in a series consolidated – undrained tests, which pore pressure measurement, on specimens of saturated clay.
Determine the values of the effective stress parameters c' and w' by drawing Mohr circles.

$\dagger_3$ kN/m²	$(\dagger_1 - \dagger_3)$ kN/m²	u_w kN/m²
100	175	70
200	300	140
300	450	200

16 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 an axial load of 500 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 60°.

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 rigid retaining wall 4 m height supports of a backfill of cohesion less soil with =30°. The water table is below the base of the wall. The backfill is dry and has a unit weight of 20 kN/m³. Determine Rankine's passive earth pressure per meter length of the wall.

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FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II – Semester (Old) Examination, December 2017

Subject: Soil Mechanics

Time: 3 Hours   Max.Marks: 75

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (25 Marks)

1 Explain in briefly phenomena of soil formation.
2 How the soil mass as it exists a nature?
3 What are use of consistency limits? What re their limitations?
4 Explain boundary classifications for fine grained soils.
5 Explain field determination of permeability.
6 What is the critical hydraulic gradient of a sand deposit of specific gravity 2.60 and a void ratio of 0.50?
7 Define the:
   i)   Coefficient of volume change
   ii) Recompression index
   iii) Compression index.
8 Explain the mode of application of shear force.
9 Write choice of appropriate earth pressure theory.
10 A cut of depth 10 m is made in a cohesive soil deposit c = 30 kN/m^2,   =0 and x =19 kN/m^2.There is a hard stratum under the cohesive soil at a depth of 12 m below the original ground surface. If the required factor of safety is 1.50, determine the safe slope.

PART – B (5x10 = 50 Marks)

11 a) Sketch the grain size distribution curves for uniformly graded, well graded, poorly graded and gap-graded soils, and discuss their characteristics.
   b) Sieve analysis of a grain sample of sand was carried out by making uses of I.S. sieves. The total mass of sand used for the analysis was 522 gm. The following information were obtained.

I.S. Sieve in micron	2000	1400	1000	500	355	180	125	75
Mass retained in gm	75.75	36.75	42.00	126.00	57.75	78.75	68.25	36.75

Plot the grain size distribution curve on a semi-log graph and compute the following (Use I.S. 1498):
   i) Percentage of gravel, coarse sand, medium sand, fine sand and fine sand.
   ii) Uniformly coefficient and coefficient of curvature. And classify the soil.

12 a) Define the following:
   i)   Flow index
   ii) Toughness index
   iii) Liquidity index
   iv) Uniformly coefficient
   v)   Activity

b) The dry unit weight of a sand sample in the loosest state is 13 kN/m^3 and in the densest state, it is 21 kN/m^3. Determine the density index of this sand when it has a porosity of 29%. Assume the grain specific gravity as 2.60.

13 a) Determine in detail laboratory permeability tests. And explain effective stress in soil mass under seepage.

b) In a flow net for a sheet pile wall, the number of flow paths is 5 and the number of equipotential drops is 10. Determine the seepage under wall in litres per day given the coefficient of permeability k = 6x10^3 mmm/s and head H=4.50 m.

14 a) What are the type of rollers used for compacting different types of soils in the field? How do you decide the compactive effort required for compacting the soil to a desired density in the field?

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

Water content %	7.70	11.50	14.60	17.50	19.70	21.20
Mass weight of soil in gm	1740	1920	2080	2030	1975	1940

If the volume of mould used was 950 cm^3 and the G = 2.65, make necessary calculations and draw:
i) Compaction curve and
ii) 80% and 100% saturated lines.

15 a) Enumerate the various methods of determining the shear strength of soils. Discuss their relative advantages and disadvantages.

b) Sample of compacted, clean dry and were tested in a shear box, 6 cm x 6 cm and the following results were obtained:

Normal load (N)	100	200	300	400
Peak shear load (N)	90	181	270	362
Ultimate shear load (N)	55	152	277	300

Determine the angle of shearing resistance of the sand in (a) the dense, and (b) the loose state.

16 a) How does Rankine's approach differ from Coulomb's approach in the estimation of active earth pressure on a retaining structure?

b) A concrete abutment has a self weight of 500 kN, the resultant back thrust from the earth backfill is 100 kN. What is the factor of safety against sliding? The coefficient of friction between concrete and soft clay is 0.30.

17 a) Explain the -circle method for analyzing slope stability.

b) Calculate the dept of a foundation trench which can be excavated with a factor of safety 1.50 for cohesive soil having cohesion of 20 kN/m^2 and angle of internal friction =10°. Given unit weight soil = 19 kN/m^3 and value of stability number = 0.22 for =90° and =10°.

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FACULTY OF ENGINEERING

B.E 3/4 (EEE) II – Semester (New) (Suppl) Examination, December, 2017

Subject : Digital Signal Processing

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

Note: Answer all questions of Part – A & Any five questions from Part – B.

Part – A (25 MARKS)

1. Determine Whether the following signal is periodic. If a signal is periodic specify it's fundamental period x (n) = cos $\frac{\pi n}{3}$ + Cos $\frac{3\pi n}{4}$ 3

2. Define Static system and Dynamic system with example   2

3. Distinguish between Linear convolution and circular convolution   2

4. Draw the basic butterfly diagram of DIT radix – 2 FFT   3

5. Determine the Z-Transform and ROC of the signal x (n) = - b^nu(-n -1)   3

6. Write the properties of Region of convergence   2

7. What is relation between digital and analog frequency in impulse invariant transformation   2

8. Compare the butterworth and chebyshev Typ,e-1 filters   3

9. Write advantages and disadvantages of FIR filter   3

10. What is the need for employing window technique for FIR filter design   2

PART-B Marks: (50 Marks)

11. Determine whether each of the following systems defined below is (i) causal (ii) linear   (iii) Time Invariant (iv) stable   10

12. a) Compute 4-Point DFT of causal three sample sequence is given by

X(n) = $\frac{1}{3}$; 0 ≤ n ≤ 2 = 0; otherwise   5

b) List out the Properties of DFT   5

13. Draw the butterfly diagram for 16-point DFT using DIF FFT algorithm   10

14. Determine the impulse response and step response of causal system given below and Discuss on stability y (n) – y (n-1) -2y (n-2) = x(n-1) +2x(n-2)   10

15. a) Given H)(S) = $\frac{zs}{s^2 + 0.2S + 1}$ Obtain H (s) when T = 1 sec   4

b) write design procedure for chebyshev filter   6

16. Design a linear phase FIR high pass filter using hamming window, with cutoff frequency Wc = 0.8$_\pi$ rad/sample and N = 7   10

17. a) Draw the architecture of TMS320C 54X DSP Processor   5

b) write application of DSP   5

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FACULTY OF ENGINEERING

B.E. 3/4 (EEE) II – Semester (Old) Examination, December 2017

Subject: Digital Signal Processing

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

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (25 Marks)

1	Define a stable system and what is the condition for stability.	3
2	Write the applications of DSP in instrumentation / control.	2
3	Compute the DFT of the sequence, $x(n) = \{0, 1, 2, 3\}$.	3
4	What is zero padding? Why is it needed?	2
5	Realize the system with linear phase realization:	3

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

6	Compare the FIR and IIR systems.	3
7	What is Gibb's phenomenon?	2
8	Write the expression for determining the order of Butterworth filter.	2
9	Write the expression for Bartlett window.	2
10	What are the differences between digital signal processor and ordinary microprocessor?	3

PART – B (5x10 = 50 Marks)

11 A discrete time system is characterized by the following difference equation

$y(n) - 2y(n-1) + (n-2) = x(n) = x(n)-x(n-1)$, determine the response $y(n)$, n   0 when the

system input is $x(n) = (-1)^{\cap} u(n)$ and the initial conditions are $y(-1), y(-2) = 1$.   10

12 Find 8 point DFT of $x(n) = \begin{cases} 0.5 & 0 \le n \le 3 \\ 0, & 4 \le n \le 7 \end{cases}$ using DIF FFT.   10

13 a) Find the step response of the following system using one sided Z-transform method.

         $y(n) = -0.75y(n-1) - 0.125\, y(n-2) = x(n)$.   5

    b) Find the inverse Z transform of the following transfer function.

$$X(z) = \frac{z}{(z-2)(z-3)} \quad \text{ROC: } 2 < |z| < 3.$$

     5

14 a) Write the procedure to design Chebyschev filter.   4

    b) Design a digital filter equivalent to this using impulse invariant transformation when

        T=1 sec; $H_a(s) = \dfrac{2}{(s+1)(s+2)}$ 6

15 Design a bandpass filter using Hamming window, with a cut-off frequency of 1.2 radians/sec and N=9.   10

16 Explain the architecture features of TMS 320 F / 2047 processor.   10

17 a) State and prove any two properties of DFT.   5

    b) Write short notes on Bilinear transformation – prewarping.   5

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FACULTY OF ENGINEERING

B.E. 3/4 (Inst.) II - Semester (New) (Suppl) Examination, December 2017

Subject: Digital Signal Processing

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

Note: Answer all questions from Part A and any five questions from Part B.

PART-A (25 Marks)

1) Find the z-transform with ROC for the signal. $x(n) = \left(\dfrac{1}{3}\right)^n u(+n)$ (2)

2) Find whether the following system is causal and stable $h(n) = a \mid x(n) \mid$ (3)

3) State and Prove Time shifting property of DFT.   (3)

4) Find the DTFT of the following signal   (2)

   $x(n) = \{1, -2, 2, 3\}$

5) Distinguish between FIR and IIR filters.   (2)

6) Explain Frequency Warping and Prewarping.   (3)

7) Write the equations for two widow functions.   (2)

8) Write the down the design steps of Linear Phase FIR filter using Windows.   (3)

9) What are the advantages of very large instruction word VLIW architecture in digital signal processor?   (3)

10) Explain the difference between RISC and CISC processors.   (2)

PART-B (50 Marks)

11) Find all possible values of inverse Z-transform of the following function   (10)

$$X(z) = \frac{z.(z^2 - 4z + 5)}{z^3 - 6z^2 + 11z - 6}$$

1.

12) Obtain radix-2 DIT FFT of the following signal.   (10)

   $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$

13) Design a low-pass Butterworth digital filter to give response of 3 dB or less for frequencies upto 2 KHz and an attenuation of 20 dB or more beyond 4 KHz. Use the bilinear transformation technique.   (10)

14) Design a high pass filter using Hamming Window, with a cut off frequency of 1.2 rad/sec and N=9.   (10)

15) a) Explain different ON-Chip peripheral available in TMS320C54X digital signal Processor.   (6)

b) Explain the difference between Digital signal processor and general purpose microprocessor.   (4)

16) a)Find IDFT of the following sequence $X(k) = \{4, -j2, 0, j2\}$ using Direct DFT.   (5)

b) Determine the Impulse response of the following LTI system using Z-transform   (5)
$y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$.

17) a) Obtain the Direct Form-I structure of the LTI system governed by the following   (5)
equation
$$y(n) = 2x(n) + 3x(n-1) + 0.5x(n-2) - 0.7y(n-1) - 0.9y(n-2)$$

b) Explain Sampling Theorem and reconstruction Signal.   (5)

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FACULTY OF ENGINEERING

B.E. 3/4 (Inst.) II - Semester (Suppl) Examination, December 2017

Subject: Digital Signal Processing & Applications

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

Note: Answer all questions from Part A and any five questions from Part B.

PART-A (25 Marks)

1) Find the z-transform with ROC for the signal $x(n) = \left(\dfrac{1}{3}\right)^n u(-n)$.   2

2) Determine the following systems are time variant or time invariant   3
   $a)\, y(n) = x(-n), b)\, y(n) = x(n) + x(n-1)$

3) State and Prove Time shifting property of DFT   3

4) What are the two properties of twiddle factor which reduces the   2
   number of multiplications and additions in FFT.

5) Distinguish between FIR and IIR filters   2

6) Write the steps for designing of Chebyshev filter.   3

7) Write the necessary and sufficient condition for FIR filter to have Linear Phase.   2

8) Write the design techniques of Linear Phase FIR filter using Windows.   3

9) What are the advantages of very large instruction word VLIW architecture in   3
   digital signal processor?

10) What is pipelining in digital signal processor.   2

PART – B (50 Marks)

11) a) Using Long division, find the inverse Z-transform of $x(z) = \dfrac{1 + 2z^{-1}}{1 - 2z^{-1} + z^{-2}}$ if x(n) is

   causal.   (6)

   b) For each of the following systems determine whether the system is:
   i) Causal   ii) Stable.   (4)
   $a)\, y(n) = e^{x(n)}, b)\, y(n) = \cos x(n)$

12) Obtain radix-2 DIT FFT of the following signal.   (10)
   $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$

13) a) For the analog transfer function $H_a(s) = \dfrac{2}{(s+1)(s+2)}$ (5)

   Determine H (z) if T=1sec using Impulse Invariant Transformation

   b) Obtain the Direct Form-I structure of the LTI system governed by the following   (5)
   equation

   $$y(n) = -\frac{3}{8} y(n-1) + \frac{3}{32} y(n-2) + \frac{1}{64} y(n-3) + x(n) + 3x(n-1) + 2x(n-2)$$

14) Design a high pass filter using Hamming Window, with a cut-off frequency of 1.2   (10)
   Rad/sec N=9.

15) a) Explain the different computer architectures for signal processing   (6)
    b) Write short notes on Selection of DSPs.   (4)

16) Determine the Impulse and step response of the system represented by the   following
    Causal LTI system. $y(n) - \dfrac{3}{4}y(n-1) + \dfrac{1}{8}y(n-2) = x(n)$
                                                                    (10)

17) a) Find the circular convolution using linear convolution   (4)
      $x(n) = \{4,3,2,1\}, h(n) = \{4,5,9\}$

     b) Determine the order of a Butterworth filter satisfying the following
      specifications   (6)
    $f_p = 0.01Hz; \Gamma_p = 0.5dB$

    $f_s = 0.15Hz; \Gamma_s = 15dB; f = 1Hz$

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FACULTY OF ENGINEERING

B.E 3/4 (ECE)   II – Semester (New) (Suppl) Examination, December, 2017

Subject : Digital Communication

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

Note: Answer all questions of Part – A & Any five questions from Part – B.

Part – A (25 MARKS)

1. Draw the basic block diagram of Digital Communication system   3
2. Compare uniform and Non uniform quantizes   3
3. What is binary symmetric channel   2
4. Define the terms priori and posteriori entropies   2
5. What is Manchester coding   2
6. What is the need for error control codes   2
7. Give the comparison between digital modulation schemes through band width and

   power requirements   3
8. Mention advantages of PSK systems   2
9. Explain how tracking is achieved for DS Signals   3
10. Explain the properties of PN sequence   3

PART-B Marks: (50 Marks)

11 a) Explain the working of PCM with a neat block diagram   5
   b) Calculate minimum number of uniform quantization levels required for speech PCM when the signal to quantization noise ratio ia 60 dB and calculate the system bandwidth required   5

12 a) What is mutual information? Calculate the mutual information of Binary erasure channel   5

   b) Explain Binary symmetric channel and calculate channel capacity   5

13 Explain the Computation of syndrome vector in cyclic codes. How is it useful to identify the error position in the received code vector   10

14. a) Explain the generation of (n, k) block codes and how block codes can be used for error control.   7

   b) What is syndrome? Explain its importance   3

15. a) Explain the coherent FSK with transmitter and receiver block diagram   6
    b) Obtain the expression for probability of error of coherent FSK   4

16 a) Describe how eye pattern can be obtained and can be used for observing the characteristics of communication channel   5

   b) With a neat diagram explain frequency hopping spread spectrum technique   5

17. Write a note on: 10
    a) Companding in PCM system
    b) Matched filter
    c) BCH Codes

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FACULTY OF ENGINEERING
B.E. 3/4 (ECE) II - Semester (OLD) Examination, December 2017
Subject: Digital Communication

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

Note: Answer all questions from Part A and any five questions from Part B.

PART-A (25 Marks)

1. Compare the performance of PCM and DM system?   3

2. Explain quantization process.   2

3. Find the mutual information of the Channel shown in figure below. Given p(x1) = 6.0 and p(x2)=0.4 3
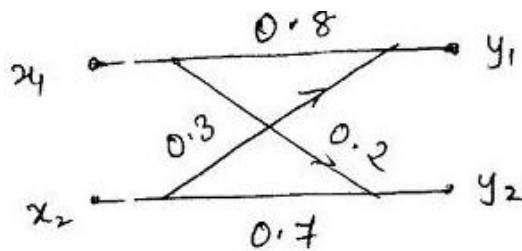
4. Derive the relation between different types of entropies   3

5. Explain the various types of transmission errors   2

6. Write a note on BCH codes   3

7. Write the expression for baud rate of QPSK system   2

8. Compare digital modulation schemes with respect to error probability   2

9. Define code rate of block code.   2

10. A PN sequence is 12^{15}-1 in length. How many runs of four 1's would be expected   3

PART - B (50 Marks)

11) a) Explain the modulation and demodulation procedure in DPCM System   6

   b) Derive the expression for overall SNR in a DM system   4

12) a) Apply Shannon Fano coding for following message ensemble   6

[x] =	x1	X2	X3	X4	X5	X6	X7	X8
[p] =	1/4	1/8	1/16	1/16	1/16	¼	1/16	1/8

   b) Define the terms information rate, information capacity and rate distortion   4

13) a) What are convolution codes? Explain the process of coding with suitable example   6

   b) Explain tree diagram, trellis diagram and state diagram of convolution codes   4

14) a) Explain binary PSK and QPSK with corresponding equations and constellation diagrams 6

   b) Obtain the probability of bit error for coherently detected BPSK and compare its probability of bit error performance with QPSK scheme 4

15) a) Derive the steps involved in generation of linear block codes. Define and explain the properties of syndrome 6

   b) What is quantization? Explain the process of uniform quantization 4

16) a) What are the applications of spread spectrum techniques? List out the advantages and disadvantages of spread spectrum techniques 6
   b) Explain tracking in frequency hopping signals 4

17) a) Discuss ideal sampling and reconstruction of low pass signals 6
   b) Write a note on joint and conditional probability 4

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FACULTY OF ENGINEERING

B.E. 3/4 (M/P) II – Semester (New) (supply) Examination, December 2017

Subject: Machine Design

Time: 3 Hours   Max. Marks: 75

Note: Answer all Questions from Part-A, & any Five Questions from Part-B.

PART – A (25 Marks)

1   What properties a spring material should have?

2   What is clash allowance in compression springs?

3   What are the design considerations for a gear drive?

4   Compare between Involute and Cycloidal gears

5   Differentiate between hydrostatic and hydrodynamic lubrication

6   What properties a bearing lubricant should have?

7   What are the principal parts of an I.C.Engine?

8   What are the various forces acting on the connecting rod?

9   Explain various stresses induced in curved beams.

10 What type of cross section is preferred for a carne hook and why?

PART – B (10 x 5 = 50 Marks)

11 Design a concentric spring for an air craft engine valve to exert a maximum force of 5000 N under a deflection of 40 mm. Both the springs have same free length, and are subjected to equal maximum shear stress of 850 MPa. The spring index for both the springs is 6.

12 A pair of helical gears 30° helix angle is used to transmit 15kW at 10,000 r.p.m of the pinion. The velocity ratio is 4:1, Both the gears are to be made of hardened steel of static strength 100 N/mm^2. The gears are 20° stub and the pinion is to have 24 teeth. The face width may be taken as 14 times the module, Find the module and face width from the standpoint of strength.

13 Design a journal bearing for a centrifugal pump running at 1440 r.p.m The diameter of the journal is 100 mm and load on each bearing is 20 kn. The factor ZN/p may be taken as 28 for centrifugal pump bearings. The bearing is running at 75^oC temperature and the atmosphere temperature is 30^0C. The energy dissipation coefficient is 875 W/m^2/^{0}C. Take diametral clearance as 0.1 mm.

14 A shaft is mounted on two roller bearings, which are 350 mm apart. The shaft carries a bevel gear at the middle. At shaft speed of 900 r.p.m., 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 plain carbon steel centre crankshaft for a single acting four stroke single engine for the following data : Bore = 400 mm; stroke = 600 mm; Engine speed = 200 r.p.m.; Mean effective pressure = 0.5 N/mm^2 ; Max. combustion pressure = 2.5 N/mm^2; Weight of flywheel used as a pulley = 50kN; Total belt pull = 6.5 kN. When the crank has turned through 35° from the top dead centre, the pressure on the pistion is 1N/mm^2 and the torque on the crank is maximum. The ratio of the connecting rod length to the crank radius is 5. Assume necessary data.

16 A Crane hook has a round cross – section with diameter 90mm. The bed diameter is 120 mm.
   a) Determine the load which will produce a maximum stress of 120 N.mm^2 in the inner fibres; and
   b) Determine the load that will produce the corresponding stress in the outer fibres.

17 Write short notes on :
   a) Properties of lubricants used bearings.
   b) Design of Bevel gears.
   c) Theory of bending in different sections with sketches

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FACULTY OF ENGINEERING
B.E. 3/4 (M/P) II – Semester (Old) Examination, December 2017
Subject: Machine Design

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

Note: Answer all Questions from Part-A, & any Five Questions from Part-B.

PART – A (25 Marks)

1 Explain nipping of leaf spring with a neat sketch?

2 What are the most preferred materials for helical springs? Explain why they are suitable for helical springs.

3 What is equivalent number of teeth in helical ears. Explain with a neat diagram

4 Sketch bevel gear pair in mesh and show the forces acting on it.

5 What are the different materials used for solid lubrication.

6 A roller bearing has a dynamic load carrying capacity of 21 KN. The desired life for 90% of the bearings is 6000 hours and the speed is 360 rpm. Calculate the equivalent radial load that the bearing can carry.

7 What is the effect of side thrust on IC engine cylinder liner?

8 Why I – section is preferred for IC engine connecting rod.

9 Explain why unsymmetrical cross sections are preferred in curved beams?

10 Explain the design criteria for C – clamps.

PART – B (10 x 5 = 50 Marks)

11 A semi elliptic leaf spring used for automobile suspension consists of three extra full length leaves and 15 graduated leaves including the master leaf. The centre to centre distance between two eyes of the spring is 1.6m, Width of shrunk band is 100 mm. The maximum force acting on spring is 100 kN. For each leaf the ratio of width to thickness is 9:1 E = 200 GPa, the leaves are prestressed in such a way that when the force is maximum, the stresses induced in all leaves are same .and equal to 450 MPa. Determine (i) the width and thickness of leaves, (ii) the initial nip; (iii) the initial preload required to close the gap C between extra full length leaves and graduated length leaves.

12 A pair of 20° full depth in volute profile spur gears are to transmit 24 Kw at a speed of 300 rpm of the pinion. The velocity ratio is 2:1. The pinion is made of cast steel having an allowable safe static stress = 120 MPa while the gear is made of cast iron having allowable sage static stress = 60 MPa. The pinion has 18 teeth and its face width is 10 times the module. Determine the module, face width and pitch-diameters of both pinion and gear from the stand point of strength Check the design for beam strength and wear strength.

Lewis form factor y = 0.154 – (0.912 / No. of teeth)

Velocity factor C_v = 3 / (3 + V)

Where V is the peripheral velocity in m / sec.

13 A pair of straight tooth bevel gears transmit 15 KW at 1250 rpm of 120 mm diameter case hardened steel pinion of † = 350 MPa, to a heat treated cast steel gear $†_0$ = 190 Mpa at a speed ratio of 3.5. Use 14 ½ in volute tooth system. The angle between shaft axes is 90° Take service factor as 1.25 Design the gears and suggest suitable hardness for the gears.

14 A bearing 50mm in dia and 75 mm in length supports a overhanging shaft running at 900 rpm. The room temperature is 30° and the oil film temperature is 75°. The viscosity of the oil used is 0.012 kg/m-sec the diameter clearance is 0.05 mm and the bearing is to operate in still air without any artificial cooling. Determine (a) The permissible load on the bearing (b) power loss.

15 The radial load acting on a ball bearing is 3000 N for the first 10 revolutions and reduces to 2000N for the next 15 revolutions. The load variation the repeats itself. The expected life of the bearing is 30 million revolutions. Determine the carrying capacity of the bearing.

16 Design head and ring section of cast iron piston for a four stroke I.C engine, for the following specifications. Cylinder bore = 120mm, stroke length = 150 mm; Maximum gas pressure = 5 MPa; Fuel consumption = 0.25 kg/Kw/ hr, Speed = 2400 rpm. Assume any other data necessary for the design.

17 A crane hook has a trapezoidal section at A-A as shown in fig. Find the maximum stress at points P and Q. † = 350 MPa, $†_0$ = 190 Mpa.

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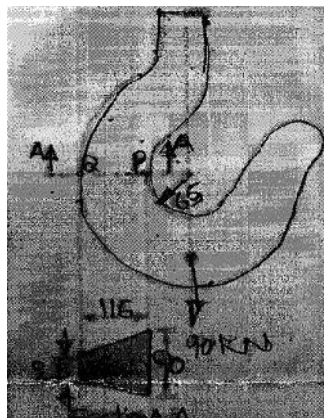
FACULTY OF ENGINEERING

B.E. 3/4 (AE) II – Semester (New) (Suppl.) Examination, December 2017

Subject: Design of Automotive Components

Time: 3 Hours   Max.Marks: 75

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (25 Marks)

1 What is the function of a flywheel and mention its two applications?

2 Why I-section is preferred to the design of connecting rod?

3 What is surge in springs? How surge in springs is eliminated?

4 What is nip of leaf spring? Explain.

5 What is an antifriction bearing?

6 Define eccentricity ratio in hydrodynamic journal bearing.

7 What are the various types of failures in gear tooth?

8 What is Tredgold's approximation in bevel gears?

9 What are advantages of v-belts over flat belts?

10 what do you mean by silent chain? What are its applications?

PART – B (5x10 = 50 Marks)

11 Design a connecting rod for a high-speed IC engine using the following data:
Cylinder bore = 125 mm; length of connecting rod 300 mm; max. Gas pressure = 3.5 MPa; length of stroke = 125 mm; mass of reciprocating part = 16 kg, engine speed 2,200 r.p.m. assume the suitable data and state the assumptions.

12 A semi elliptical truck spring has 12 leaves, of which 2 are full length leaves. The spring supports are 0.7 m apart and the width of the central band is 80 mm, and the load on the spring is 20×10^3 N. The permissible stresses are 460 MPa. The rate of total depth to width of the spring is 3. Determine the thickness and width of the spring leaves. Also, determine the deflection of the spring. Assume that the extra full length leaf is not prestressed. Take E = 2.1×10^5 N/mm^2.

13 Design a journal bearing ror a centrifugal pump from the following data:
Load = 20,000 N, Speed = 900 r.p.m., type of oil SAE10 for which absolute viscosity at 55°C = 0.017 Kg/m-sec; Ambient temp of oil = 16°C; Max. bearing pressure = 1.5 N/mm^2; Calculate also mass of lubricant oil required for artificial cooling if rise of temperature of oil is limited to 10°C. Take that dissipation co-efficient = 1234 W/m^2/$^{\circ}$C.

14 Design a spur gear pair of 20° involute full depth to transmit 120 kN from a pinion at 75 rpm to a gear running at 140 rpm. The service is intermittent with light shocks.

15 a) Define over drive and write the steps involved in designing over drive.
   b) Mention the design considerations for a year train of an automobile gear box.

16 A helical spring for a valve is to be designed for an operating load range of 90 N to 140 N. The 90 N load acts when the valve is closed and 140 N force acts when valve is open. The deflection of the spring is limited to 8 mm, Take spring index as 6 and $C_T = 84$ GPa.

17 A ball bearing is operating on a work cycle consists of three parts as follows: Aratial load of 2000 N and axial load of 1000 N at 1200 rpm for one quarter cycle. A radial load of 2200 N and axial load of 1500 N at 1440 rpm for the remaining cycle. The expected life of the bearing is 12,000 hrs. Calculate the dynamic load carrying capacity of the bearing. Also calculate the life in hours of the reliability is 98%.

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FACULTY OF ENGINEERING

B.E. 3/4 (AE) II – Semester (Old) Examination, December 2017

Subject: Design of Automotive Components

Time: 3 Hours   Max.Marks: 75

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (25 Marks)

1 What are the advantages of cylinder liner?

2 What is tappet? What is the stress in tappet?

3 Name the materials used for connecting rod.

4 Define co-efficient of fluctuation speed.

5 Differentiate between open coiled and closed coiled helical springs.

6 Define nipping in lead springs.

7 what is hypoid gear? Why is it used in automobiles?

8 What is miter gear?

9 State any two advantages of hydrodynamic bearings over hydrostatic bearings.

10 Define dynamic load carrying capacity of rolling contact bearing?

PART – B (5x10 = 50 Marks)

11 The cylinder of a four stroke diesel engine has the following specifications. Brake power = 8 kN, speed = 800 rpm. IMEP = 0.3 MPa, mechanical efficiency = 80%. Determine the bore nd length of the cylinder liner.

12 Design an overhang crank shaft with two main bearings and a flywheel in between them for an IC engine, single cylinder 0.25 m x 0.3 m. The flywheel weighs 27 kN. The max pressure is 2.1 MPa. The torsional moment is maximum when the crank is at 35° from the IDC, while the pressure is 1.05 MPa. Assume missing data.

13 Design a helical compression spring to carry a load of 1.5 kN with a deflection of 40 mm. Spring index '5'. Allowable shear stress is 400 MPa, and $G = 8 \times 10^{10}$ N/m^2.

14 Design a leaf spring for the following specifications:
   Total load = 140 kN; No. of springs supports the load = 4; Max. No. of leaves = 10, Span of spring is 1000 mm. Permissible deflection = 80 mm, G = 200 kN/mm^2, allowable stress in spring material as 600 MPa.

15 A pair of cast iron level gears connect two shafts at night angles. The pitch dia of pinion and gear are 80 mm and 100 mm respectively. The tooth profiles of the gears are 14.5^o composite form. The allowable static stress for the gear materials is 55 MPa. If the pinion transmits 2.75 kN at 400 rpm. Design the gear's from standard point of strength and check for wear. Take endurance limit as 630 MPa and E = 84 kN/mm^2.

16 Single row deep groove ball bearing is subjected to a 30 sec work cycle that consists of the following:

	Part – I	**Part – II**
Duration	10 sec	20 sec
Radial load	45 kN	15 kN
Axial load	12.5 kN	6.25 kN
Speed	720 rpm	1440 rpm

The static and dynamic carrying capacities of the ball bearings are 50 kN and 70 kN respectively. Calculate the expected life of the bearing in hours.

17 A full journal bearing of 0.075 M dia and a length of 0.125m is to support a load of 20×10^3 N at speed of 1000 rev/min. The bearing temp is limited to $77^\circ C$ in a room temperature of $30^\circ C$. The viscosity of the oil used is 0.0098 kg/m.s at $116^\circ C$. Find amount of artificial cooling required by means of external oil cooler when the bearing is not ventilated.

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FACULTY OF ENGINEERING

BE 3/4 (CSE) II- Semester (New) (Supplementary) Examination, December, 2017
Subject: COMPUTER NETWORKS

Time: 3 hours   **Max. Marks: 75**
Note : Answer all questions from Part-A & Any Five Questions from Part-B.

PART – A (25 MARKS)

1	Discuss IP Architectures.	3
2	What are the design issues	2
3	What is Tunneling	3
4	Explain CIDR	2
5	Define Buffering	3
6	Define the TCP Protocol	2
7	What is SNMP	3
8	Define Multimedia	2
9	List the Elementary socket system calls	3
10	What are the signals	2

PART – B (50 MARKS)

11 a)	Explain the duties of Network Layer.	5
b)	What is congestion control? Discuss the general principles?	5
12 a)	Discuss the IP protocol in detail.	5
b)	Explain the Gateway routing protocols	5
13 a)	Discuss the TCP service model	5
b)	What are the performance issues list	5
14 a)	Explain socket address	5
b)	Discuss Asynchronous I/O	5
15 a)	Discuss DNS name space	5
b)	Explain SMTP and MIME	5

16 a) Define multiple ring   4

    b) Explain crash recovery in detail   6

17. a) Discuss congestion control in virtual circuit   5

    b) Explain Quality of Service (QoS)   5

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FACULTY OF ENGINEERING
B.E 3/4 (CSE) II – Sem (Old) Examination, December, 2017
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

1. What the use of resource sharing?   3

2. What is the technique used for preventing from impersonating people on the internet? 2

3. List out the various services offered by sessions   3

4. Define Access point and what is the use of it?   2

5. Define socket   2

6. What is stub and marshalling   3

7. Abbreviate ICANN and its usage   3

8. What is mail submission   2

9. What is the difference between Symmetric and asymmetric key?   3

10. What is the use of Digital signatures?   2

Part - B

11. Write short notes on

    A   PAN $(2^{1/2})$

    B   LAN $(2^{1/2})$

    C   WAN $(2^{1/2})$

    D   Man $(2^{1/2})$

12. Elaborate on ARP (Address Resolution Protocol) Clearly and its advantages   10

13. a) Discuss on Input   output multiplexing   6

    b) Write Short notes on Son RPC   4

14. a) Explain briefly about MIME.   6

    b) Discuss on name servers   4

15 How secure connections can be achieved using SSL.   10

16 Write short notes on

    a) Authentication using herberos   6

    b) Fragmentation   4

17. Elaborate the ISO-OSI reterence models with neat diagram   10

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FACULTY OF INFORMATICS

B.E. 3/4 (IT) II-Semester (New) (Supplementary) Examination, December 2017

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 are the metrics of quality of service?	3
2	Convert the IP address whose hexadecimal representation is D22F1529 to dotted decimal notation.	2
3	List the advanced socket system calls.	3
4	What do you mean by video on demand?	2
5	Write about authentication protocols.	3
6	What are the uses of computer networks?	2
7	What are all the IP address classes and how IP address is expressed?	3
8	Define Socket.	2
9	Explain the role of name servers.	3
10	Differentiate between authentication and authorization.	2

PART – B (5 x 10 = 50 Marks)

11 a)	What are the functions of the network layer? List out the design issues in it.	5
b)	Explain about the key design issues in network layer.	5
12	What are the elements of Transport protocols?	10
13	Explain about the connection oriented communication with block diagram using elementary system calls.	10
14	Explain protocols for voice over IP.	10
15	Write about RSA in detail with an example.	10
16 a)	List the layers of ISO-OSI reference model	2
b)	Explain about RPC	4
c)	List and explain about 1 bit flags in TCP header	4
17 a)	Explain about Jitter.	2
b)	What are the functions of an email system?	4
c)	Explain about IPSec in detail.	4

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FACULTY OF INFORMATICS

B.E. 3/4 (IT) II-Semester (Old) Examination, December 2017

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	Distinguish between connection-oriented and connection-less service.	3
2	Explain different uses of Computer Networks.	2
3	List the protocols used by the Network layer.	2
4	Write about BGP and OSPF.	3
5	What are value-results arguments? Which system calls use them?	3
6	Write different types of port numbers and its range.	2
7	What is DNS resource record?	3
8	Differentiate between static and dynamic web document.	2
9	Differentiate between public key and private key algorithm.	2
10	Explain the encryption model for Network security.	3

PART – B (50 Marks)

11 a) Explain ISO-OSI model of network architecture.   6
   b) Compare ISO-OSI and TCP/IP reference model.   4

12 a) Briefly explain one adaptive and one Non-Adaptive routing algorithms.   8
   b) What is count to infinity problem?   2

13 a) Draw the IPV4 header format and explain in various field on it.   6
   b) Explain the different IP address classes in detail.   4

14 Explain about elementary socket system call for connection-oriented and
   connection-less protocol.   10

15 Explain the architecture and services of electronic mail.   10

16 a) Explain RSA algorithm   8
   b) Define cryptography and firewalls   2

17 Write short notes on :
   a) Digital signatures   5
   b) Domain name system   5

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