FACULTY OF ENGINEERING

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

Sub: 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 A saturated clay has a water content of 39.30% and a mass specific gravity of 1.84. Determine the void ratio and the specific gravity of soil solids.

2 Write the representative heights of capillary rise (m) in different types of soils.

3 Discuss how shear test conditions are decided for total and effective stress analysis.

4 What do you understand index properties? What is their importance?

5 Discuss the importance of Atterberg's limits in soil engineering.

6 How would you determine the average permeability of soil deposit consisting of number of layers?

7 What are the factors that effect on compaction? Discuss in brief.

8 Define:
   i) Coefficient of volume change
   ii) Recompression index
   iii) Compression index.

9 Explain the mode of application of shear force.

10 Write the variation of earth pressure and co-efficient of earth pressure with the movement of the wall.

PART – B (5x10 = 50 Marks)

11 a) What are the requirement of a system of soil classification?

   b) Determine liquid limit, liquid index, and consistency index. Determine the value of the liquid limit of a soil from the following test data.

Number of blows	Water content %
38	16
34	17
20	20
12	22

12 a) Define the "Critical hydraulic gradient" and explain how the 'piping' is produced.

b) A sand sample of 35 cm^2 cross sectional area and 20 cm long was tested in constant head permeameter. Under a head of 60 cm, the discharge was 120 ml in 6 min. The dry weight of sand used for the test was 1120 g, and G = 2.68. Determine

i) The coefficient of permeability in cm/sec

ii) The discharge velocity, and

iii) Seepage velocity.

13 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: $e_1 = 0.80$	$p_1 = 1.50$ kg/cm^2
Point 2: $e_2 = 0.65$	$p_2 = 2.95$ kg/cm^2

If the average overburden pressure on a 5 m thick clay layer is 1.55 kg/cm^2, how much settlement will the clay layer experience, due to additional load intensity of 1.65 kg/cm^2?

14 a) What are the measurement of shear strength with various laboratory methods?

b) Undrained triaxial tests are carried out on four identical samples of silty clay, and the following results are obtained:

Cell Pressure (kN/m^2)	50	100	150	200
Deviator stress at failure (kN/m^2)	350	440	530	610
Pore pressure (kN/m^2)	5	10	12	18

Determine the value of the effective angle of shearing resistance and the cohesion intercept by plotting "modified failure envelope".

15 a) What are the factors affecting while field compaction control?

b) The following are the results of compaction test obtained on sample of soil.

Water content %	5	10	14	20	25
Bulk density (g/cc)	1.77	1.98	2.10	2.18	2.16

Plot MDD & OMC curve. Calculate the water content necessary to complete saturate the sample at its maximum density, assuming no change in volume. Take G=2.70.

16 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 6 m height supports of a backfill of cohesion less soil with $w = 35^o$. The water table is below the base of the wall. The backfill is dry and has a unit weight of 20 kN/m^3. Determine Rankine's passive earth pressure per meter length of the wall.

17 a) What is Coulomb's wedge theory of earth pressure? Explain the conditions for obtain the maximum earth pressure.

   b) A retaining well with a vertical back of height 7.32 m supports a cohesion less soil and unit weight 17.30 kN/m^3 and an angle of shearing resistance $w = 35^o$. The surface of the soil is horizontal. Determine the magnitude and the direction of the thrust per meter of wall using Rankine's theory.

****

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II-Semester (Main) Examination, May / June 2017

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 wet unit weight of a clay sample compacted at a water content of 25% was found to be 17 kN/m^3. The specific gravity of solids was found to be 2.75. Determine the degree of saturation, % of air voids and the unit weight.
2. Define the i) Coefficient of compressibility ii) Compression index iii) Expansion index.
3. Discuss the importance of Atterberg's limits in soil engineering.
4. What is Darcy's law? What are its limitations?
5. How would you determine the average permeability of soil deposit consisting of number of Layers?
6. Explain the mode of application of shear force.
7. Explain i) the unit, in which the compaction is measured, ii) zero air voids line, and iii) effect of compaction on the shear strength of soil.
8. Describe the effective stresses in partially saturated soils.
9. The following results were obtained from an undrained shear box test on a soil.

Normal load (N)	230	490	725
Failure load (N)	305	450	600

   Determine the shear parameters in terms of total stress. The C/S area of the shear box was 36 cm^2.
10. What is the maximum depth to which a trench of vertical sides can be excavated in a clay stratum with c = 50 kN/m^2 and γ = 16 kN/m^3?

PART – B (50 Marks)

11. a) Differentiate between a residual soils and a transported soils. Also enumerate the various common soils found in general use. Briefly define and point out the characteristics of any three of these soils.

    b) The deep soft clay sub-soil below a proposed highway embankment in Waranagal area has following grain sizes :
   Gravel = nil
   Sand = 2%
   Silt = 51%
   Clay = 47%
   The liquid limit of clay is 56% and its plastic limit is 25%, what is the general engineering classification? Comment on its use in the embankment.

12 a) Explain in detail 'Unified soil classification system' in coarse grained soil and fine grained soil with plasticity chart.

b) For a constructing embankment, the soil transported from a borrow area using a truck which can carry $6m^3$ of soil at time. With the following details, determine the number of truck loads of soil required to obtain $100m^3$ of compacted earth fill and the volume of borrow pit.

Property	Borrow area (in situ)	Truck (loose)	Field (compacted)
Bulk unit weight	16.60 kN/m^3	11.50 kN/m^3	18.20 kN/m^3
Water content	8%	6%	14%

13 a) Develop an equation for determining the rise of water in a capillary tube. Also Explain as to how this equation is applied to determine the depth of capillary fringe.

b) A pumping test was carried out to determine the coefficient of permeability of soil at a site which was selected for the construction of an earth dam. Observation wells were established at a distance of 3m and 6m from the test well.
The following data were obtained :
Depth of water table   = 16m
Discharge under steady condition   = 2.30 m^3/min
Drawdown at outer well   = 0.50m
Drawdown at inner well   = 1.50m
Determine the coefficient of permeability of the soil.

14 a) What is the quick sand phenomenon and in which type of soils and under what situation may this occur?

b) What is the flow net? Sketch flow nets for seepage through the body of an earthen dam and also for the seepage taking place through the pervious foundations of weir. How would you utilize such flow nets for computing seepage discharge?

15 a) Explain the 'e-log p' field curves from normally and preconsolidated samples of clay of low sensitivity.

b) A soil sample has a compression index of 0.30. If the void 'e' at a stress of 1.40 kg/m^2, is 0.50, compute i) the void ratio if the stress is increased to 2 kg/m^2 and ii) the settlement of soil stratum 4m.

16 a) Explain the terms of total stress, effective stress and pore pressure as applied to soils. When will negative pressure be developed in soils?

b) Two undrained triaxial tests were conducted on soil specimen, and they gave the following results :

Confining pressure (kN/m^2)	Failure load (kN/m^2)
150	500
300	800

Determine the value of apparent cohesion and friction of the soils.

..3

17 a) Explain the major difference between Rankine's and Coulomb's theories of lateral earth pressures.

   b) Calculate the factor of safety in a infinite slope at a point 5m below the surface. The slope angle with the horizontal is 20^0, and the effective shear parameters for the given soil : c = 19 kN/m^2 and $\phi = 30^0$: unit weight of the moist soil = 19 kN/m^3.

******

FACULTY OF ENGINEERING

B.E. 3/4 (EEE) II-Semester (Main) Examination, May / June 2017

Subject : Digital Signal Processing

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) Linearity   b) Stability   3
2   Determine the fundamental period of $x(n) = \cos(0.5\Pi n)$.   2
3   Mention the properties of ROC in Z-transform.   2
4   Computer the DFT of a sequence $(-1)^n$ for N = 4.   3
5   Find the IDFT of $Y(k) = \{1,0,1,1\}$.   3
6   Distinguish between Analog and Digital Filter.   3
7   What is pre-warping effect?   2
8   Determine the Z-Transform of $a^n u(n)$.   2
9   Compare Hamming and Kaiser Window.   3
10 Draw the architecture of ADSP.   2

PART – B (5 x 10 = 50 Marks)

11 a) Find the forced response of the system described by difference equation
     $Y(n) + 2y(n-1) + y(n-2) = x(n) + x(n-1)$ 5
   b) Determine if the system described by input output equation is linear or nonlinear
     i) $y(n) = x(n)$ ii) $y(n) = x^2(n)$ 5

12 a) State and prove symmetry properties of DFT.   5
   b) Calculate the time sequence $x(n)$ for given DFT components $x(k) = \{2, 1 + j, 0, 1 – j\}$.   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 a) Write short notes on Inverse Z-transform and mention the methods for evaluation of the inverse Z-Transform.   5
   b) Find the inverse Z-Transform of $X(z) = z + 0.2 / (z + 0.5)(z-1)$ |z|>1.   5

16 a) What are the popular windows functions used for computing the coefficients of FIR filters? Mention the advantages of FIR over IIR filter.   5
   b) For the analog transfer function $H(s) = 2 / (s+1)(s+2)$. Determine $H(z)$ using impulse invariance method. Assume T = 1sec.   5

17 a) Design a Chebyshev filter with a maximum pass-band attenuation of 2.5dB at $\Omega p = 20$ rad/ sec and the stop-band attenuation of 30 dB at $\Omega s = 50$ rad/sec.   5
   b) Write short notes on application of DSP.   5

******

FACULTY OF ENGINEERING

B.E. 3/4 (EEE) II-Semester (Old) Examination, May / June 2017

Subject : Digital Signal Processing

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 Find the Z transform and ROC of the signal $x(n) = -a^n u(-n-1)$.   3
2 Write the expression for the order of the filter for chebyshev filter.   3
3 Find the DFT of the sequence $x(n) = \{1,1,-2,-2\}$.   3
4 What is prewarping?   2
5 Compare FIR and IIR filters.   2
6 What is Gibb's phenomenon?   2
7 Find whether the following signal is power signal or energy signal : $u(n) - u(n-1)$.   2
8 Explain and sketch the mapping of s-plane to z-plane in impulse invariant transformation.   3
9 List any 3-properties of DFT.   3
10 What are the applications of DSP?   2

PART – B (50 Marks)

11 Determine the linear convolution of x(n) and h(n).   10
    $x(n) = \{1,2,3,-4\}$ and $h(n) = \{1,-1,2\}$.

12 Convert the analog filter with system transfer function into a digital IIR filter by means of impulse invariant method.   10

$$H(s) = \frac{s + 0.1}{(s + 0.1)^2 + 9}$$

13 a) Define causal and non-causal system with examples.   5
    b) Test the stability of the following system   5

14 The impulse response of system is   10

$$h(n) = \begin{cases} 1; & 0 \le n \le (N\text{-}1) \\ 0; & \text{otherwise} \end{cases}$$

Find the transfer function and frequency response

15 Compute 8-point DFT of x(n) by radix-2 DIF-FFT   10
    $X(n) = \{1,3,2,2,1,3,2,2\}$

16 Design a band stop filter to reject frequencies in the range 1 to 2 rad/sec using rectangular window with N = 7.   10

17 Explain the architecture features of ADSP processor.   10

******

FACULTY OF ENGINEERING

B.E. 3/4 (Inst.) II-Semester (New) (Main) Examination, May / June 2017

Subject : Digital Signal Processing

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 Analyze whether the following system is stable or unstable system   h(n) =
   e^3n.u(n-2)   2
2 Determine the inverse z-transform using long division method   3

$$X(z) = \frac{z^2 + 2z}{z^3 - 3z^2 + 4z + 1}; ROC|z| > 1$$

3 Compute the Linear convolution of the following signals   2
      X(n) = {3, -2, 1, 4}, h(n) = {2, 5, 3}

4 Explain the two properties of twiddle factor $W_N^K = e^{-J2f^{k}/N}$ in FFT.   3

5 How analog poles are mapped to digital poles in impulse invariant transformation?   2
6 Compare Butterworth and chebyshev filter.   3
7 What are the sufficient conditions for FIR filter to have linear phase characteristics?   2
8 Compare rectangular window and Hanning window functions.   3
9 Explain the difference between fixed point and floating point DSP processors.   2
10 Explain applications of DSP processors.   3

PART – B (50 Marks)

11 a) Analyze whether the following systems are causal and stable   4
       i) y(n) = ax(n-7),   ii) h(n) = a^n ; for 0 < n < 11
    b) Find the transfer function of the following system using Z-transform
       y(n) = x(n) + 0.81x(n-1) – 0.81x (n-2) – 0.45 y(n-2)   6

12 Find 8-point DFT using DT FFT algorithm for the following sequence   10
       x(n) = {2,2,2,2,1,1,1,1}

13 a) Obtain H(z) using impulse invariant transformation when T = 0.5 sec for   5

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

    b) Obtain the lowest order Chebyshev filter that meets the following specifications   5
       i)   1 dB ripple in the Passband $0 \le |\check{S}| \le 0.3f$

       ii) Atleast 60 dB attenuation in the stopband $0.35f \le |\check{S}| \le f$.

14 Design a digital low pass FIR filter using Rectangular window function by taking   N =
   9 samples of the window function and with a cut-off frequency of 1.2 rad/sec.   10

15 Explain the architecture of TMS320C54X fixed point DSP processor with neat block diagram.   10

16 a) Compute the 4-point Radix-2 DIF FFT of the following sequence   6
$\qquad$ x(n) = {1,2,1,0}
  b) Find the linear convolution using circular convolution   4
$\qquad$ x(n) = {3, -2,1,4} and h(n) = {2,5,3}

17 a) Explain sampling theorem in detail.   5
  b) Obtain the Direct Form-I realization of the following LTI system   5
$\qquad$ y(n) = x(n) + 0.5x(n-1) + 0.4x(n-2) – 0.6y (n-1) – 0.7y(n-2)   5

******

FACULTY OF ENGINEERING

B.E. 3/4 (Inst.) II – Semester (Old) Examination, May / June 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 $y(n) = T\ run[x(n)]$, where $T\ run[x(n)]$ denotes integer part of $x(n)$ by truncation, check whether the system is linear or non-linear. Justify your answer with an example.   3

2 The unit sample response of a linear shift invariant system is known to be zero except in the interval $N_o \leq n \leq N_1$. The input $x(n)$ is known to be zero except in the interval $N_2 \leq n \leq N_3$. As a result the output is constrained to be zero except in the interval $N_4 \leq n \leq N_5$. Determine $N_4\ N_5$ in terms of N_o, N_1, N_2 and N_3.   3

3 How to avoid time domain aliasing in frequency domain sampling?   2

4 What are the two properties, which are used in FFT to reduce number of multiplications and additions in DFT?   2

5 What are the expressions for Butterworth poles for order n even and odd?   2

6 An analog filter $H(s) = \dfrac{1}{s(s+1)}$, determine digital filter using impulse invariant method.   3

7 What are the advantages of FIR filters?   3

8 what is the criteria for selecting a particular windows?   2

9 Who are leading manufacturers of Digital Signal Processors?   2

10 Explain the Harvard architecture of DSP.   3

PART – B (5x10 = 50 Marks)

11 a) Find the convolution of the following signals
       $x(n) = 2^{n}u\ (-n+2)$; $h(n) = u(n-3)$.   6

   b) What are the different steps in converting an analog signal into a digital signal?   4

12 a) Casual LTI system is represented by difference equation
       $y(n) + 4y(n-1) + 4y(n-2) = x(n)$. Determine the step response of the system.   5

   b) Impulse response of a system is $h(n) = \dfrac{1}{2}[u(n) - u(n-1)]$, determine the frequency response of the system.   5

13 Obtain radix – 2 DIFFT algorithm and find DFT of the following signal

x(n) = {1, 2, 3, 2, 1, 2, 3, 2}.　　　　　　　　　　　　　　　　　　10

14 a) Design a Butterworth low pass filter for the specifications given below:

　　　i) -3db cutoff frequency of 100 rad/sec

　　　ii) -25 db cutoff frequency of 250 rad/sec.　　　　　　　　　7

　　b) What is warping effect? How to overcome it?　　　　　　　3

15 Design a digital low pass filter with a cutoff frequency of 1 rad/sec using rectangular window with N=7.　　　　　　　　　　　　　　　　　　　10

16 a) Explain how pipelining increases the speed of Digital Signal Processor.　　5

　　b) Explain the implementation of DSP algorithms in a general purpose DSP.　　5

17 Write short notes on:

　　a) Chebyshev filter design　　　　　　　　　　　　　5

　　b) Kaiser window.　　　　　　　　　　　　　　　5

<div align="center">****</div>

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) II – Semester (New) (Main) Examination, June 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. Explain the significance of eye pattern.   2

2. What are the advantages of DM over DPCM?   2

3. What do you mean by source coding?   2

4. Define the following terms:

   a) Entropy

   b) Uncertainty

   c) Information   3

5. Define hamming distance and calculate its value for two code words 11100 and 11011.   3

6. Mention the properties of cyclic code.   2

7. Compare digital modulation schemes through bandwidth and power requirements.   3

8. A binary FSK system employs two signalling frequencies f_1 and f_2. Lower frequency f_1 = 1200 Hz. Band rate is 500 band. Calculate f_2.   3

9. Discuss the properties of PN sequence.   3

10. Give applications of HFSS.   2

PART – B (5x10 = 50 Marks)

11. a) Discuss the advantages and disadvantages of Digital Communication. Also draw the block diagram of digital communication system with functional description of each block.   8

    b) Write the advantages of adaptive delta modulation technique over Delta Modulation.   2

12 a) Prove that the entropy of a binary DMC is maximum if both the information bits are equally likely. 5
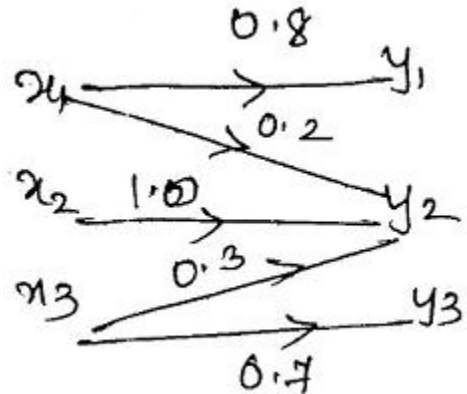
b) Find the transferred information for the channel shown above. 5

13 Construct standard array for a (6, 3) linear block code whose generator matrix is given below:

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$

Decode the received vector 010110 using table look up decoding method. 10

14 a) Explain with a neat block diagram modulation and demodulation of FSK. 5

b) Calculate the probability of error of non coherent PSK. 5

15 a) Explain the generation of PN sequence. 5

b) Explain in detail the coarse acquisition of a DSSS signal. 5

16 Write short notes on following: 10
   a) M-ary signalling scheme
   b) Synchronization methods
   c) BCH codes

17 Explain tree diagram, trellis diagram and state transition diagram of convolution codes. 10

****

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) II-Semester (Old) Examination, May / June 2017

Subject : Digital Communication

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 slope overload distortion in DM and how to overcome?   2
2 Discuss the two laws used for companding in PCM system.   3
3 Calculate mutual informational I(X, Y) for β = 0.5 and p = 0.1 for binary symmetric
   channel.   3
4 Explain the need for source coding.   2
5 What is syndrome decoding explain?   3
6 Define hamming distance and calculate its value for two code words 111000 and
   11011.   3
7 Brief the characteristics of MSK signal.   2
8 Compare digital modulation schemes with respect to error probability.   2
9 Define processing gain and jamming margin.   2
10 Explain the generation of PN sequence.   3

PART – B (50 Marks)

11 Draw a neat block diagram of a typical digital communication system and explain the
   function of key signal processing blocks.   10

12 a) Apply Shannon Fano coding for following message ensemble   6
       [X] = [x1   x2   x3   x4   x5   x6   x7]
       [P] = [0.4   0.2   0.12   0.08   0.08   0.08   0.04]
   b) Write a note on different types of discrete memory less channels.   4

13 a) Show that if g(x) is a polynomial of degree 9n-k) and is a factor of (xn+1) then g(x)
      generated by V(x) = D(x)g(x).   6
   b) A(7,4) linear cyclic code has a generator polynomial $g(x) = 1+x+x^3$. Find code
      polynomial for the message polynomial $D(x) = 1+x+x^2$ (in a systematic form).   4

14 a) Explain non-coherent detection methods of binary frequency shift keying
      scheme.   6
   b) Distinguish coherent and non coherent detection.   4

15 a) Derive the necessity of DSSS techniques. Draw the transmitter and receiver
      block diagram and explain.   6
   b) Write a note on acquisition scheme for spread spectrum receivers.   4

16 a) Describe how channels are classified and explain each of them.   6
   b) Calculate the channel capacity of any three channels.   4

17 a) Discuss frequency hopping spread spectrum technique in detail.   6
   b) Write the error correction and detection capabilities of linear block codes.   4

******

FACULTY OF ENGINEERING
B.E. 3/4 (M/P) II-Semester (Old) Examination, May / June 2017

Subject : Machine Design

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 Wahl's factor? Explain its importance.
2 What are the different stresses induced in Leaf spring when loaded?
3 What is herringbone gear? Draw a neat sketch and explain.
4 What are the advantages of worm gear drives over the other gear drives?
5 Differentiate between hydrodynamic and hydrostatic lubrication.
6 Explain the bearing designation 6410.
7 With a neat sketch explain differences between overhung and centre crankshafts.
8 What is whipping stresses in connecting rod?
9 Distinguish between curved beams and straight beams.
10 Explain why forged steel is preferred materials for crane hook.

PART – B (50 Marks)
11 A vertical spring loaded valve is required for a compressed air receiver. The valve is to start opening at a pressure of 1 N/mm^2 gauge and must be fully open with a lift of 4 mm at a pressure of 1.2N/mm^2 gauge. The diameter of the port is 25mm . assume the allowable shear stress in steel as 480 MPa and shear modulus as 80 kN/mm^2. Design a suitable closed coiled round section helical spring having squared and ground ends. Also specify initial compression and free length of the spring.

12 A bronze spur pinion rotating at 600 rpm drives a cast iron spur gear at a transmission ration 4 :1. The allowable static stresses for bronze pinion and C.I. gear are 84 MPa and 105 MPa respectively. The pinion has 16 standard 200 full depth involute teeth of module 8 mm. The face width of both gear is 90 mm. Find the power that can be transmitted from the standpoint of strength.

13 A worm gear drivetransmits 15 kW to a machine. The worm speed and the gear speeds are respectively 2000rpm and 50 rpm. The worn is triple threded and has a pitch diameter of 65mm. the gear has 120 teeth of 6mm module. The tooth form is 200 full depth involute and co-efficient of friction = 0.1. Find i) Tangential force acting on the worm ii) Axial thrust on the worm iii) Separating force on the worm iv) Efficiency of the worm.

14 Design a journal bearing for a centrifugal pump. Operating conditions are as follows.
Load on the journal = 11.5 kN
Speed of the journal = 1440 rpm
Diameter of journal = 75mm
Oil film temperature = 70^0 C
Ambient temperature = 22^0 C

..2

15 A 30 second work cycle consists of the following two parts

	Part-I	Part-II
Duration	10	20
Radial load (KN)	50	20
Axial load (KN)	10	5
Speed (r.p.m.)	600	1200

For this application the static and dynamic load capacities of a single row deep groove ball bearing are 45 KN and 60 KN respectively. Calculate the life of the bearing in hours.

16 Design a connecting rod for a four stroke petrol engine with the following specifications :
Diameter of Piston = 100 mm
Mass of reciprocating parts = 2.25 kg
Length of connecting rod = 300 mm
Stroke length = 125 mm
Speed = 1500 rpm
Maximum explosion pressure = 3.5 MPa
Factor of safety = 5
Density of rod material = 8000 Kg/m^3
Yield stress in compression = 330 MPa
Allowable bearing pressures at this small end and big eng are 12 MPa 8 MPa

17 Design a crane hook of capacity 60 KN.

******

FACULTY OF ENGINEERING

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

Subject: Machine Design

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 Nipping in Leaf springs?

2 How to avoid buckling in compression springs?

3 Write two preventive measures to avoid gear tooth failure.

4 What is the Lewis's equation for strength of gear teeth?

5 Of what variables the coefficient of friction function in journal bearing?

6 Compare journal bearings with antifriction bearings.

7 What is the role of bearing pressure in design of crank shaft?

8 Define coefficient of fluctuation of speed.

9 Write the relationship between moment and curvature for trapezoidal section

10 Explain the design criteria for C-clamps.

PART – B (5x10 = 50 Marks)

11 A semi elliptical laminated spring 900 mm long and 55 mm wide is held together at the centre by a band of 50 mm wide. If the thickness of each leaf is 5 mm, find the number of leaves required to carry a load of 4500 N. Assume a maximum working stress of 490 MPa. If the two of these leaves extend the full length of the spring, find the deflection of the spring. The Young's modulus for the spring material may be taken as 210 kN/mm^2.

12 Design worm and gear speed reducer to transmit 22 kW at a speed of 1440 r.p.m. The desired velocity ratio is 24:1. An efficiency of at least 85 % is desired. Assume that the worm is made of hardened steel and the gear of phosphor bronze.

13 The rolling contact ball bearing are to be selected to support the overhung counter shaft. The shaft speed is 720 r.p.m. The bearings are to have 99 % reliability corresponding to a life of 24,000 hours. The bearing is subjected to an equivalent radial load of 1 kN. Consider life adjustment factors for operating condition and material as 0.9 and 0.85 respectively. Find the basic dynamic load rating of the bearing from manufacturer's catalogue, specified at 90 % reliability.

14 Design a cast iron piston for a four stroke I.C Engine, for the following specifications:
 Cylinder bore = 120 mm; Stroke length = 150 mm; Max. gas pressure = 5 MPa; Brake mean effective pressure = 0.7 MPa; Fuel consumption = 0.25 kg/kW/hr and Speed = 2400 r.p.m. Assume necessary data.

15 A single cylinder double acting steam engine delivers 185 kW at 100 r.p.m. The maximum fluctuation of energy per revolution is 15 per cent of the energy developed per revolution. The speed variation is limited to 1 per cent either way from the mean. The mean diameter of the rim is 2.4 m. Design the flywheel.

16 Find the load carrying capacity of the crane hook having an approximate trapezoidal cross-section with radius of curvature of inner fibre 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) End connections for compression helical springs.
   b) Design considerations for a gear drive.
   c) Piston skirt.

****

FACULTY OF ENGINEERING

B.E. 3/4 (AE) II-Semester (Old) Examination, May / June 2017

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 Why is the design of exhaust valve more critical than that of an inlet valve?
2 Why is the area of inlet port is more than that of an exhaust valve?
3 Under what force big and both and caps are designed in converting rod?
4 Write short note on Whipping stresses.
5 What is what's factor? What is its importance in design of springs?
6 What is the objective nipping of leaf spring?
7 What are skew gears? Write its applications.
8 Why is the efficiency of worm gear drive is low?
9 What are the assumptions made by Reynold's theory of hydrodynamic lubrication?
10 Define rating life of bearing.

PART – B (50 Marks)

11 Design a exhaust valve for a horizontal diesel engine using following data :
Cylinder bore : 140mm ; length of stroke : 280 mm ; engine speed = 750 rpm ; max gas pressure : 4 MPa ; seat angle = 45^0 ; mean velocity of gas : 50 m/s ; thickness contatn (k) = 0.42 ; permissible bending stress : 60 N/mm^2 ; calculate   i) Diameter of valve port   ii) Diameter of valve lead   iii) Thickness of valve lead   iv) Dia of valve stem   v) Max lift of valve

12 The following data is given for a connecting rod : Engine speed = 1800 rpm length of connecting rod = 350 mm, length of stroke :175mm, density of material : 7800 kg/m^3, thickness of web flange: 8 mm, Assume A = 11 t^2, $I_{xx} = \dfrac{419}{12} t^4$ and $y = \dfrac{5t}{2}$, calculate whipping stresses in connecting rod.

13 A semi-elliptic multiple spring is used for the suspension of the rare axle of a truck. It consider of two full length leaves including the master leaf. The centre to center distance between the eye is 1.2m, leaves are made of steel (J_{yt} = 1500 N/mm^2, E = 207000 N/mm^2) and F.O.S.= 2.5. The spring is to be designed for maximum force of 30 KN. The leaves are prestressed so as to equalize stresses in all leaves. Determine   i) Crans section of leaves   ii) deflection at end of the spring.

14 A bum ber consisting of two helical steel springs of circular cross section brings to rest, a railway wagon of mass 1500 kg and moving at 1.2 m/s while doing so, the springs are compressed 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 and coidiameter   c) No. of coils   Take   G = 0.84 x 105 MPa.

15 A pair of helical gear consists of 18teeth pinion meshing with a 45 teeth gear. An electric motor of 75 kw running at 200 rpm is supplying power to pinion. The helix anglers 230 and normal pressure angle is 200. Determine tangential, radial and axial loads between the resting teeth, if module is 6mm in normal plant to teeth.

16 A ball bearing is required to resist a radial load of 10 kN and a thrust load of 5 kN. The average life of a bearing is to be 5000 hrs, with inner race rotation at 980 rpm. What basic dynamic load rating must be used in selecting the bearing? If the bearing is to have life of 5000 hrs at a reliability of 97% what is the required basic dynamic load rating?

17 A journal bearing, 100mm in diameter and 150mm long ; carries a radial load of 7 KN at 1200 rpm, the diametral clearance is and 150mm long carrier a radial load of 8 KN at 1200 rpm, the diametral clearance is 0.075mm. Find the viscosity of the oil being used at the operating temp : if 2.3 KN power is wasted in friction.

******

FACULTY OF ENGINEERING
B.E. 3/4 (AE) II-Semester (New) Examination, May / June 2017

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 Why I-section is preferred for the design of connecting rod?
2 Explain the classification of Piston rings.
3 Why the area of the inlet valve port is made larger then the area of exhaust valve port in an IC engine?
4 Define the term i) spring index   ii) Wahl's facto   iii) spring rate
5 Differentiate between semi-elliptical and elliptical leaf spring.
6 What is equivalent dynamic load in rolling contact bearing?
7 Distinguish between full and partial bearing. What is the preferred angle of contact of partial journal bearing.
8 What is herringbone gear? Where they are used?
9 What is crown gear?
10 What are different pulley's used in belt drives?

PART – B (50 Marks)

11 The cylinder of a four stroke diesel engine has the following specifications brake power : 10 kW, speed : 1440 rpm , IMEP = 0.4 MPa, η_m = 80%, max gas pressure : 4 MPa, cylinder liner and head art made of grey cost iron (T_{uf} = 260 N/mm^2) , FOS = 6 Calculate : i) bore and length of cylinder   ii) thickness cylinder liner and head iii) size and no. of study required.

12 Design a leaf spring for the following specifications : Total load = 140 kW ; No. of springs supports the laod = 4 ; max no. of leaves = 10 ; span of spring = 1000 mm ; permissible deflection = 80 mm, Take E = 200 kN/mm^2 , allowable shear stresses in the spring material as 600 MPa.

13 A shaft is mounted on a two roller bearings which are 350mm apart. The shaft carries a berl gear at the middle at the shaft speed of 900 rpm. The gear forces are : radial load = 10 KN, thrust load = 4 KN. Determine rated dynamic capacity of the bearing for desired life of 10,000 hrs. Take service factor = 1.5, thrust factor = 3.7, radial load factor = 0.67.

14 A bronze spur pinion rotating at 600 rpm drives a cost iron spur gear at a transmission ration of 4 : 1. The allowable static stresses for the bronze and coast iron are sympa and 105 MPa respectively. The pinion has 16 standard 200 full depth involute teeth of module 8 mm. Face width of the both gear's is 90mm. Find the power that can be transmitted from the standard point of strength and wear.

..2

15 a) Mention the criteria is selection of type of gear and type of gear train.   5
   b) Write the steps involved in the design of an automobile differential.   5

16 Design a spring for a safety valve of 60mm diameter is to blow off at a pressure of 1.2 N/mm^2.   The max lift of the valve is 10mm.   Spring index is 5, and initial compression is 35mm, C_{max} = 500 MPa, G = 80 KN/mm^2.

17 A journal bearing of 100mm in dia and 150mm long carrier a radial load of 8 KN at 1200 rpm, the diametral clearance is 0.075mm, find the viscosity of oil being used at the operating temp if 2 KW power is wasted in friction.

******

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) II – Semester (New) (Main) Examination, May 2017

Subject: Computer Networks

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 Jitter control.	(2M)
2	Write functionalities of Transport layer.	(3M)
3	What is Autonomous System?	(2M)
4	What is the purpose of ARP?	(3M)
5	What is the idea behind RPC?	(2M)
6	Draw the diagram for TCP three-way handshake.	(3M)
7	Write built-in HTTP request methods.	(3M)
8	What is the purpose of Telnet?	(2M)
9	Distinguish between synchronous I/O and asynchronous I/O.	(2M)
10	Write significance of Out-of –Band data.	(3M)

PART – B (5x10 = 50 Marks)

11 a) Explain similarities and differences between ISO-OSI and TCP/IP architecture. (4M)

b) Illustrate Broadcast and Multicast routings. (6M)

12 a) A router has just received the following new IP addresses: 57.6.96.0/21, 57.6.104.0/21, 57.6.112.0/21, and 57.6.120.0/21. If all of them use the same outgoing line, can they be aggregated? If so, to what? If not, why not? (4M)

b) Explain Packet Fragmentation with neat diagram. (6M)

13 a) Describe RTP (Real-Time Transport Protocol). (5M)

b) Illustrate TCP Timer management. (5M)

14 a) Explain SNMP in detail. (5M)

b) Distinguish IMAP and POP3. (5M)

15 Illustrate Elementary socket system calls. (10M)

16 a) Explain RSVP (Resource Reservation Protocol) with neat diagram. (5M)

b) Discuss Tunneling with neat diagram. (5M)

17 Write short notes on:

a) Multiplexing in Transport layer (3M)

b) FTP (3M)

c) Socket address. (4M)

****

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) II – Semester (Old) Examination, May 2017

Subject: Computer Networks

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	Define networks.	2
2	Give the relation between hosts on LANs and the subnet.	3
3	Differentiate internetwork and intranetwork.	2
4	Mention the IPv6 (internet Protocol) header.	3
5	Define upward multiplexing and downward multiplexing with examples.	3
6	What is RPC?	2
7	What is meant by name resolution?	2
8	Mention the two kinds of sybsystems in E-mail system.	3
9	State Cryptology.	2
10	What is the difference between symmetric and asymmetric key algorithm.	3

PART – B (50 Marks)

11 a) What are the two reasons for using layered protocols? What is one possible advantage of using layered protocols?   5

   b) Elaborate the issues that the designers of the network layer must consider.   5

12 a) Discuss on DHCP – the dynamic host configuration protocol.   4

   b) Compute a multicast spanning tree for router C in the following network for a group with members at routers A, B, C, D, E, F, I and K.   6

13 a) Discuss the transparency issues in RPC (Remote Procedure Calls).   6

   b) Mention neatly about service primitives of a Berkeley socket interface.   4

14 a) Explain Domain Resource Records clearly.   6

   b) Discuss briefly on the Internet Message Access Protocol (IMAP).   4

15 a) State Kerckhoff's principle.   3

   b) Elaborate on two fundamental cryptographic principles.   7

16 Explain clearly on AES (Advanced Encryption Standard).   10

17 a) Can a machine with single DNS name have multiple IP addresses? How could this occur?   6

   b) How Business Applications make use of computer networks.   4

****

FACULTY OF INFORMATICS

B.E. 3/4 (IT) II – Semester (Old) Examination, May / June 2017

Sub: Computer Networks

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 computer networks. (2)
2 Distinguish between Virtual Circuit Subnet and Datagram Subnet. (3)
3 What is Internet Super Server? (2)
4 Specify Transparency Issues of RPC. (3)
5 Write about Tunneling in Internet working. (3)
6 Draw the TCP header format. (2)
7 What is the role of HTTP Protocol in WWW? (3)
8 State about Streaming Audio. (2)
9 Briefly explain about PGP in Email Security. (3)
10 Write about Message digests. (2)

PART – B (5x10 = 50 Marks)

11 a) Explain Link-State Routing Algorithm along with an example. (7)
   b) List the Quality of service parameters. (3)

12 a) Discuss the details of OSPF protocol. (5)
   b) Draw the header format of IP and explain it. (5)

13 a) Describe about Connection-oriented Communication with block diagram
     Using elementary socket system calls. (6)

   b) Explain about IPV4 and IPV6 Interoperability. (4)

14 a) Give the architecture overview of World Wide Web. (6)
   b) Write about Wireless Application protocol stack. (4)

15 a) Illustrate the working of RSA algorithm in detail. (6)
   b) Differentiate Substitution Ciphers and Transposition Ciphers. (4)

16 a) Discuss the concept of Video on demand. (5)
   b) Write about Firewalls. (5)

17 Write short notes on
  a. Differences between OSI/ISO and TCP/IP reference model. (4)
  b. Show the IPV6 header format and explain. (6)

****

FACULTY OF INFORMATICS

B.E. 3/4 (IT) II – Semester (Main) Examination, May / June 2017

Sub: Computer Networks

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 do you mean by computer network? List any two applications of computer
   networks.   2
2 State general principles of congestion control.   3
3 What is tunneling?   2
4 List the elements of transport protocols.   3
5 What is out-of-band data?   2
6 Define daemon process. List few common daemons.   3
7 Differentiate between static and dynamic documents.   3
8 What are the advantages of VOIP over PSTN?   2
9 Write are the differences between private key cryptography and public key
   cryptography?   3
10 What is digital signature?   2

PART – B (5x10 = 50 Marks)

11 a) Describe TCP/IP Reference Model.   6
   b) Distinguish between leaky bucket algorithm and token bucket algorithm.   4

12 a) What is Internetworking? What are the different devices used to interconnect
       dissimilar networks at different layer levels?   4

   (b) What is inter Domain Routing? Explain OSPF Protocol on detail.   6

13 a) Discuss advanced socket calls.   5
   b) Explain the steps in making Remote Procedure Call.   5

14 a) Describe email architecture and services.   5
   b) Explain the working principle of VOIP.   5

15 a) Explain DES with the help of neat sketch   6
   b) Discuss Pretty Good Privacy.   4

16 a) Explain QOS parameters of Network Layer.   5
   b) Draw IPV6 header and explain each field.   5

17 Write short notes on the following:
   a) Sun RPC   4
   b) Video on Demand   3
   c) Web security   3

****