FACULTY OF ENGINEERING
B.E. (CIVIL) VI - Semester (AICTE) (Backlog) Examination, March / April 2022

Subject: Environmental Engineering

Time: 3 Hours   **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(10 x 2 = 20 Marks)**

1   Define design period.
2   What is coagulation and flocculation?
3   What are the advantages of water softening?
4   What are the various methods of layout of distribution pipes?
5   Define BOD and COD.
6   What are the various sewer appurtenances?
7   What do you mean by activated sludge?
8   Draw the flow chart for the treatment of sewage.
9   What are the major air pollutants?
10 What are the control technologies used in air pollutions?

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 (a) What are intakes? What factors affect the design of intake structure?
   (b) Describe river intake and canal intake with the help of neat sketch.

12 (a) What is meant by disinfection of water, residual chlorine, super chlorination and dechlorination?
   (b) What is filtration? What are the various types of filters used? Design set of 3 rapid gravity filters for treating the water at water works which has to supply water to a town of population 1,00,000. Per capita demand of the town is 270litres/day. The rate of filtration may be taken as 4,500 litres/hours/sq.m.

13 (a) State the merits and demerits of separate system of sewage and combined system of sewage.
   (b) What are the various methods of sewage disposal? Explain.

14 (a) What is activated sludge process? Explain the process involved in the sewage purification of activated sludge process.
   (b) Design the activated sludge unit treatment with the following data for a town of population of 65,000.
       i) Average sewage flow=210 litres/C/day
       ii) BOD of the raw sewage= 210mg/litre
       iii) Suspended solid in raw sewage = 300mg/litre
       iv) BOD removal in primary treatment = 40%
       v) Overall BOD removal desired = 90%.

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15 (a) Explain the effect of air pollution on men, materials and animals.
   (b) What are the components of urban air pollution model? What types of sources are considered in air pollution model?

16 (a) Define sedimentation. What are the various types of sedimentation tanks used? Explain
   (b) Why softening of water is necessary? What are the various methods of water softening?

17 Write short note on the following:
   (a) Break point chlorination
   (b) Principles of anaerobic sludge digestion
   (c) Permissible limits of noise pollution.

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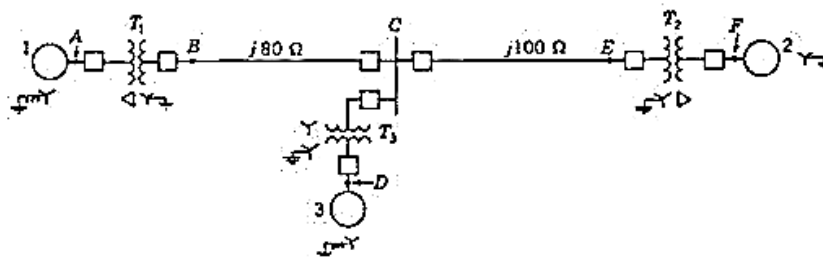# FACULTY OF ENGINEERING
B.E. (EEE) VI - Semester (AICTE) (Backlog) Examination, March / April 2022

Subject: POWER SYSTEM – II

Time: 3 Hours   **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(10 x 2 = 20 Marks)**

1. What are tuned power lines?
2. Write the empirical formula to calculate the power loss due to corona and explain the parameters in it.
3. What are the quantities whose base values are required to represent the power system by reactance diagram?
4. The generator emf is 1 p.u and the sub transient reactance is 20%. Find the sub transient currents.
5. Write the boundary conditions for L-L and L-L-G fault when the fault occurs at the terminals of the alternators.
6. Distinguish between symmetrical and unsymmetrical faults.
7. Compare series and shunt compensation for voltage control.
8. Obtain transmission line coefficient for voltage and current for a line terminating with two dissimilar lines.
9. What is the function of booster transformer?
10. Why a travelling wave suffers reflection when it reaches different impedances. Give reason.

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11. (a) Derive the expression for critical disruptive voltage.
    (b) A 3 ph 50 Hz overhead transmission line delivers 10MW at 0.8 p.f lag & at 6.6KV. The resistance & reactance of line per Km per ph are 10Ω & 20Ω resp while capacitance admittance is $4*10^{-4}$ mho . Calculate
      (i) sending end voltage

      (ii) transmission efficiency using nominal T method.

12. (a) Explain about per unit representation of transformer and draw per unit equivalent circuit with necessary equations. Prove that the per unit impedance of transformer is same when computed from primary side or secondary side.

    (b) A 3 ph transmission line operating at 33KV & having a resistance of 5Ω & reactance of 20Ω is connected to the generating station through 15000KVA step up transformer. Connected to the bus bars are 2 alternators one of 10000KVA with 10%reactance & another 5000KVA with 7.5% reactance. Calculate the short circuit KVA fed to the symmetrical fault between phases if it occurs
      (i) at the load end of the line
      (ii) at the high voltage terminal of the transformer.

13. (a) Show that the positive & negative sequence currents are equal in magnitude both out of phase by 180 degree in a line to line fault. Draw the interconnection diagram of

sequence network.

   (b) A 3 ph 11KV,10000KVA alternator has $X_0 = .05$p.u , $X_1 = .15$p.u, $X_2 = .15$p.u . It is on no load & rated terminal voltage. Find the ratio of the line currents for a single LG fault to 3 ph fault. Neutral is solidly grounded.

14. (a) Explain the operation of thyristor controlled reactor with diagram.
   (b) Explain about on load tap changing transformers.

15. (a) Explain about travelling wave phenomenon over a long line, considering the line with receiving end is short circuited. Draw necessary voltage and current wave.
   (b) Two stations are connected together by a cable having surge impedance of 60Ω joined to O.H line with a surge impedance of 400Ω. If the surge having a max value of 100KV travels along the cable towards the junction with the O.H line, determine the value of the reflected & transmitted wave of voltage & current at the junction.

16. (a) Explain the methods to reduce the corona effect.
   (b) When a 3 phase short circuit occurs at the terminals of an alternator, draw the equivalent circuit of an alternator under (a) sub transient (b) transient (c) steady state conditions and explain it.

17. The single line diagram of an unloaded power system is shown. The generator and transformer are rated as follows:

   $G_1 = 20$MVA ,13.8KV, X" = 20% $G_2 = 30$MVA, 18KV, X" = 20%
   $G_3 = 30$MVA , 20KV, X" = 20% $T_1 = 25$MVA, 13.8/ 220 KV , X= 10%
   $T_2 = 3$ single phase units each rated at 10MVA , 127/18KV, X = 10%
   $T_3 = 35$MVA, 220/22 KV , X= 10% . Draw the reactance diagram using a base value of 50MVA and 13.8KV on the generator G_1.

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FACULTY OF ENGINEERING
B.E. (EIE) VI - Semester (AICTE) (Backlog) Examination, March / April 2022

Subject: Biomedical Instrumentation

Time: 3 Hours   **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)
PART – A

Note: Answer all questions.   **(10 x 2 = 20 Marks)**

1. Define Bio potential.
2. Define signal to noise ratio of biomedical instrument.
3. What is electro encephalography (EEG)?
4. Write the specifications of EMG amplifier
5. Differentiate between non-invasive and invasive method for measurement of blood pressure.
6. Why endoscope is called fiber scope?
7. Explain the principle of generation of X-rays.
8. Mention the laser applications in biomedical instrumentation.
9. What are safety codes and standards?
10. Define Micro shock and Macro shock.

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11. (a) Explain the General features of recorders for biomedical applications.
    (b) Explain the Carrier amplifier with neat circuit diagram.

12. (a) Explain optical recorder with neat diagram.
    (b) Explain the specifications of EEG amplifier.

13. (a) Explain block diagram of ECG recording system in detail.
    (b) Explain amplifiers and circuits of ECG recording system.

14. (a) Explain the block diagram of EMG recording system in detail
    (b) Explain the design consideration of EMG amplifier in detail

15. (a) Explain the measurement of blood flow by Doppler shift method.
    (b) Explain the block diagram of phonocardiography recording system with neat diagram.

16. (a) Write advantages and disadvantages of CT scan.
    (b) Write short note on collimators and grids.

17. Explain the following
    (a) Types of leakage currents
    (b) Phonocardiography

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FACULTY OF ENGINEERING
B.E. (ECE) VI - Semester (AICTE) (Backlog) Examination, March / April 2022

Subject: Digital Communication

Time: 3 Hours   Max. Marks: 70

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(10 x 2 = 20 Marks)**

1. What are the advantages and disadvantages of digital communication system?
2. What are the advantages of DM over PCM?
3. What is the need for source coding?
4. Define information and entropy.
5. The generator matrix for (6,3) block code is (i= $\begin{bmatrix} 100 & 011 \\ 010 & 101 \\ 101 & 110 \end{bmatrix}$.

   Find the code vector for message block (1, 0, 1).
6. What is the need for error control codes?
7. Differentiates between PSK and QPSK.
8. What is correlation receiver and explain?
9. What is the necessity of spread spectrum?
10. Differentiate between fast and slow frequency hopping.

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11. (a) Explain the modulation and demodulation procedure in DPCM system.
    (b) What is quantization noise and derive the expression for the same?

12. (a) Apply Shannon fano coding for following message ensemble.

[X]=	X1	X2	X3	X4	X5	X6	X7	X8
[P]=	1/4	1/8	1/16	1/16	1/16	1/4	1/16	1/8

   (b) Explain binary symmetric channel and calculate channel capacity.

13. The parity check bits of a (8, 4) block code are given by
    $$C1 = m1+m2+m3$$
    $$C2 = m1+m2+m3$$
    $$C3 = m1+m3+m4$$
    $$C1 = m2+m3+m4$$
    Here m1, m2, m3 are the message bits.
    (a) The generator matrix and parity check matrix for this code.
    (b) Find the minimum weight of this code.
    (c) Find error defecting capabilities of this code.

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

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15 (a) With a neat diagram explain frequency hopping spread spectrum technique.
   (b) What are the application of spread spectrum technique? List out the advantages
       and disadvantages of spread spectrum.

16 (a) Explain in detail coarse acquisition of a direct sequence spread spectrum signal
    (b) Explain about M-ary signalling schemes.

17 (a) what are code tree, code trellis and state diagrams for convolution encodes.
    (b) Explain the slope overload error in DM.

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FACULTY OF ENGINEERING
**B.E. (MECH/PROD) VI Semester (AICTE) (Backlog) Examination,
March / April 2022
Subject: Machine Design**

Time: 3 hours   **Max. Marks: 70**
(Missing data, if any, may be suitably assumed)
PART – A

Note: Answer all questions   **(10 x 2 = 20 Marks)**

1 Explain what you understand by A.M Wahl's factor and state its importance in the design of helical springs?
2 Explain the utility of centre bolt, U-clamp, rebound clip and camber in leaf spring.
3 Explain the different causes of gear failures and suggest some possible remedies to avoid such failures.
4 Explain the following terms (i) Helix angle (ii) normal pitch.
5 Define the terms (i) Bearing characteristic number (ii) Bearing modulus.
6 How do you express the life of bearing? What is an average or median life?
7 Mention the various considerations in the design of flywheel.
8 Mention the various types of stresses used in crank shafts.
9 What factors are to be considered while designing crane hooks?
10 Mention the criteria for design of C-clamp.

PART – B

Note: Answer any five questions   **(5 x 10 = 50 Marks)**

11 A Semi-elliptical laminated spring is made of 50 mm wide and 3mm wide thick plates. The length between the supports is 650 mm and the width of the band is 60mm. The spring has two full length leaves and five graduated leaves. If the spring carries a central load of 1600N, find:
  1) Maximum stress in full length and graduated leaves for an initial condition of no stress in the leaves.
  2) The maximum stress if the initial stress is provided to cause equal stress when loaded.
  3) The deflection in parts (1) and (2).

12 A motor shaft rotating at 1440rpm has to transmit 15kW to a low-speed shaft rotating at 500rpm. The teeth are 20degrees involute with 25 teeth on the pinion. Both the pinion and gear are made of cast iron with a maximum safe stress of 56MPa. A safe stress of 35MPa may be taken for the shaft on which the gear is mounted. Design and sketch spur gear drive to suit the above conditions. The starting torque may be assumed as 1.25 times the running torque.

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

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14   Select the single row deep groove ball bearing with the operating cycle listed below, which will be a life of 12000 hours.

Fraction of cycle	Type of load	Radial (N)	Thrust (N)	Speed (R.P.M)	Service factor
1/10	Heavy shocks	2000	1200	400	3.0
1/10	Light shocks	1500	1000	500	1.5
1/5	Moderate shocks	1000	1500	600	2.0
3/5	No shock	1200	2000	800	1.0

Assume radial and axial load factors to be 1.0 and 1.5 respectively and inner race rotates.

15   Design an overhung crankshaft with two main bearings and a flywheel in between them for an I.C engine, cylinder 0.24m x0.28m. The flywheel weighs 26kN. The maximum pressure is 2.12 MPa. The torsional moment is maximum when the crank is at 35^0 from I.D.C., while the pressure is 1.05MPa. Assume missing data.

16   Design a connecting rod for a single cylinder four stroke diesel engine with following specifications:
Power=7.5kW, Mechanical Efficiency = 80%, weight of reciprocating parts=20N, Length of Connecting rod=0.30m, Speed = 1500rev/min with a possible over speed of 2500rev/min. Assume suitable data.

17   Design a crane hook with the useful load lifting capacity of the crane as 120kW. The weight of the hook is 20kN.

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FACULTY OF ENGINEERING

B.E. (AE) VI - Semester (AICTE) (Backlog) Examination, March / April 2022
Subject: Design of Automotive Components

Time: 3 Hours   **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions   **(10 x 2 = 20 Marks)**

1. What are the differences between Dry and Wet Liner?
2. Enumerate the advantages and disadvantages of aluminum piston.
3. What is Wahl factor? Why is it used?
4. Differentiate between open coiled and closed coiled helical springs.
5. State any two advantages of hydrodynamic bearings over hydrostatic bearings.
6. Define eccentricity ratio in hydrodynamic journal bearing.
7. State the fundamental law of gearing
8. List out any four advantages of chain drive over belt drives
9. What are the important parameters necessary for the selection of a particular drive for power transmission?
10. Sketch Ray-diagram of a gear box.

PART – B

Note: Answer any five questions   **(5 x 10 = 50 Marks)**

11. Design a cast iron piston for single acting four stroke engine for the following specifications: Cylinder bore = 100 mm; Stroke = 120 mm, Maximum gas pressure = 5 N/mm^2 Break mean effective pressure =0.65N/mm^2; Fuel Consumption = 0.23 Kg/KW/hr Speed = 2200 rpm.

12. A semi-elliptical truck spring has 12 leaves, of which two are full length leaves. The spring supports are 0.7m apart. The width of the central band is 80 mm and the load on the spring is 20kN. The permissible stress is 460 MPa. The ratio of the 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 pre-stressed. Take E = 2.1 x 10^5 MPa.

13. A radial ball bearing has a basic load rating of 50 kN. If the desired rating life of the bearing is 6000 hrs, what equivalent radial load can the bearing carry at 500 RPM?

14. A Pinion rotating at 600 rpm drives a cast iron spur gear at a transmission ratio of 4:1. The allowable static stresses for the bronze pinion and cast iron gear are 84 MPa and 105 MPa respectively. The pinion has 16 standard 20^0 full depth involute teeth of module 8 mm. The face width of both the gears is 90mm. Find the power that can be transmitted from the standpoint of strength.

15. Explain Hotchkiss drive & Torque tube drive.

16. a) Explain the following: i) Thickness of the cylinder wall (ii) Bore and length of cylinder (iii) Cylinder flange and studs (iv) Cylinder head.
    b) What is nipping in leaf spring? Explain with neat sketch?

17. A Journal bearing of 100mm in dia and 150mm long carrier a radial load of 8KN at 12 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.

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FACULTY OF ENGINEERING

B. E. (CSE) VI – Semester (AICTE) (Backlog) Examination,

March / April 2022

Subject: Complier Design

Time: 3 hours   **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(10 x 2 = 20 Marks)**

1. Give the general format of LEX Program.
2. Eliminate Left Recursion from E->E+T T   T->T* F F.
3. What is Inherited attribute?
4. What is Activation Records? What are its contents?
5. What is a dead code? Explain dead code elimination with an example.
6. What is Cross Complier?
7. Write the Rules to compute Follow set.
8. Construct DAG for a+a*(b-c)+(b-c)*d.
9. Write about type checking?
10. Write about the different Parameter Passing Mechanism.

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 Explain in brief the different phases of a compiler with an example?

12 Explain the construction of SLR parse table for the following grammar

$E \rightarrow E + T \mid T$

$T \rightarrow T * F \mid F$

$F \rightarrow (E) \mid i$

13 Explain symbol table organization.

14 Discuss and analyze all the allocation strategies in run time environment.

15 Write short note on Basic blocks and their construction.

16 (a) Translate the assignment statement a[i] = b*c – b*d into quadruples, triples and indirect triples.

(b) Write about Type Equivalence.

17 Write about

(a) Peephole Optimization

(b) Bootstrapping

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FACULTY OF ENGINEERING
B.E (Civil) VI - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Steel Structures

Time: 3 Hours   Max. Marks: 70

(Missing data, if any may be suitably assumed)

PART – A

Note: **Answers all questions**.   **(10 x 2 =20 Marks)**

1   List out the hot rolled sections used in practice.
2   Define strength of a bolt using relevant formulae.
3   Explain three modes of failure in case of tension members.
4   What is lug angle? Explain with diagram.
5   Differentiate between web buckling and web crippling.
6   Define section modulus, plastic modulus and shape factor using relevant formulae.
7   Define slenderness ratio and effective length of a compression member.
8   How do you decide the thickness of lacing bar in compression member?
9   Calculate live load for a roof truss of 15m span and pitch of 1/5.
10 What are the load combinations that are usually considered for truss analysis?

PART - B

Note: Answers any five questions.   **(5 x 10 = 50 Marks)**

11. Calculate the strength of 20mm$\varnothing$ bolt of grade 4.8 for lap joint. The main plates can be joined are 16mm thick of Fe410 grade. Also calculate the number of bolts required if the service load is 300kN.

12. Design a double angle tension member connected on each side of 10mm think gusset plate to carry an axial factored load of load of 300KN. use M20 bolts of grade 4.6.

13. Design a laterally supported beam of effective span 5.6m subjected to a working load 30kN/m. Assume the ends to be simply supported. Adopt Fe410 plates use limit state method.

14. Design a built up column consisting of two channels back to back to carry a factored load of 1000KN. Design suitable lacing. Effective column height is 4.5m. Use Fe410 grade steel. Design by limit state method.

15. Design a slab base for a column ISHB 350 to carry a factored load of 900kN. Assume the load is transferred to base plate by welded connection, the column end and base plate are not machined for bearing. Take Fe410 grade steel and M25 grade concrete. Use limit state method.

16. The trusses for a factory building are spaced @5m c/c and the purlins are spaced @ 2m c/c. The pitch of the truss is ¼ and span of roof is 12m. The vertical load from roof sheets is 200N/m2 and wind load normal to roof is 1500 N/M2. Design a channel section purlin.

17. Write short notes on the following:
    (a) Design principles of principal rafter.
    (b) How limit state method differs from working stress method.
    (c) Block Shear.

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FACULTY OF ENGINEEERING
B.E. (EEE) VI - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Electrical Machines - III

Time: 3 Hours   Max marks: 70
(Missing data, if any may be suitably assumed)

PART – A
Note: Answers all questions.   **(10 x 2 = 20 Marks)**

1. Why alternator are rated in KVA rather than in KW?
2. Define Pitch factor and distribution factor of a synchronous machine.
3. A 50Hz alternator has a flux of 0.1 Wb/pole, sinusoidally distributed. Calculate the rms value of the emf generated in one turn of the winding, which spans 3/4 of a pole pitch.
4. List the advantages of connecting synchronous generators in parallel.
5. What do you understand by Hunting and how is it prevented?
6. Find the frequency of emf generated in a 6 - pole alternator running with 1440rpm.
7. Define (a) Transient state stability (b) Steady state stability.
8. What is meant by synchronizing power?
9. Explain in brief, any two operational modes of Switched Reluctance Motor (SRM).
10. What is difference between brushed and brushless DC motor?
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PART - B
Note: Answers any five questions.   **(5 x 10 = 50 Marks)**

11a) A 500 KVA, 1100V 50 HZ star connected 3 phase alternator has armature resistance of 0.1Ω/phase and synchronous reactance of 1.5 Ω/ phase. Find its voltage for (a) unity P.F. (b) 0.9 lagging (c) 0.8 leading. Also calculate the voltage regulation in each case.
  b) Derive the e.m.f. equation of Alternator.

12 a) Explain clearly what is meant by synchronous impedance of an alternator and how it can be determined experimentally.
  b) A 3-Φ, 200KVA, 400V, 50Hz alternator has per phase armature resistance and synchronous reactance of 0.1Ω and 1.2Ω respectively. Determine the induced emf when the machine is delivering rated current at a load power factor of unity. Draw the phasor diagram also.

13 a) What are the starting methods of a synchronous motor? Describe in detail.
  b) With suitable diagrams, explain how a synchronous condenser is used in a power system?

14. a) Transient stability of synchronous machine connected to infinite bus.
  b) Obtain the Swing Equation for Determining the Transient Stability in synchronous generator

15. a) Explain the torque speed characteristics of brushless D.C. motor.
  b) Derive the torque expression of an SRM.

16. a) Explain the construction and working of Permanent Magnet Synchronous Motor (PMSM).
    b) Two 3-ph alternators are working in parallel with the following particulars:
       Alternator 1: $Z_1 = (0.2+j2)$ ohms/ph; $E_1 = (2000+j0)$ V/ph
       Alternator 2: $Z_2 = (0.2+j2)$ ohms/ph; $E_2 = (2200+j100)$ V/ph
       Load: $Z_L = (3+j4)$ ohms/ph.
       Determine the kW output and power factor of each alternator

17. a) What is armature reaction? Explain the effect of armature reaction on the terminal voltage of an alternator.
    b) Give the analysis of V & Inverted V Curves.

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FACULTY OF ENGINEERING
B.E. (EIE) VI - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Biomedical Instrumentation

Time: 3 Hours   **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(10 x 2 = 20 Marks)**

1 What is a use of Fluroscopy?
2 What are the safety codes used during bioelectric monitoring?
3 State the Doppler principle used in blood flow measurement.
4 Explain bremsstrahlung X-ray radiation.
5 List any four applications X-ray radiation.
6 What is meant by medical imaging?
7 Define Threshold of perception.
8 Mention any two characteristics of Biomedical Instrument.
9 What are the various heart sounds in ECG?
10 Define Microshock and Macroshock.

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 Explain in detail mechanical conduction of heart.

12 Explain Recorders & display devices for Bio medical applications.

13 List the advantages and disadvantages of Laser surgery and CT scan.

14 Explain briefly phonocardiogram and Heart Sounds.

15 Distinguish between EEE and ECG in detail.

16 Explain clearly the blood flow measurement using the electromagnetic principle.

17 Explain equipotential grounds & earth free monitoring.

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FACULTY OF ENGINEERING
B.E. (ECE) VI - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Digital Communication

Time: 3 Hours   **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(10 x 2 = 20 Marks)**

1. Draw the basic block diagram of Digital Communication system.
2. What are the advantages of ADM system?
3. Define information and entropy.
4. Define the terms priori and posteriori entropies.
5. Write a short note on BCH codes.
6. What is the hamming distances? Mention its significance.
7. What are the difference between BPSK and QPSK?
8. What are the advantages of M-ary signaling scheme?
9. Draw the block diagram of the frequency hopping spread spectrum.
10. Compare direct sequence and frequency hopping spread spectrum.

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 (a) Derive the overall signal to noise power ratio in a Delta Modulation System.
   (b) Explain how adaptive delta modulation overcomes the problem of DM system.

12 (a) Illustrate the Huffman source coding procedure for a source that emits '6 symbols with probabilities given as 0.3, 0.2, 0.16, 0.12, 0.12 and 0.1. Determine the coding efficiency and redundancy.
   (b) What is mutual information? Calculate the mutual information of Binary erasure channel.

13 The generator polynomial of (7,4) cyclic code is g(x) = 1+x+x3. Find the code words in systematic and non-systematic methods for the message vectors 1010,1100 & 1101.

14 (a) Draw the block diagram of DPSK modulator and explain how synchronization problem is avoided for its detection.
   (b) Derive the expression for probability of error of coherent ASK signaling scheme.

15 (a) Explain the characteristics of PN sequence.
   (b) What are the applications of spread spectrum techniques? List out the advantages and disadvantages of spread spectrum.

16 (a) Explain encoding and decoding of cyclic codes using shift registers.
   (b) Explain about synchronization methods.

17 Write a short note on:
   (a) Adaptive Delta Modulation   (b) Tracking of FHSS   (c) Linear block codes.

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FACULTY OF ENGINEERING
B.E. (MECH) VI - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Metal Cutting and Machine Tools

Time: 3 Hours **Max. Marks: 70**
(Missing data, if any, may be suitably assumed)
PART – A
Note: Answer all questions. **(10 x 2 = 20 Marks)**

1   What are the desirable characteristics of cutting tool materials?
2   Name various cutting tool materials.
3   Why cemented carbide is considered as an useful tool material?
4   List the types of chips formed during machining.
5   Explain the criteria for tool wear.
6   How a grinding wheel is selected?
7   Differentiate between plain milling and universal milling machine.
8   Summarize burring process.
9   Explain method of gear generation.
10 Explain the concept of AJM process.

PART – B
Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 Explain the nomenclature of single point cutting tool in detail by ORS system.

12 In orthogonal turning of a 50mm dia mild steel bar on a lathe, the following data were obtained: Rake angle=15°, Cutting speed =100m/min, Feed=0.2mm/rev, Cutting force=180N, Feed force=60N. Calculate the shear plane angle, coefficient of friction, cutting power, the chip flow velocity and shear force, if the chip thickness=0.3 mm.

13 Explain the sources of heat generation in metal cutting and also the measurement of interface temperature with the help of tool-work thermocouple method.

14 (a) Discuss the working of a horizontal milling machine.
    (b) List out various taper turning methods on lathe and explain any one of them in detail.

15 (a) Distinguish between conventional machining and unconventional machining process.
    (b) Explain 3-2-1 location principle.

16 Explain in detail about the concept, working principle and applications of Electron-Beam Machining (EBM) with a neat sketch.

17 Write short notes on:
    (a) Chip breakers
    (b) Thread rolling process
    (c) Jigs and fixtures.

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FACULTY OF ENGINEERING

B.E. (A.E) VI – Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Design of Automotive Components

Time: 3 Hours   **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(10 x 2 = 20 Marks)**

1. Explain the different parts of a tappet valve with a simple sketch.
2. What are the functions of piston liners?
3. What are concentric springs?
4. Explain nipping of leaf springs briefly.
5. What are the different sources of dynamic loading?
6. What do you understand by internal bevel gears?
7. What are the advantages of gear drive?
8. What is the mathematical formula for calculating eccentricity ratio?
9. Explain viscosity of lubricants.
10. How is the strength of bevel gears calculated?

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11. A four stroke diesel engine has the following specifications: Brake power = 5 Kw; Speed = 1200 rpm; Indicated mean effective pressure =0.35 N/mm^2; Mechanical efficiency = 80%. Determine the (a) bore and length of the cylinder (b) thickness of the cylinder head.

12. Explain in detail about the working of the valve gear mechanism.

13. Design a close coiled helical compression spring for a load of 2000N to 2750 N. The axial deflection of the spring for the load range is 6mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity G = 84KN/mm^2. Neglecting the effect of stress concentration, draw a fully dimensioned sketch of the spring, showing details of the finish of the end coils.

14. What are the properties to be considered while selecting the materials for sliding contact bearings?

15. The load on the journal bearing is 150 KN due to turbine shaft of 300m diameter running at 1800 rpm. Determine the (a) length of the bearing if the allowable bearing pressure is 1.6 N/mm^2 and (b) The amount of heat to be removed by the lubricant per minute if the bearing temperature is 60^0 and viscosity of the oil at 60^0 is 0.02 kg/m-s and the bearing clearance is 0.25 mm.

16. A single row angular contact ball bearing number 310 is used for an axial flow compressor. The bearing is to carry a radial load of 2500 N and an axial load or thrust load of 1500N. Assuming light shock load, determine the rating life of the bearing.

17. A pair of straight teeth spur gears is to transmit 20KW when the pinion rotates at 300 rpm. The velocity ratio is 1: 3. The allowable static stresses for the pinion and gear materials are 120 MPa and 100 MPa respectively. The pinion has 15 teeth and its face width is 14 times the module. Determine the (a) module, (b) face width, (c) pitch circle diameters of both the pinion and the gear from the strength standpoint, Taking the effect of dynamic loading also. The tooth form factor y can be taken as follows:

Y = 0.154 – 0.912 **/** no. of teeth and velocity factor C as $C = \dfrac{3}{3+v}$ where v is in m/s.

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FACULTY OF ENGINEERING

**B.E. (CSE) VI - Semester (CBCS) (Backlog) Examination, March / April 2022**

Subject: Design and Analysis of Algorithms

Time: 3 hours   Max. Marks: 70

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(10 x 2 = 20 Marks)**

1   If $f(n)=5n^2+6n+4$ than prove that $f(n)$ is $O(n^2)$.
2   Explain the Mid-square hashing method.
3   Differentiate knapsack problem and O/1 knapsack problem.
4   Write an algorithm for binary search using Divide-and-Conquer.
5   Explain the properties of strongly connected components.
6   State the principal of optimality.
7   Write the applications of Branch and Bound problem.
8   List the applications of backtracking.
9   Distinguish between deterministic and non deterministic algorithm.
10 What is meant by Satisfiability?

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 (a) Write the pseudo code for Binary Search and analyze the time complexity.
   (b) Write an algorithm to form a heap using 'Heapify' and discuss about its time complexity.

12 (a) Find optimal merge pattern for ten files whose record lengths are
          28, 32, 12, 5,84, 53, 91, 35, 3 and 11.
   (b) Trace the quick sort algorithm to sort the list C, O,L, L, E, G, E in alphabetical order.

13 Compute all pair shortest path for following graph shown in figure
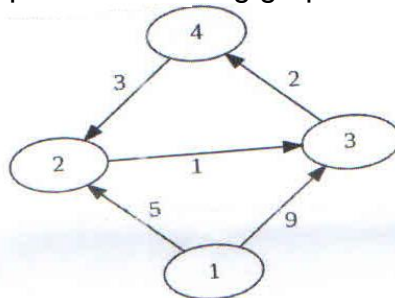
14 What are Hamiltonian cycles? Present an algorithm that finds all the Hamiltonian cycles of a given graph.

15 Explain NP-Hard Scheduling Problems.

16 (a) Explain briefly Hash functions.
   (b) How to find articulation point and Bi-connected components from given graph? Explain with an example.

17 (a) Write short notes on 3-SAT problem.
   (b) Consideration the following instance of knapsack problem n = 7, m = 15
       (P1, P2, P3, P4, P5, P6, P7) = (10, 5, 15, 7, 6,18, 3) and
      (W1, W2, W3, W4, W5, W6, W7) = (2, 3, 5, 7, 1, 4, 1) solve by using Greedy approach.

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FACULTY OF ENGINEERING
B.E. (IT) VI - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Design and Analysis of Algorithms

Time: 3 Hours   Max. Marks: 70

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(10 x 2 = 20 Marks)**

1. Define the term Algorithm and its characteristics.
2. What is the time complexity of binary search?
3. What is the control abstraction for Divide and Conquer method?
4. Differentiate feasible and optimal solution.
5. Define optimal binary search tree.
6. Discuss about depth first search with an example.
7. What is graph coloring problem?
8. Explain about explicit and implicit constraints of 8 queens problem.
9. Under what situation(s), a problem becomes NP-complete.
10. What is a decision problem?

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11. (a) Write Union and Find Algorithm.

    (b) Discuss two methods to resolve collision during hashing.

12. (a) Obtain set of optimal Huffman codes for the messages (m1-m2) with relative frequencies (q1-q2)=(4,6,8,10,12,20,25).

    (b) Explain Job Sequencing with deadlines problem with an example. Give greedy solution.

13. (a) Explain Multistage graph with dynamic programming.

    (b) Explain about Biconnected component with example.

14. (a) Explain Lower Bound Theory.

    (b) What is backtracking? Explain how it is used to solve 8-queen's problem.

15. (a) State and explain cooks theorem.

    (b) Is node covering NP-complete? Discuss.

16. (a) Let Profits (P1,P2,P3,P4) = (100,10,15,27), and deadlines (D1,D2,D3,D4)) = (2,1,2,1) Find the feasible solution and total profit Gain?

    (b) Explain Prim's algorithm.

17. Solve the following instance of optimal cost binary search tree.

    n=4, (a1-a4)=(do,if,int,while) P(1:4)=(2,2,3,1) Q(0:4) =(2,3,2,1)

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FACULTY OF ENGINEERING
B.E. III / IV (Civil) II - Semester (NON-CBCS) (Backlog) Examination,
**March / April 2022**
Subject: Soil Mechanics

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

(Missing data, if any, may be suitably assumed)
PART – A
Note: Answer all questions.   **(25 Marks)**

1 Differentiate Discharge Velocity and Seepage Velocity.
2 Explain the mode of shear force, and draw typical stress – strain curve for specimens failed by brittle failure and plastic failure.
3 Draw a slip circle for a failure plane in a slope and show the forces involved.
4 What do you mean by Thixotropy?
5 What is the use of consolidation test data?
6 What is the quick sand condition? List the conditions for the occurrence of quick sand condition.
7 In the case of c and phi soil, the slope failure of an infinite slope never takes place, if the angle of slope is equal to the angle of internal friction of the soil. Why?
8 List various field compaction methods along with their suitability.
9 The diameter of the Mohr circles drawn at incipient failure condition for the results of a triaxial test performed on a soil is the same and equal to 150 kPa to a scale. Find the shear strength parameters of the soil.
10 A homogeneous gravity retaining wall supporting a cohesionless backfill is shown in the figure. The lateral active earth pressure at the bottom of the wall is 40 kPa. The maximum weight of the wall (expressed in km per length) required to prevent tit from overturning about its toe (point P) is
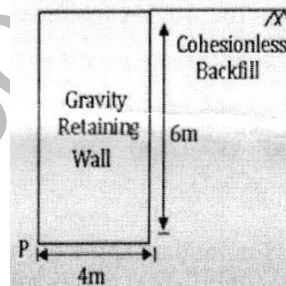
PART – B
Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 (a) A soil mass in its natural state is partially saturated having a water content of 17.5 percent and void ratio 0.87. Determine the degree of saturation, total unit weight, dry unit weight what is the weight of water required to make a mass of 10 m^3 volume to get saturated assume G = 2.69.
   (b) (i) Derive the relation between Porosity (n) and Void ratio (e).
   (ii) Write the formula for Flow Index and Plasticity Index.

12 (a) The groundwater table in a deep deposit of sand is located at 4m from the ground level. Due to the capillary action, sand is saturated for a height of 1 m from the water table. The degree of saturation (s) of the sand above the capillary fringe is 40%. If the specific gravity of solids and average void ratio of the sand are 2.68 and 0.72 respectively, obtain the effective stress at 2 m, 3 m, 4 m and 10 m from the ground level.

(b) Derive Laplace's equation of continuity for two-dimensional steady flow of water through an isotropic soil.

13 (a) Sandy soil in a borrow pit has unit weight of solids as 26.3 kN/m^3, water content equal to 11% and bulk unit weight equals to 16.4 kN/m^3. How many cubic meter of compacted solid cold be constructed of 3500 m^3 of sand excavated from the borrow pit, if the required value of porosity in the compacted fill is 30%.

(b) Discuss the effect of compaction on various engineering properties of soils.

14 (a) A 5m thick saturated soil stratum has a compression index of 0.25 and coefficient of permeability 3.2*10$^{(-3)}$ mm/sec. If the void ratio is 1.9 m at vertical stress of 0.15 N/mm^2. Compute the void ratio when the vertical stress is increased to 0.2N/mm^2 also calculate settlement due to above stress increase and time required for 50% consolidation and 90% consolidation.

(b) Explain with neat sketch Taylor's $\sqrt{T}$ method for the determination of coefficient of consolidation.

15 (a) A cylindrical sample of soil having a cohesion of 80kN/m^2 and an angle of internal friction of 20° is subjected to a cell pressure of 100 kN/m^2 determine (i) The maximum deviator stress at which the sample will fail (ii) the angle made by the failure plane with the axis of the sample.

(b) Sketch and discuss the stress- strain relationship for dense sand and loose sand.

16 (a) A canal with a depth of 5m has banks with slope 1:1 the properties of soil are C=20 kN/m^2, ϕ= 15°, e=0.7, G=2.6. Calculate factor of safety with respect to cohesion (i) when canal runs full and (ii) it is suddenly and completely emptied.

(b) Describe any four techniques for slope protection with clear sketches.

17 (a) Explain the difference between Rankine's and Coulomb's theory of lateral earth pressures. How does Rankine's approach differ from Coulomb's approach in the estimation of active earth pressure on a retaining structure?

(b) A 9m high retaining wall with a vertical face is supporting a backfill 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 3 m include c=0 kN/m^2; $\phi = 33°$; γ= 17 kN/m^3 and those for soil from 3m to 9m include c=0 kN/m^2; ϕ=40°; unit weight= 20.50 kN/m^3. 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.

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FACULTY OF ENGINEERING
B.E. III / IV (EIE) II - Semester (NON-CBCS) (Backlog) Examination, March / April 2022
Subject: Digital Signal Processing

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

(Missing data, if any, may be suitably assumed)
PART – A

Note: Answer all questions.   **(25 Marks)**

1. Write the Properties of linear convolution.
2. Define a power signal and Energy signal
3. Write the Properties of ROC in Z transform
4. Distinguish between DTFT and DFT.
5. Derive the relation between s-plane and z-plane
6. Distinguish between FIR and IIR filters.
7. How is FFT computationally efficient?
8. Write the expression for Hanning window.
9. How is FFT computationally efficient
10. Explain the various Applications of DSP Processor

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 (a) Determine the response of causal system.
     $y(n)-y(n-1) = x(n) + x(n-1)$ to input $x(n) = u(n)$ and $x(n) = 2^{-n}u(n)$ test its stability

  (b) Determine the IZT of $X(z) = 1/(1-Z^{-1})(1-Z^{-1})^2$.

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

13.   Determine the output response $y(n)$ of $x(n) = \{3, 2, 2, 1\}$ and $h(n) = \{1, 1, 1\}$ by using
     a) Linear convolution
     b) Circular convolution   and
     c) Circular convolution with zero padding.

14.   Design a Chebyshev digital filter using the impulse invariant transformation.

     The specifications of the desired low-pass filter are
           $0.9 \leq |H(\omega)| \leq 1; \quad 0 \leq \omega \leq 0.25\pi$
           $|H(\omega)| \leq 0.24; \quad 0.5\pi \leq \omega \leq \pi$

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

16. Explain the architecture of TMS320C5x DSP Processor with neat diagram

17   Write short notes on:
     a) Harvard Architecture
     b) Sampling, Quantization, aliasing

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FACULTY OF ENGINEERING
B.E. III / IV (ECE) II Semester (NON-CBCS) (Backlog) Examination,
March / April 2022
Subject: Digital Communication

Time: 3 Hours   **Max. Marks: 75**
(Missing data, if any, may be suitably assumed)
PART – A
Note: Answer all questions.   **(25 Marks)**

1 What are the advantages and disadvantages of digital communication system?
2 What are commonly used compression laws in a compander?
3 What is a binary symmetric channel?
4 Define the terms priori and posteriori entropies.
5 The generator matrix for (6,3) block code is $i = \begin{bmatrix} 100 & 011 \\ 010 & 101 \\ 101 & 110 \end{bmatrix}$ find the code vector

   for message block (1,0,1).
6 What is the hamming distance? Mention its significance.
7 Mention the advantages of PSK.
8 What is correlation receiver and explain?
9 Draw the block diagram of the frequency hopping spread spectrum.
10 Differentiate between fast and slow frequency hopping.

PART – B
Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 (a) Explain the working of PCM with a neat block diagram.
   (b) What is quantization noise and derive the expression for the same?

12 (a) Illustrate the Huffman source coding procedure for a source that emits '6
       symbols with probabilities given as 0.3, 0.2, 0.16, 0.12, 0.12, and 0.1.
       Determine the coding efficiency and redundancy.
   (b) What is mutual information?

13 Consider a (7,4) linear block code whose generator matrix is given below

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

   (i) Find all code vectors of this code
   (ii) Find the parity check matrix of this code
   (iii) Find minimum weight of this code.

14 (a) Explain binary PSK and QPSK with corresponding equations and
       constellation diagrams.
   (b) Compare various basic digital modulation techniques.

15 (a) Explain the direct sequence spread spectrum and discuss its advantages.
   (b) Explain tracking in frequency hopping signals.

16 (a) Explain the demodulation techniques used in frequency hopped spread spectrum.
   (b) Explain source coding theorem.

17 Write a short note on:
   (a) Companding in PCM
   (b) Need for MSK modulation
   (c) Syndrome.

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FACULTY OF ENGINEERING
BE III / IV (MECH/PROD) II - Semester (NON-CBCS) (Backlog) Examination, March / April 2022
Subject: Machine Design

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

(Missing data, if any, may be suitably assumed)
PART – A
Note: Answer all questions.   **(25 Marks)**

1 How to avoid buckling in compression springs?
2 What are the different types of springs and where are the springs of non-circular cross sections used?
3 Write two preventive measures to avoid gear tooth failure.
4 What is herringbone gear? Draw a neat sketch and explain.
5 Define the terms: (a) equivalent bearing load
   (b) reliability related to Rolling contact bearings.
6 Compare journal bearings with antifriction bearings.
7 What is the function of a flywheel and mention two applications?
8 What is the function of a valve spring in an I.C. Engine?
9 Mention the criteria for the design of C- clamp.
10 Write the relationship between moment and curvature for trapezoidal section.

PART – B
Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

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

12 A pair of bevel gears is required to transmit 12 KW power at 500 rpm from a motor shaft to a machine shaft. The speed reduction is 4:1 and the shafts are inclined at 60°. The pinion is to have 24 teeth with pressure angle 20° and is made of cast iron gear with static stress of 55 N/mm^2. The pinion is mounted mid way on the shaft which is supported between two bearings having a span of 200 mm. Design the gear drive.

13 A full journal bearing of 50 mm diameter and 100 mm long has bearing pressure of 1.5 Mpa the speed of the journal is 1000rpm, ratio of journal diameter to diametric clearance(d/c) is 1000. The bearing is lubricated with oil whose absolute viscosity at the operating temperature of 75°C may be 0.11 kg/m-sec. Determine (i) amount if the artificial cooling required (ii) the mass of the lubricating oil required if the temperature difference is 12° C, specific heat of the oil 1900 J/kg/$^\circ$C. Take heat dissipation coefficient as 500 W/m^2/$^\circ$C.

14 Design a plain carbon steel centre crank shaft for a single acting 4 stroke single cylinder engine for the following data;
Bore 400mm, stroke 600mm, Engine speed 200 rpm, mean effective pressure 0.5 MPa, max. Combustible pressure 2.5 MPa, Weight of the Flywheel used as pulley 50KN, Total belt pull 6.5 KN. When the crank has turned through 35^0 from TDC the pressure on the piston is 1 MPa and the torque on the crank is maximum. The ratio of connecting rod length to the crank radius is 5.Assume any other data required for the design.

15 The bed diameter of a crane hook is 90mm.The cross section of the hook is trapezoidal with depth equal to 180mm.The width of the section at the larger end is 120mm and at the smaller end is 90mm.The load on the hook is 150KN.Determine the Maximum stresses in tension and compression.

16 A ball bearing is operating on a work cycle consists of three parts as follows. A radial load of 2500N at 1200 rpm for one quarter cycle. A radial load of 4500N at 900 rpm for on half cycle and Radial load of 2000N at 1440 rpm for the remaining cycle. The Expected life of the bearing is 12000 hr. calculate the dynamic load carrying capacity of the bearing.

17 Write short notes on
(i) Design considerations for a gear drive
(ii) Theory of bending in different sections with sketches
(iii) Piston skirt

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FACULTY OF ENGINEERING
B.E. III / IV (CSE) II - Semester (NON-CBCS) (Backlog) Examination, March / April 2022

Subject: Computer Networks

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

(Missing data, if any, may be suitably assumed)
PART – A
Note: Answer all questions.   **(25 Marks)**

1   List out the functions of the network layer.
2   Define Load Shedding.
3   Define tunneling.
4   Define subnet masking.
5   List the different timers used in TCP.
6   Describe the UDP header.
7   Write down the principal DNS resource record types.
8   List out the MIME content types and example subtypes.
9   Define Input / Output Multiplexing.
10 Describe the Socket options, any three.

PART – B
Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 (a) Comparison of Datagram and Virtual-Circuit networks.
   (b) Define Traffic shaping? Compare various Traffic shaping Approaches

12 (a) Write down the ways networks can differ.
   (b) Describe the following Internet control protocols: ICMP, ARP.

13 (a) Explain the connection establishment and connection release in transport
       layer.
   (b) Discuss the congestion control mechanism in TCP.

14 (a) Compare the PoP and IMAP with respect to use and functioning.
   (b) Write short notes on SMTP.

15 (a) Discuss about the Elementary Socket System calls. Explain briefly.
   (b) Compare the SPP- Out-of-Band Data and TCP- Out-of-Band Data.

16 (a) Describe OSPF gateway routing protocol.
   (b) Write short on Telnet and FTP.

17 (a) Write short notes on Internet super server.
   (b) Write short on Distance vector routing.

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