

FACULTY OF ENGINEERING
B.E. VI - Semester (AICTE) (Civil) (Main) Examination, September 2021

Subject: Environmental Engineering

Time: 2 Hours

Max. Marks: 70

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

PART – A

Note: Answer any five questions.

(5x2 = 10 Marks)

- 1 What is meant by population forecast and why is it done as a first step while planning for a water supply scheme?
- 2 List the various sources of surface and ground water resources.
- 3 List the advantages of a slow sand filter.
- 4 What is meant by softening of water and list the various techniques involved?
- 5 List various shapes of sewers along with neat sketches.
- 6 Describe C.O.D. briefly.
- 7 Discuss in brief, the principle of operation of activated sludge process.
- 8 Describe briefly, the principle of operation of septic tanks.
- 9 What is air pollution meteorology?
- 10 List the various measures to control noise pollution.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) What is a coagulant? Write about various chemicals used for coagulation.
(b) A rectangular sedimentation tank treats 1.8MLD of raw water. Assuming detention period as 4 hours and velocity of flow as 8 cm/min and depth of tank as 4.2m with 1.2m reserved for deposition of sludge, determine the width and length of tank.
- 12 (a) Discuss the theory behind design of distribution networks by Hardy-Cross method.
(b) Describe any two methods for disinfection of water for drinking purpose.
- 13 (a) What is a trap? Describe various types of traps used with the help of diagrams.
(b) Explain the various hydraulic formulae used for the design of sewers.
- 14 (a) Describe trickling filters with the help of a neat sketch.
(b) Describe the functioning of a septic tank with the help of a neat sketch.
- 15 (a) Discuss air pollution meteorology.
(b) Discuss the impacts of noise.
- 16 (a) Describe various methods for disposal of sewage.
(b) Describe the functioning of contact beds with the help of a neatly labelled diagram.
- 17 (a) Discuss the operation and maintenance of slow sand filters with the help of a neat sketch.
(b) Describe the disposal of Municipal Solid Waste (MSW) in detail by incineration and pyrolysis.

FACULTY OF ENGINEERING**B.E. VI - Semester (AICTE) (EEE) (Main) Examination, September 2021****Subject: Power Systems - II****Time: 2 Hours****Max. Marks: 70****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer any five questions.****(5x2 = 10 Marks)**

- 1 Define the term 'surge impedance loading' of line.
- 2 Write the advantages and disadvantages of Corona.
- 3 What is reactive power compensation? Write its benefits.
- 4 Show that the approx per unit change in voltage equals the ratio of change in reactive power to the short circuit capacity of the bus.
- 5 Write the equation and also the phasor diagram to obtain the phase voltages using symmetrical components.
- 6 Two generating stations having short circuit capacities of 1500 MVA and 1000 MVA respectively and operating at 11 kV are linked by an interconnected cable having a reactance of 0.6 ohm per phase, determine the short circuit capacity of each station.
- 7 The line-to-ground voltages on the high voltage side of a step-up transformer are 100 kV, 33 kV and 38 kV on phases a, b and c respectively. The voltage of phase a leads that of phase b by 100° and lags that of phase c by 176.5° . Determine negative sequence of the voltage.
- 8 Draw the connections of sequence networks for line to ground fault through an impedance which is the parallel combination of Z_i and Z_p .
- 9 What is a travelling wave? Draw the characteristics of it?
- 10 Why a travelling wave suffers reflection when it reaches a change in impedance of terminated with different line parameters?

PART – B**Note: Answer any four questions.****(4x15 = 60 Marks)**

- 11 (a) What are short, medium and long transmission lines? When is the voltage regulation of transmission line negative?
(b) Find the sending end voltage and voltage regulation of a 250 km, 3-ph, 50 Hz, transmission the delivering 25 MVA, at 0.8 p.f. lag to a balanced load at 132 kV. The inductance of the line is 1.25 mH/km/ph and the shunt capacitance is $0.0095 \mu\text{f}/\text{km}/\text{ph}$. Use nominal π method.
- 12 A 3-ph induction motor delivers 500 HP at an efficiency of 90% when the operating p.f is 0.8 lag. A loaded synchronous motor with a power consumption of 120 KW is connected in parallel with the induction motor. Calculate the necessary KVA and the operating p.f. if the synchronous motor if the overall p.f. is to be unity.
- 13 (a) Show that the p.u impedance of a transformer is same for primary and secondary side.
(b) Two generators rated at 12 MVA, 13.2 kV and 25 MVA, 13.2 kV are connected in parallel to a busbar. They feed supply to two motors of inputs 8 MVA and 14 MVA respectively. The operating voltage of motors is 12.5 kV. Assuming base quantities as 60 MVA and 13.8 kV draw the reactance diagram. The per cent reactance for generators is 14% and that for motors is 19%.

- 14 (a) What are functions of series capacitor when adoleol to transmission line.
(b) Two 50 MVA, 50 Hz, 11 kV alternators with sub-transient reactance $x'' = h0.1$ p.u. and a transformer of 40 MVA 11 kV and reactance of 0.08 p.u. are connected to a bus A. Another generator 60 MVA, 11 kV alternator with reactance of 0.12 p.u. is connected to bus B. Bus A and B are interconnected through a reactor of 80 MVA 20 per cent reactance. If a 3-phase fault occurs on the high voltage side of the transformer, calculate the current fed into the fault.
- 15 Derive the wave equation and write its significance.
- 16 (a) Write the advantages of p.u. calculations.
(b) What do you mean by "Tuned lines"?
(c) What is booster transformer? Where it is used?
- 17 Write short notes on:
(a) Thyristor switched capacitors
(b) Power circle diagram.

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FACULTY OF ENGINEERING

B.E. VI - Semester (AICTE) (Instrumentation) (Main) Examination, September 2021

Subject: Biomedical Instrumentation

Time: 2 Hours

Max. Marks: 70

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

PART – A

Note: Answer any five questions.

(5x2 = 10 Marks)

- 1 Define Bio-potential.
- 2 What is the role of ramp generator in optical recorder?
- 3 What is bipolar recording in EEG?
- 4 Write any two characteristics of Bio amplifier.
- 5 Define systolic and diastolic pressure.
- 6 Explain Korotkoff sound.
- 7 Why grid is used in radiography?
- 8 Define endoscopy.
- 9 Define micro shock and macro shock.
- 10 Define "Let Go" current.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

- 11 Explain in detail optical recorder with neat diagram.
- 12 (a) Explain in detail Heart Lung machine with neat diagram.
(b) Explain resting rhythms of EEG.
- 13 (a) Explain catheterization method for measurement of BP.
(b) Differentiate between direct and indirect BP measurement techniques.
- 14 (a) Explain echocardiography.
(b) Explain A and B mode of ultrasound imaging.
- 15 (a) Explain about safety codes and standards used for patients and operators in hospital.
(b) Explain use of isolation transformer for protection of patients.
- 16 (a) Write the advantages and disadvantages of Laser surgery.
(b) Explain in detail Ink jet recorder.
- 17 (a) Differentiate between X-rays and Fluoroscopy.
(b) Write the advantages and disadvantages of CT scan.

FACULTY OF ENGINEERING
B.E. VI - Semester (AICTE) (ECE) (Main) Examination, September 2021

Subject: Digital Communication

Time: 2 Hours

Max. Marks: 70

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

PART – A

Note: Answer any five questions.

(5x2 = 10 Marks)

- 1 What are the advantages and disadvantages of PCM?
- 2 What are commonly used compression laws in a compander?
- 3 What is meant by concept of information and average information?
- 4 Define the terms priori and posteriori entropies.
- 5 Write a note on BCH codes.
- 6 What is hamming distance? Mention its significance.
- 7 Draw the block diagram of a coherent receiver.
- 8 What are the different synchronization methods?
- 9 Draw the block diagram of frequency hopping spread spectrum system.
- 10 List the properties of PN – sequence.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) Explain the working of PCM with a neat block diagram.
 (b) Derive the overall signal to noise power ratio in a Delta modulation 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 (a) 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.
 (b) Write error detection and error correction capabilities of linear block codes.
- 14 (a) Derive an expression for probability of error for coherent ASK signalling scheme.
 (b) Compare various basic digital modulation techniques.
- 15 (a) Explain the characteristics of PN sequence.
 (b) Explain the direct sequence spread spectrum and discuss its advantages.
- 16 (a) Explain encoding and decoding of cyclic codes using shift registers.
 (b) Explain about DPSK with neat block diagram using examples.

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17 Write short notes on the following

- (a) Adaptive Delta Modulation.
- (b) Tracking of FHSS.
- (c) Linear block codes.

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FACULTY OF ENGINEERING
B.E. VI - Semester (AICTE) (M/P) (Main) Examination, September 2021

Subject: Machine Design

Time: 2 Hours

Max. Marks: 70

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

PART – A

Note: Answer any five questions.

(5x2 = 10 Marks)

- 1 What properties of spring materials should have?
- 2 Explain the utility of center bolt, U-clamp, rebound clip and camber in a leaf spring.
- 3 compare the beam strength of spur and helical gears.
- 4 What is Tredgold's approximation in bevel gears?
- 5 What is equivalent dynamic load in rolling contact bearing?
- 6 Draw bearing characteristic curve and indicate the various regions.
- 7 Explain the classification of piston rings.
- 8 Explain the stresses induced in flywheel.
- 9 Write the assumptions made by Winkler Bach while deriving the theory of curved beams.
- 10 Briefly discuss the effect of initial curvature on the analysis of theory of bending of beams.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

- 11 A helical compression spring is required to deflect through 25mm when the external force acting on it varies from 500 to 1000N. The spring index is 8. The spring has square and ground ends. There should be a gap of 2mm between adjacent coils when the spring is subjected to the maximum force of 1000N. The spring is made of cold drawn steel wire with ultimate tensile strength of 1000 MPa, and permissible shear strength is 500 MPa, $G=81370$ MPa. Design the spring calculate: (i) wire diameter (ii) Mean coil diameter (iii) number of active coils (iv) total number of coils (v) solid length (vi) free length.
- 12 A pair of 20° involute straight tooth spur gears to transmit 50kW and reduce the speed from 720 rpm to 180 rpm. The pinion and gear are made from phosphor bronze and cast steel with allowable static stresses 50 N/mm^2 and 70 N/mm^2 respectively. Assuming medium shock conditions design drive completely.
- 13 A cast iron bevel gear has a module of 2.5mm and its pitch diameter is 0.6m. and the pitch angle is 30° and the teeth are 20° full depth. Determine the permissible endurance load.
- 14 A full journal bearing of 50mm diameter and 75mm long supports an overhung shaft, running at 1000 rpm. The room temperature is 28°C and the bearing temperature is 80°C . The viscosity of the oil used is 0.018 kg/m-sec at the operating temperature of 125°C . The Diametral clearance is 0.06mm and the bearing has to operate in still Air without any artificial cooling. Calculate the permissible load on the bearing and the power lost in friction. The heat dissipation coefficient may be assumed as $280 \text{ W/m}^2/^\circ\text{C}$.

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

	Part-I	Part-II
Duration (Seconds)	10	20
Radial Load (kN)	50	20
Axial Load (kN)	10	5
Speed (RPM)	600	1200

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

16 Design the cross section of connecting rod of petrol engine, from the following data: Diameter of piston = 90mm, Length of connecting rod = 300mm, Maximum explosion pressure = 2.2 N/mm², Factor of safety =5, the rod of I-section, with width 4t and depth 5t where 't' is the thickness of the web and flanges. Compare the values of 't' obtained in direct compression and buckling.

17 Design a crane hook for a lifting capacity of 50kN with 50 percent over load.

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FACULTY OF ENGINEERING
B.E. VI - Semester (AICTE) (AE) (Main) Examination, September 2021

Subject: Design of Automotive Components

Time: 2 Hours

Max. Marks: 70

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

PART – A

Note: Answer any five questions.

(5x2 = 10 Marks)

- 1 Describe the function of cylinder head gasket.
- 2 What is tappet? What is the stress in tappet?
- 3 Define the term (i) spring index (ii) Wahl's factor (iii) spring rate.
- 4 Write some practical applications for the various types of springs.
- 5 Define dynamic load carrying capacity of rolling contact bearing.
- 6 Define basic load rating of a ball bearing.
- 7 Which type of gear is used when the shafts are perpendicular to each other?
- 8 Define the terms pitch circle, pressure angle and backlash as applicable to spur gears.
- 9 What are speed reducers in gear box?
- 10 State any four advantages of gear drive over other types of drives.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

- 11 Design the I-section connecting rod for a single cylinder I.C. engine using the following specifications. Diameter of the piston = 100 mm, mass of the reciprocating parts = 2.25 kg, length of the connecting rod = 300 mm, stroke length = 125 mm, speed = 1500 rpm, maximum explosion pressure = 3.5 N/mm² compression ratio = 6, factor of safety = 7, density of the rod material = 8000 kg/m³, yield stress in compression = 330 mpa.
- 12 A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 350 MPa and modulus of rigidity 84 kN/mm², find the axial load which the spring can carry and the deflection per active turn.
- 13 A journal bearing 60 mm is diameter and 90 mm long runs at 450 rpm. The oil used for hydrodynamic lubrication has absolute viscosity of 0.06/ kg/m-s. If the diametral clearance is 0.1 mm, find the safe load on the bearing.
- 14 A bronze spur 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° full depth involute teeth of module 8 mm. The face width of both the gears is 90 mm. Find the power that can be transmitted from the stand point of strength.
- 15 Explain Hotchkiss drive & Torque tube drive.
- 16 (a) Explain what you understand by A.M. Wahl's factor and state its importance in the design of helical springs.
 (b) State the function of the following for an internal combustion engine piston. (i) Ribs (ii) Piston rings (iii) Piston skirt and (iv) Piston pin.

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

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FACULTY OF ENGINEERING
B.E. VI - Semester (AICTE) (CSE) (Main) Examination, September 2021

Subject: Compiler Design

Time: 2 Hours

Max. Marks: 70

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

PART – A

Note: Answer any five questions.

(5x2 = 10 Marks)

- 1 State error recovery techniques in top down parsing.
- 2 What is Boot Strapping?
- 3 Difference between Top Down parsing and Bottom up parsing.
- 4 What are ambiguous grammars? Give an example.
- 5 What is Yacc? Explain the Syntax.
- 6 Define shift-reduce conflict and Reduce-reduce conflict.
- 7 Define an ambiguous grammar.
- 8 What is Basic Block in Code Generation?
- 9 Write about back patching.
- 10 Write the functions of bootstrap loader.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) Enumerate the various phases of a compiler. Explain each phase briefly.
(b) Write a LEX program to count the number of words, characters, blank spaces and lines.
- 12 (a) Check whether the following grammar is LL(1) or not: $S \rightarrow iEtS \mid iEtSeS \mid a, E \rightarrow b$.
(b) Explain in detail about Shift Reduce Parsing.
- 13 construct a CLR parsing table for given grammar: $S \rightarrow L=R/R, L \rightarrow *R/id, R \rightarrow L$.
- 14 (a) Explain various parameters parsing mechanisms.
(b) Explain in detail about Hash Table in Symbol Table organization.
- 15 (a) Write briefly about memory organization during program execution.
(b) Explain Stack-based runtime environments.
- 16 (a) Explain DAG representation of the basic blocks with an example.
(b) Explain various machine independent code optimization techniques.
- 17 Write short notes on:
 - (a) Error handling in top-down parsers.
 - (b) Code generation from DAGs.
 - (c) Semantic analysis.

FACULTY OF ENGINEERING
B.E. VI - Semester (AICTE) (I.T) (Main) Examination, September 2021

Subject: Embedded Systems

Time: 2 Hours

Max. Marks: 70

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

PART – A

Note: Answer any five questions.

(5x2 = 10 Marks)

- 1 Define interrupts and write its applications.
- 2 List out the purpose of embedded system design process.
- 3 Memorize the various ranges of jump or call instruction.
- 4 Define decimal arithmetic with an example. What is decimal arithmetic? Give an example.
- 5 List the various Home Appliance Sensors.
- 6 State the Compensation.
- 7 Discuss Tasks and task states.
- 8 Discuss interrupts routines in an RTOS environment.
- 9 Construct the basic SOC system model.
- 10 Define sequential processor model.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

- 11 Explain the architecture of 8051 microcontroller and its components in detail.
- 12 (a) Draw and explain the interfacing of keyboard with micro controllers.
(b) Explain the functioning of A/D converter circuit.
- 13 Explain about functional block diagram of the sensor in detail.
- 14 Explain the basic design principles in RTOS with an example.
- 15 Explain about System Architecture and Complexity.
- 16 Discuss in detail about the structure of operation of CAN bus.
- 17 Discuss the following topics:
 - (a) Counter and Timers
 - (b) Multiple Interrupts
 - (c) Pipelined processor model vs. superscalar processor model.

FACULTY OF ENGINEERING

BE VI-Semester (CBCS) (Civil) (Backlog) Examination, September 2021

Subject: Steel Structures

Time: 2 Hours

Max marks: 70

PART – A

Note: (Missing data, if any, may be suitably assumed).

Note: Answers any five questions.

(5x2=10 Marks)

1. What are the factor of safties recommended by IS 800-2007 for the design of steel sections and welded sections?
2. Explain the three modes of failures of tension members with diagrams?
3. Distinguish between web buckling and web crippling
4. Explain low shear and high shear in the case of design on beams?
5. What are compound beams?
6. What is slenderness ratio in compression members?
7. Why battens and laces are provided to built up columns?
8. What for column splice is used?
9. Draw typical shape of purlin, rafter and strut of trusses?
10. Write about economical spacing of trusses?

PART - B

Note: Answer any four questions.

(4x15=60 Marks)

11. Two steel plates 12mm and 10mm thick are connected by lap joint, they carry a tensile force of 150KN. Design the joint using M20, grade 4.6 bolts?
12. Diagonal members of a bridge truss carry a factored tensile force of 200KN. Length of the member is 3m and it is connected to a gusset plate with 4 number of M22 grade 5.6 bolts in single line. Design a flat plate tension member using Fe 410 grade steel Thickness of gusset plate is 12mm.
13. A simply supported beam of span 6m carries a UDL of 80KN/m. Design the beam if it is laterally supported. Carry out necessary checks. Take grade of steel as Fe 410? Use limit state method?
14. Design a laced column with two channels back to back of length 10m to carry an axial factored load of 1400KN. The column may be assumed to have restrained in position but not in direction at both ends?

15. A column ISHB 350 carries an axial compressive load of 1500KN. Design a bolted gusset base. The base rest on M20 grade concrete pedestal. Use M24 grade 4.6 bolts Use limit state method?
16. The trusses of a factory building are spaced at 5m c/c and the purlins are spaced at 2m c/c. The pitch of truss is $\frac{1}{4}$ and the span of roof is 12m. The vertical load from roof sheets is 200N/m². Design a channel section roof purlin?
17. a) What are the different modes of failures of bolted connections? Explain with neat sketches?
b) Write short notes on column splices.

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FACULTY OF ENGINEERING
B.E. VI - Semester (CBCS) (EEE) (Backlog) Examination, September 2021

Subject: Electrical Machines - III

Time: 2 Hours

Max. Marks: 70

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

PART – A

Note: Answer any five questions.

(5x2 = 10 Marks)

- 1 What are the different types of windings of synchronous machines?
- 2 Write expressions for distribution factor and pitch (chording) factor of a synchronous machine.
- 3 Why is OCC non linear and SCC is linear?
- 4 Explain the causes of direct and quadrature axis reactances in synchronous machines.
- 5 Why is Synchronous motor not self starting?
- 6 Draw the V curves and inverted V curves of a synchronous motor.
- 7 What is the subtransient period of an alternator?
- 8 Write the applications of Permanent Magnet Synchronous motor.
- 9 What are the advantages of BLDC motors?
- 10 What are the applications of the Switched Reluctance motors?

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) How do the distribution and coil span factors of a synchronous machine winding eliminate some harmonic components.
(b) A 3ph 1500 kVA, Star connected 50Hz, 2300V alternator has a DC resistance of 0.16 Ohms between each pair of terminals. Assume effective resistance of 1.5 times the ohmic resistance. A field current of 70A produces a SCC current of FL current of 376A in each line. The same field current produces an OCC emf of 700V. Determine the synchronous reactance of the machine and its FL regulation at 0.8 PF lagging.
- 12 (a) Explain the synchronization of alternators by one dark and two bright lamp method.
(b) Explain the MMF (AT) method of calculating the voltage regulation of an alternator.

- 13 (a) Explain hunting, causes of hunting and method to prevent hunting in synchronous motors.
(b) A synchronous motor improves the PF of a load of 500 kW from 0.707 lagging to 0.95 lagging. Simultaneously the motor carries a load of 100 kW. Find (i) the leading KVAR supplied by the motor, (ii) kVA rating of the motor and (iii) pf at which the motor operates.
- 14 (a) Explain with diagram the subtransient, transient and steady state periods and corresponding reactances of a synchronous machine during symmetrical short circuit condition.
(b) Explain the principle of operation of PM Synchronous Motor.
- 15 (a) Describe the operation of BLDC motor with neat diagram.
(b) What are the various modes of the Switched Reluctance Motors?
- 16 (a) Derive the expression for the EMF in the alternator.
(b) Explain the construction and working of SRM.
- 17 (a) Derive expressions for synchronizing power and torque of a synchronous machine.
(b) What are the different torques of synchronous motors?

FACULTY OF ENGINEERING
B.E. (Inst.) VI-Semester (CBCS)(Backlog) Examination, September 2021

Subject: Biomedical Instrumentation

Time: 2 hours

Max. Marks: 70

Note: (Missing data, if any, may be suitably assumed).

PART – A

Answer any five questions.

(5x2 = 10 Marks)

- 1 Define linearity of biomedical instrument.
- 2 Draw the block diagram of Basic Electronic recording system.
- 3 Explain briefly Einthoven triangle.
- 4 Discuss the role of superior venacava and inferior venacava.
- 5 Explain Korotkoff sound.
- 6 Define Tachycardia and Bradycardia.
- 7 Discuss properties of X-rays.
- 8 Explain why endoscope is called fibroscope? Define Otoscope.
- 9 Define Let Go current.
- 10 Define Microshock and Macroshock.

PART – B

Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) Explain Ink Jet recorder with neat sketch.
(b) Discuss basic requirements of bio amplifier.
- 12 (a) Explain resting rhythms of EEG.
(b) Explain how noise problems are eliminated in ECG recording.
- 13 (a) Differentiate between direct and indirect methods for measurement of BP.
(b) Explain blood flow measurement using electromagnetic principle.
- 14 (a) Differentiate between X-rays and Fluoroscopy.
(b) Explain A and B mode of ultrasound imaging.
- 15 (a) Explain in detail types of leakage currents.
(b) Explain use of isolation transformer for protection of patients.
- 16 Explain in detail 12 lead configurations used in ECG recording.
- 17 (a) Explain in detail Holter Monitor.
(b) Discuss about amplifiers and filters used in phonocardiography.

FACULTY OF ENGINEERING
B.E. VI - Semester (CBCS) (ECE) (Backlog) Examination, September 2021
Subject: Digital Communication

Time: 2 Hours

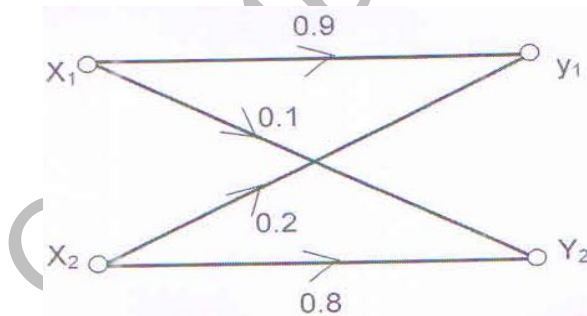
Max. Marks: 70

PART – A**Note: (Missing data, if any, may be suitably assumed).****Note: Answer any five questions.****(5x2 = 10 Marks)**

- 1 Draw the block diagram of elements of digital communication system.
- 2 Explain briefly about types of uniform quantization.
- 3 Is coding efficiency of Huffman coding better than Shannon coding. Justify.
- 4 State the properties mutual information.
- 5 Explain the need for error control coding.
- 6 How many errors can be detected and corrected by a linear block code with $d_{\min} = 5$.
- 7 Distinguish between coherent and non-coherent detection schemes.
- 8 Explain correlation receiver in brief.
- 9 Discuss the properties of PN sequences.
- 10 What are the applications of spread spectrum modulation technique?

PART – B**Note: Answer any four questions.****(4x15 = 60 Marks)**

- 11 (a) With a neat sketch explain the working of a DPCM system.
 (b) Derive the expression for the signal to quantization noise ratio of PCM system.
- 12 Given a binary symmetric channel shown in fig.
 (a) Find the channel matrix of the channel
 (b) Find $P(y_1)$ and $P(y_2)$ if inputs are equally likely
 (c) Find the joint probability $P(x_2, y_2)$ and $P(x_2, y_1)$ when $P(x_1) = P(x_2) = 0.5$



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

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

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

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- 14 With a neat block diagram explain the generation and demodulation of PSK and also calculate its probability of error P_e .
- 15 (a) With a neat diagram explain direct sequence spread spectrum techniques.
(b) Explain acquisition of DS signal using coarse synchronization.
- 16 (a) State and prove channel capacity theorem.
(b) What is meant by M-ary signaling? What are the advantages and disadvantages of M-ary signaling over binary signaling?
- 17 Write short notes on the following
(a) Data modulation
(b) Synchronization methods.

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FACULTY OF ENGINEERING
B.E. (Mechanical) (CBCS) VI – Semester (Backlog) Examination,
September 2021

Subject: Metal Cutting & Machine Tool Engineering

Time: 2 hours

Max. Marks: 70

Note: (Missing data, if any, may be suitably assumed).

PART – A

Note: Answer any five questions.

(5x2=10 Marks)

1. What are the basic functions of Machine Tools?
2. What are the Essential properties of Cutting Tool Materials?
3. Sketch Tool geometry as per ASA.
4. Mention the types and reasons for the tool wear.
5. Give the comparisons between 3 jaw and 4 jaw chucks.
6. Define Indexing. Mention the different types.
7. What is the importance of Grinding operation?
8. State important specifications of Lathe Machine.
9. Give the comparisons between shaper/slotter/planer machines.
10. Write about the unique features and applications of un-conventional machining processes.

PART - B

Note: Answer any four questions.

(4x15=60 Marks)

11. Derive the expression for shear plane angle? Sketch neatly merchant circle of machining forces and write all the governing equations.
12. Discuss the importance of Tool life. What are the parameters influencing tool life.
What is the Significance of Taylor's tool life equation.
13. Explain the parameters considered in the grinding wheel selection. Discuss about the various Grinding machines.
14. Explain the different types of thread cutting methods with neat figures.
15. Explain the quick return mechanism with neat figure.

16. Explain all the details of Ultrasonic Machining (USM) process with neat figure.

Mention the process variables and applications.

17. Write short notes of any three of the following

- a) Tapper turning methods.
- b) Radial drilling Machine
- c) Broaching operation
- b) EDM-wire cut machining.

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OU - 1607 OU - 1607

FACULTY OF ENGINEERING

B. E. VI –Semester (CBCS) (Production) (Backlog) Examination, September 2021

Subject: Metal Casting & Welding

Time: 2 hours

Max. Marks: 70

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

PART – A

Note: Answer any five questions.

(5 x 2 = 10 Marks)

- 1 Sketch the cross-section of a sand mould showing the elements of gating system
- 2 Define the term Casting yield
- 3 State Sivert's Law
- 4 Name the gases used in MIG welding
- 5 In DCSP, mention the percentage amount of heat generated at an electrode
- 6 What is "H A Z "in welding
- 7 Explain low pressure system and high pressure system in oxy-acetylene gas welding
- 8 Mention the applications of resistance welding
- 9 Distinguish between hot cracks and cold cracks in welding
- 10 List out few Non-Destructive testing methods

PART – B

Note: Answer any four questions.

(4 x 15 = 60 Marks)

- 11 (a) Explain the properties of moulding sands.
(b) Explain the working of Jolt-squeeze moulding machine with a neat sketch.
- 12 (a) Explain shell moulding process and mention its advantages, limitations and applications.
(b) Explain any five defects in castings, its causes and remedies.
- 13 (a) Explain forge welding process and mention its applications.
(b) Differentiate between GMAW & GTAW processes.

- 14 (a) Explain the working of resistance spot welding with neat sketch.
(b) Explain the welding aspects of stainless steel and aluminum alloys.
- 15 (a) List out the fire defects in welding and suggest remedies for them.
(b) Sketch and explain the process of injection moulding.
- 16 (a) With the neat sketch explain blow moulding process and state its applications.
(b) Write short notes on composites.
- 17 Distinguish on any two of the following:
(a) Chills & chaplets
(b) Soldering & brazing operations
(c) Thermoplastics & thermosetting plastics.

* * *

OU - 1607 OU - 1607

FACULTY OF ENGINEERING**B.E. VI Sem. (CBCS) (A.E.) (Backlog) Examination, September 2021****Subject: Design of Automotive components****Time: 2 hours****Max. Marks: 70****Note: Missing data, if any, may be suitably assumed.****PART – A****Note: Answer any five questions.****(5x2 = 10 Marks)**

1. Sketch a piston and name its parts.
2. Why I-section is preferred to the design of connecting rod?
3. What is Wahl factor? Why is it used?
4. Differentiate between closed coil and open coil helical spring.
5. Define eccentricity ratio in hydrodynamic journal bearing.
6. Differentiate between footstep bearing and collar bearing.
7. Define the terms pitch circle, pressure angle and backlash as applicable to spur gears.
8. What are advantages of v-belts over flat belts?
9. What are the important parameters necessary for the selection of a particular drive for power transmission?
10. What are the Speed reducers in gear box?

PART – B**Note: Answer any four questions.****(4x15= 60 Marks)**

11. The cylinder of a four stroke diesel engine has the following specifications brake power = 10kW, speed = 1440Rpm, IMEP = 0.4 MPa, η_m (Mechanical Efficiency) = 80%, max gas pressure = 4MPa, cylinder liner and head art made of grey cast iron ($Tuf = 260 \text{ N/mm}^2$), FOS = 6 Calculate : i) bore and length of cylinder ii) thickness cylinder liner and head iii) size and no. of studs required.
12. A spring is subjected to a variable load, varying from 500 N to 900N. Determine the diameter of wire and mean diameter of the coils. Take factor of safety as 1.5. Assume the other suitable data.

-2-

13. A semi elliptical truck spring has 12 leaves, of which 2 are full length leaves. The spring supports are 0.7m apart and the width of the central band is 80mm, and the load on the spring is 20×10^3 N. The permissible stresses are 460 MPa. The ratio of total depth to width of the spring is 3. Determine the thickness and width of the spring leaves. Also, determine the deflection of the spring. Assume that the extra full length leaf is not prestressed. Take $E = 2.0 \times 10^5$ N/mm².
14. A journal bearing of 100mm in dia and 150mm long carries a radial load of 8 kN at 1200rpm, 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.
15. A ball bearing has a radial load of 5 KN acting on it and the expected life for 90% of the bearing is 8000hours. Calculate the dynamic load carrying capacity of the bearing, when the shaft rotates at 1450 Rpm.
16. Write a short note on a) Preventive measures to avoid gear tooth failure. B) Spacers in gear box c) Speed diagram of a gear box.
17. Sketch a piston and state the function of the following for an internal combustion engine piston. (i) Ribs (ii) Piston rings (iii) Piston skirt and (iv) Piston pin.

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FACULTY OF ENGINEERING
B.E. (CSE) VI-Semester (CBCS) (Backlog) Examination, September 2021

Subject: Design and Analysis of Algorithms

Time: 2 hours

Max. Marks: 70

Note: (Missing data, if any, may be suitably assumed).

PART – A

Answer any five questions.

(5x2 = 10 Marks)

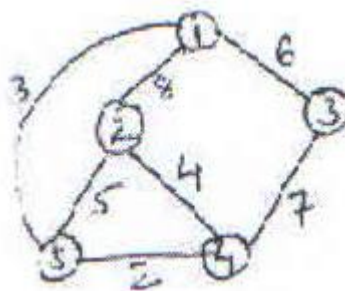
- 1 What is Knapsack problem?
- 2 Explain job sequencing using deadlines.
- 3 Define Time complexity for Divide and conquer strategy.
- 4 What is meant by Satisfiability?
- 5 Write the control abstraction for greedy method.
- 6 What is the chromatic number of the graph?
- 7 Explain travelling salesperson problem.
- 8 Define the properties of LC-search.
- 9 What is meant by spanning tree?
- 10 State purging rule and list out its applications.

PART – B

Answer any four questions.

(4x15 = 60 Marks)

- 11 (a) Derive the average case time complexity of merge set.
- (b) Find the minimum cost spanning tree for the given graph? Use kruskals algorithm.



- 12 Write an algorithm for N-Queens problem.
- 13 (a) Write an algorithm for all pairs shortest paths.
- (b) Differentiate between back tracking and branch and bound strategies.

14 Solve the knapsack problem using backtracking for the following problem:

$$P = \{11, 21, 31, 33, 43, 53, 55, 65\}, w = \{1, 11, 21, 23, 33, 43, 45, 55\}, m = 110, n = 8.$$

15 Write a notes on:

- (a) Optimal storage on tapes
 - (b) Multistage graphs
- 16(a) State Cook's theorem. Explain.
- (b) Discuss NP-Hard code generation problem.
- 17(a) What is a tree edge and back edge? Explain with an example.
- (b) Differentiate between NP-hard and NP-complete.
 - (c) Explain FIFO Branch and Bound.

FACULTY OF ENGINEERING**B.E. VI - Semester (CBCS) (I.T) (Backlog) Examination, September 2021****Subject: Design & Analysis of Algorithms****Time: 2 Hours****Max. Marks: 70****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer any five questions.****(5x2 = 10 Marks)**

- 1 How is an algorithm's time efficiency measured?
- 2 State the weighting, collapsing rules in sets.
- 3 Write the Control abstraction for Divide-and conquer.
- 4 What are the constraints of knapsack problem?
- 5 Briefly differentiate between the Greedy method and Dynamic programming.
- 6 Define feasible and optimal solution.
- 7 List out the application of backtracking.
- 8 Differentiate between back tracking and branch and bound.
- 9 Discuss node cover decision problem.
- 10 State and explain polynomial time reduction

Part-B**Note: Answer any four questions.****(4x15 = 60 Marks)**

- 11 (a) Explain the usefulness of the UNION and FIND fundamental operations on set.
(b) Develop the algorithm for Find using collapsing rule with an example.
- 12 (a) Trace the quick sort algorithm to sort the list C, O, L, L, E, G, E in alphabetical order.
(b) Explain the worst case time complexity of Quick sort algorithm.
- 13 (a) Define OBST. How will you construct an optimal binary search tree?
(b) Use function OBST to compute $w(i,j)$, $r(i,j)$ and $c(i,j)$, $0 \leq i < j \leq 4$, for the identifier set $(a_1, a_2, a_3, a_4) = (\text{count, float, if, while})$ with $p(1)=1/20$, $p(2)=1/5$, $p(3)=1/10$, $p(4)=1/20$, $q(0)=1/5$, $q(1)=1/10$, $q(2)=1/5$, $q(3)=1/20$, and $q(4)=1/20$. Using the $r(i,j)$'s, construct the Optimal Binary Search Tree.
- 14 (a) Explain the principles of Control Abstractions for LC-search.
(b) Give the principles of FIFO Branch & Bound.
- 15 (a) Write short notes on 3-SAT problem.
(b) Briefly explain the deterministic and non-deterministic algorithms with example.
- 16 Give short notes on:
 - (a) DFS
 - (b) Bi connected components
 - (c) NP-Hard
- 17 Find an optimal solution to the 0/1 knapsack instance
 $n=7, m=15, (p_1, p_2, \dots, p_7) = (10, 5, 15, 7, 6, 18, 3)$ and $(w_1, w_2, \dots, w_7) = (2, 3, 5, 7, 1, 4, 1)$.

FACULTY OF ENGINEERING**B.E. 3/4 II - Semester (Civil) (Backlog) Examination, September 2021****Subject: Soil Mechanics****Time: 2 Hours****Max. Marks: 75****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer any seven questions.****(7x3 = 21 Marks)**

- 1 Define (i) Flow Index (ii) consistency index.
- 2 Derive the relation between void ratio, percentage air void & degree of saturation.
- 3 What is Darcy's law? What are its limitations?
- 4 Define permeability. What are the factors that affect permeability?
- 5 Differentiate between compaction and consolidation.
- 6 What are the factors that affect compaction? Discuss in brief.
- 7 Explain the mode of application of shear force.
- 8 The following results were obtained from an undrained shear box test on a soil.

Normal load (N)	250	500	750
Failure load (N)	320	460	610

Determine the strength parameters in terms of total stresses. The cross-sectional area of shear box was 36cm^2 .

- 9 Explain the stability of finite slope.
- 10 A cut of depth 10m is made in a cohesive soil deposit ($c=30\text{ kN/m}^2$, $\phi=0$ and $\gamma=19\text{ kN/m}^3$). There is a hard stratum under the cohesive soil at a depth of 12m below the original ground surface. If the required factor of safety is 1.50, determine the safe slope.

PART – B**Note: Answer any three questions.****(3x18 = 54 Marks)**

- 11 (a) Explain in detail "Indian soil classification system" in coarse grained & fine grained soil with plasticity chart.
- (b) Sketch the plasticity chart used for classifying fine grained soil in the IS soil classification system. Give the group symbols for the following soils.

(i)	Types of soil	Liquid limit	Plastic limit
	Soil A	40%	22%
	Soil B	20%	14%

- (ii) Passing 4.75mm sieve = 70%, passing 75μ sieve = 8%, uniformity coefficient = 7, coefficient of curvature = 3, plasticity index = 3.
- 12 (a) If k_1 , k_2 , k_3 are the permeabilities of layer h_1 , h_2 , h_3 thick what is its equivalent permeability in the vertical and horizontal directions? Derive the formula used.
- (b) The water table in a deposit of sand 8m thick, is at a depth of 3m below the surface.
Above the water table, the sand is saturated with capillary water. The bulk density of sand is 19.62 kN/m^3 . Calculate the effective pressure at 1m, 3m and 8m below the surface. Hence plot the variation of total pressure, neutral pressure and effective pressure over the depth of 8m.

13 (a) Write a detail note on spring analogy to describe consolidation process.

(b) The following are the results of a compaction test

Mass of mould+ wet soil (g)	2925	3095	3150	3125	3070
Water content (%)	10.0	12.0	14.3	16.1	18.2

Volume of mould = 1000ml, Mass of mould = 1000g, Specific gravity of solids =2.70.

- (i) Find the compaction curve showing optimum moisture content and maximum dry density.
- (ii) Plot the zero air void line
- (iii) Determine the degree of saturation at the maximum dry density.

14 (a) Enumerate the various methods of determining the shear strength of soils.

Discuss

any one method with its relative advantages and disadvantages.

(b) The following results were obtained from a consolidated-undrained (CU) test on normally consolidated clay. Plot the strength envelope in terms of total stresses and effective stresses and determine the shear strength parameters.

Sample No.	Cell pressure (kN/m ²)	Deviator stress (kN/m ²)	Pore water pressure (kN/m ²)
1	250	152	120
2	500	300	250
3	750	455	350

15 (a) Differentiate between Rankine and Coulomb wedge theories of earth pressure.

(b) An excavation is to be made in a soil at an angle of 30° with the horizontal for a depth of 20m. the properties of soil are $c=14\text{kPa}$, $\theta=15^\circ$ and $\gamma=17\text{ kN/m}^3$. Find the factor of safety assuming that the entire friction is mobilized. If the factor of safety with respect to friction is 1.5 what is the factor of safety with respect to cohesion.

16 (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) A san sample of 35cm² cross sectional area and 20cm long was tested in constant head permeameter. Under a head of 60cm, the discharge was 120ml in 6min. the dry weight of sand used for the test was 1120g & $G=2.68$.

- Determine
- (i) Coefficient of permeability
 - (ii) The discharge velocity
 - (iii) Seepage velocity.

17 Write a short notes on the following:

- (a) Quality control in field compaction
- (b) Significance of shear strength in soils
- (c) Importance of Atterberg's limits in soil engineering.

FACULTY OF ENGINEERING
B.E. 3/4 (EEE) II-Semester (Backlog) Examination, September 2021

Subject: Digital Signal Processing

Time: 2 hours

Max. Marks: 75

Note: Missing data, if any, may be suitably assumed.

PART – A

Note: Answer any seven questions.

(7x3 = 21 Marks)

- 1 $x(n) = u(n) - u(n-4)$, check whether the signal is energy signal or power signal?
- 2 Input of a discrete time system is $x(n) = \{1, 2, 3, 1\}$ and impulse response is $h(n) = \{-1, 3, 2\}$ determine the output of the discrete time system.
- 3 Find the DFT of the sequence $x(n) = \{2, 0, 1, 1\}$.
- 4 What is the criterion to choose number of samples in frequency domain sampling?
- 5 Find the z-transform and ROC of the signal $x(n) = (-1)^n u(n)$.
- 6 Discuss the relation between S-plane and Z-plane.
- 7 Determine Butterworth poles for order $n = 2$.
- 8 What is bilinear transformation? Which integral approximation is used to derive that transformation?
- 9 What is the significance of main lobe width and side lobe amplitude of a window?
- 10 Which features of DSP made it faster compared to other processors?

PART – B

Note: Answer any three questions.

(3x18 = 54 Marks)

- 11 Determine whether the following signals are
 - (a) linear or nonlinear
 - (b) time variant or time invariant
 - (c) stable or unstable
 - (d) causal or non-causal
- (i) $y(n) = \sum_{n-n_0}^{n+n_0} x(k)$
- (ii) $y(n) = e^{-x(n)}$
- (iii) $y(n) = x(-n+2)$ (iv) $y(n) = x(n) \cos 2\pi fn$

12(a) A discrete time system is characterized by the following difference equation

$$Y(n) - 4y(n - 1) + 4y(n - 2) = x(n) - x(n - 1)$$

Determine the impulse response of the system.

(b) Determine the magnitude and phase response of the system whose unit sample response is $h(n) = \frac{1}{2} [\delta(n) + \delta(n - 2)]$.

13(a) Derive the algorithm for radix 2 DITFFT.

(b) State and prove symmetry properties of DFT.

14(a) Find the impulse response a of the following systems using one sided Z-transform method and also determine stability of the systems.

$$Y(n) - 0.6y(n - 1) - 0.08y(n - 2) = x(n)$$

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

$$X(z) = \frac{z}{(z - 1)(z - 2)} \quad R O C : 1 < |z| < 2$$

15(a) Design a Butterworth high pass filter for the specification given below:

(i) - 1db cutoff frequency of 0.4π rad/sec

(ii) -15 db cutoff frequency of 0.2π rad/sec

(b) Write the design procedure for Chebyshev filter

16(a) State and prove necessary condition for the FIR filter to have linear phase.

(b) Discuss the memory organization of TMS320C54X processor.

17(a) Design a digital low pass filter with a cutoff frequency of 1rad/sec using rectangular window with $N = 7$.

(b) Discuss the applications of Digital Signal Processing.

FACULTY OF ENGINEERING
B.E. (3/4) (Inst.) II – Semester (Backlog) Examination, September 2021

Subject: Digital Signal Processing

Time: 2 hours

Max. Marks: 75

Note: Missing data, if any, may be suitably assumed.

PART – A

Note: Answer any seven questions:

(7x3=21 Marks)

1. Determine whether the following signal is periodic or not $x(n) = \sin(5\pi n)$.
2. Determine the Z-transform and ROC of the following Causal signal
 $x(n) = \{1, 0, -2, 3, 5, 4\}$
3. Compute the Circular convolution of the following signals.
 $x(n) = \{1, 2, 3, 4\}$, $h(n) = \{1, 1, 1, 1\}$
4. Write the number of complex multiplications and additions needed in DFT and FFT.
5. What is Frequency Warping in that arises in IIR filter approximation?
6. Compare Butterworth and Chebyshev IIR filters.
7. Write down the sufficient conditions for FIR filter to have linear phase characteristics.
8. Write the steps involved In FIR filter design using Windowing technique.
9. Explain the difference Microprocessors and Digital signal Processors.
10. Explain the difference between Harvard architecture and Von Neumann architecture.

PART – B

Note: Answer any three questions:

(3x18=54 Marks)

11. (a) Analyze the stability and causality of the following systems.

$$y(n) = x(n) + \frac{1}{2} x(n-1) + \frac{1}{4} x(n-2)$$

- (b) Determine the inverse z-transform of the following

$$X(z) = \frac{z(z^2 - 4z + 5)}{(z-1)(z-2)(z-3)}; \text{ROC}/z > 3.$$

..... 2

12. Find 8-point DFT FFT algorithm of the following sequence,

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

13. (a) Explain the procedure to Design of a low pass digital Butterworth filter using the Bilinear Transformation.

(b) Obtain $H(z)$ using impulse invariant Transformation when $T=0.25$ sec for the

$$\text{given system } H_a(s) = \frac{2}{s(s+2)}.$$

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.

15. (a) Explain in detail the pipelining concept in digital signal processor.

(b) Explain the selection of digital signal processors.

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

(b) Find the Transfer function of the following Causal system given below.

$$y(n) - y(n-1) - 2y(n-2) = x(n-1) + 2x(n-2)$$

17. (a) Find Linear convolution using Circular convolution for the following sequences.

$$x(n) = \{3, -2, 1, 4\}, h(n) = \{2, 5, 3\}$$

(b) Find the DTFT of the following Sequences

$$\text{a) } x(n) = 3^n \cdot u(n) \quad \text{b) } x(n) = \{1, -2, 2, 3\}$$

FACULTY OF ENGINEERING
B.E. 3/4 (Inst.) II-Semester (Old) Examination, September 2021

Subject: Digital Signal Processing and Applications

Time: 2 hours

Max. Marks: 75

Note: (Missing data, if any, may be suitably assumed).

PART – A

Answer any seven questions.

(7x3 = 21 Marks)

- 1 Define a Discrete time signal and how discrete time signals are classified.
- 2 Define a Discrete Linear System.
- 3 Distinguish between time-invariant and time varying system.
- 4 Find the linear convolution of $x(n) = \{4, 2, 1, 3\}$ and $h(n) = \{1, 2, 2, 1\}$ signals.
- 5 What are the methods to perform circular convolution?
- 6 Explain the shifting property of discrete linear convolution.
- 7 Define a Z-transform. What is the condition for Z-transform to exist?
- 8 Write the properties of Butterworth filter.
- 9 Compare analog and digital filters.
- 10 Write the Hamming window function.

PART – B

Answer any three questions.

(3x18 = 54 Marks)

- 11 (a) Check whether the following systems are causal or not:

(i) $y(n) = x(n) + \frac{1}{2x(n-2)}$ (ii) $y(n) = x(-2n)$ (iii) $y(n) = \sin[x(n)]$

- (b) Determine whether the following systems are time-invariant or not:

(i) $y(n) = x(n) + nx(n-3)$ (ii) $y(n) = x^2(n-2)$

12(a) Using final value theorem find $x(\infty)$, if $X(z)$ is given by

$$(i) \frac{z+1}{(z-0.6)^2} \quad (ii) \frac{2z+3}{(z+1)(z+3)(z-1)}$$

(b) Using long division, determine the inverse Z-transform of

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

13(a) Explain the properties of Linear Convolution of discrete signals.

(b) Explain the properties of Discrete Time Fourier Transform.

14(a) Compare Radix – 2 DIT and DIF algorithms of FFT.

(b) Find the 4-point DFT of $x(n) = \{1, 2, 3, 4\}$ using DIT FFT method.

15(a) Differentiate between Direct Form – I and Direct Form – II.

(b) Determine the direct form-I realization of the LTI system which is given by

$$y(n) = -0.5y(n-1) + 0.25y(n-2) + 0.125y(n-3) + x(n) + 0.5x(n-1) + 0.75x(n-2).$$

16(a) Explain the design procedure for low-pass digital Butterworth IIR filter.

(b) Determine the order and poles of a low-pass Butterworth filter that has a pass band -3dB at 500Hz and stop band of 40dB at 1000Hz.

17(a) Differentiate between IIR and FIR filters.

(b) Explain the advantages of Digital Signal Processors.

FACULTY OF ENGINEERING
B.E. 3/4 II - Semester (ECE) (Backlog) Examination, September 2021

Subject: Digital Communication

Time: 2 Hours

Max. Marks: 75

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

PART – A

Note: Answer any seven questions.

(7x3 = 21 Marks)

- 1 What are the advantages and disadvantages of PCM?
- 2 Contrast between DPCM and DM.
- 3 What is meant by concept of information and average information?
- 4 What is the need for source coding?
- 5 Write a note on BCH codes.
- 6 What are different types of errors that occur during transmission?
- 7 Draw neat diagram of ASK, FSK and PSK signals.
- 8 What are the different synchronization methods?
- 9 What is Jamming Margin? State its significance.
- 10 List the properties of PN- sequence.

PART – B

Note: Answer any three questions.

(3x18 = 54 Marks)

- 11 (a) Explain how adaptive delta modulation overcomes the problems of DM.
 (b) Calculate minimum number of uniform quantization levels required for speech PCM when the signal to quantization noise ratio is 60 dB and calculate the system bandwidth required.
- 12 (a) Perform the shannonfano coding on the following source symbols.

Symbols	S0	S1	S2	S3	S4
Probability	0.2	.01	0.4	0.1	0.2

Calculate the efficiency of the coder.

- (b) Explain Binary symmetric channel and calculate channel capacity.
- 13 (a) What are code tree, code trellis and state diagram for convolutional encoder?
 (b) Write the error detection and error correction capabilities of Linear block code.
- 14 (a) Derive an expression for probability of error for coherent ASK signaling scheme.
 (b) Explain the coherent FSK with transmitter and receiver block diagram.
- 15 (a) Explain the characteristics of PN sequence.
 (b) Explain acquisition schemes for spread spectrum receivers.
- 16 (a) Explain encoding and decoding of cyclic codes using shift registers.
 (b) Explain the differentially coherent PSK with neat block diagrams using an example.
- 17 Write short notes on the following:
 - (a) Adaptive Delta Modulation.
 - (b) Tracking of FHSS.
 - (c) Prediction theory.

FACULTY OF ENGINEERING**BE 3/4 (M/P) II-Semester (Backlog) Examination, September 2021****Subject: Machine Design****Time: 2 Hours****Max. Marks: 75****Note: (Missing data, if any, may be suitably assumed).****PART – A****Answer any seven questions.****(7x3 = 21 Marks)**

- 1 Explain the following terms
 - i) Free length of the helical spring
 - ii) Pitch of the spring
- 2 What are the merits and demerits of Worm Gear drive?
- 3 What are the main components of rolling contact bearing?
- 4 How do you design the Piston Head?
- 5 What are the differences between straight beam and curved beam?
- 6 State the importance of Wahl's stress factor in the design of helical spring.
- 7 What is form factor in the design of spur gear?
- 8 Briefly explain about Sommer field number in journal bearing.
- 9 Explain about the operation of flywheel in a punching press with neat a diagram.
- 10 How do you design the Piston skirt?

PART – B**Answer any three questions.****(3x18 = 54 Marks)**

- 11 Design and draw a laminated spring for the following specifications:

Total load = 150kN, Number of springs supporting the load = 4,

Maximum number of leaves= 10, Span of the spring = 1000 mm,

Permissible deflection = 90mm, Young's modulus, $E = 10\text{kN/mm}^2$ and

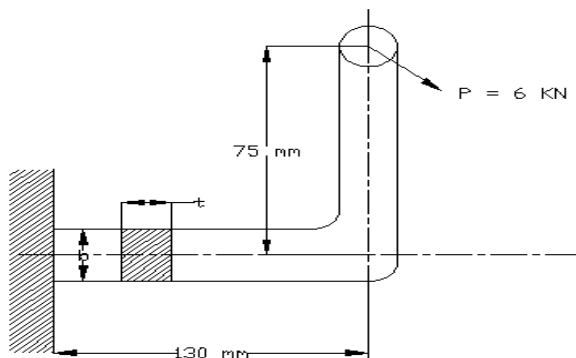
Allowable stress in spring material as 600MPa.

-2-

- 12 A worm drive transmits 15 kW at 2000 r.p.m. to a machine carriage at 75 r.p.m. The worm is triple threaded and has 65 mm pitch diameter. The worm gear has 90 teeth of 6 mm module. The tooth form is to be 20° full depth involute. The coefficient of friction between the mating teeth may be taken as 0.10. Calculate: 1. tangential force acting on the worm; 2. axial thrust and separating force on worm; and 3. efficiency of the worm drive.
- 13 The load on the journal bearing is 150 kN due to turbine shaft of 300 mm diameter running at 1800 r.p.m. Determine the following :
1. Length of the bearing if the allowable bearing pressure is 1.6 N/mm^2 , and
 2. Amount of heat to be removed by the lubricant per minute if the bearing temperature is 60°C and viscosity of the oil at 60°C is 0.02 kg/m-s and the bearing clearance is 0.25 mm.
- 14 Design a connecting rod for a Combustion engine running at 1800r.p.m. and developing a maximum pressure of 3.15N/mm^2 . The diameter of the piston is 100mm: mass of the reciprocating parts per cylinder 2.25 kg: length of connecting rod 380mm: stroke of piston 190mm and compression ratio 6:1. Take factor of safety of 6 for the design. Take length to diameter ratio for big end bearing as 1.3 and small end bearing as 2 and corresponding bearing pressure as 10 N/mm^2 and 15 N/mm^2 . The density of material of the rod may be taken as 8000 Kg/m^3 and the allowable stress in the bolts as 60 N/mm^2 and in cap as 80N/mm^2 .The rod is to be of I-section for which you can choose your own proportions.

Draw a neat dimensional sketch showing provision for lubrication. Use rankine formula for which the numerator constant may be taken as 320 N/mm^2 and the denominator constant $1/ 7500$.

- 15 A bracket of rectangular cross section whose depth is twice the thickness is shown in the figure. It is subjected to a load of 6 kN acting at 45° to its horizontal axis. Permissible stress in the material of the bracket is limited to 60MPa. Determine the dimensions of the bracket.



16 A cast steel Spur gears are to transmit 20 KW when the pinion rotates 300r.p.m. The velocity ratio is 1:3. The allowable static stresses for the pinion and gear materials are 120MPa and 100MPa respectively. The pinion has 15 teeth and its face width is 14 times the module. Determine the module and face width. Taking into consideration of the dynamic loading. The tooth form factor y can be taken as $y=0.154 - \frac{0.912}{\text{No.of teeth}}$

$$\text{Velocity factor } C_v = \frac{3}{3+V}$$

where V is the pitch line velocity in m/S

17 Write short notes on

- i) surge in the spring
- ii) backlash of gears
- iii) classification of bearings
- iv) function of crank shaft
- v) assumptions of a curved beam

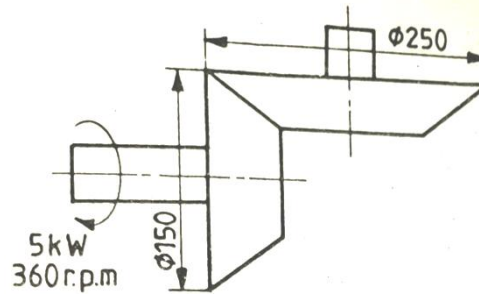
FACULTY OF ENGINEERING**B.E. 3/4 II - Semester (AE) (Backlog) Examination, September 2021****Subject: Design of Automotive Components****Time: 2 Hours****Max. Marks: 75****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer any seven questions.****(7x3 = 21 Marks)**

- 1 What are the factors to be considered while designing a piston for an I.C. engine?
- 2 What are the different cross sections of piston rings used in I.C. engines?
- 3 Explain the different parts of a poppet valve.
- 4 Write the formula to calculate the buckling load of a connecting rod.
- 5 What are the factors or terms used in the design of a coil spring?
- 6 What do you understand by nipping of leaf springs?
- 7 Define what belt creep is.
- 8 Name the different parameters of a gear system.
- 9 What is a ray diagram and what is it used for?
- 10 What are the different parts of a drive line?

PART – B**Note: Answer any three questions.****(3x18 = 54 Marks)**

- 11 Design a C.I. piston head and piston rings for a four-stroke I.C. engine, with the following specifications:
Cylinder bore = 100mm, stroke length = 120 mm; max. Gas pressure = $4\text{N} / \text{mm}^2$;
Indicative mean effective pressure = 0.75 N/mm^2 ; Mechanical efficiency = 80 %; fuel consumption = 0.15 kg per BHP hour; higher calorific value of the fuel = $42 \times 10^3 \text{ KJ/kg}$; speed = 2000rpm. Assume any other relevant data if required.
- 12 Design a helical compression spring to be used for a balance to measure 0 to 1200N over a scale of length, 100mm. The spring is to be enclosed in a space of 35 mm diameter. Approximate number of turns is 25. Take the modulus of rigidity as $0.84 \times 10^5 \text{ MPa}$. Also, calculate the maximum shear stress induced.
- 13 Write the formulae for calculating the thickness of a bearing cap and for calculating the heat generated at the bearing or power lost in friction.
- 14 In a crossed belt drive, the diameters of the driver and follower pulleys are 200mm and 400 mm respectively. The center distance of the drive is 2m. The driver pulley rotates at 400 rpm. Find the angle of contact between belt and both the pulleys and the length of the belt required. What is the power capacity of the drive, if the permissible tension in the belt is 1.2 KN and the coefficient of friction between the belt and both the pulleys is 0.25?

- 15 An electric motor running at 1500 rpm is transmitting, 15KW power to a low speed shaft, with a velocity ratio of 3. The teeth are $14\frac{1}{2}^0$ involute, with 25 teeth on the pinion. Both the pinion and gear are made of steel, with static strength of 200 MPa. Assuming starting torque to be 25% higher than the running torque, determine the face width of the gears, from the strength point of view, and also determine the principal dimensions of the drive.
- 16 A pair of bevel gears transmitting 5KW at 360 rpm of the pinion is shown in the figure below. The pressure angle is 20^0 . Determine the components of the resultant gear tooth force and sketch the free-body diagram of the gear, indicating the force components.



- 17 What are the points to be considered while designing a sliding-mesh type of gear box?

FACULTY OF ENGINEERING
B.E. 3/4 (CSE) II-Semester (Backlog) Examination, September 2021

Subject: Computer Networks

Time: 2 Hours

Max. Marks: 75

Note: (Missing data, if any, may be suitably assumed).

PART – A

Answer any seven questions.

(7x3 = 21 Marks)

- 1 List out the design issues of the network layer.
- 2 Define Jitter Control.
- 3 Describe the Path MTU.
- 4 Define Classless Inter Domain Routing.
- 5 Write down the socket primitives for TCP.
- 6 Define Multiplexing.
- 7 List out the SMTP extensions.
- 8 Compare static and dynamic web pages.
- 9 Define Asynchronous I/O.
- 10 Define Out-of-Band data.

PART-B

Answer any three questions.

(3x18 = 54 Marks)

- 11 (a) List two ways in which the OSI reference model and the TCP/IP reference model are the same and list two ways in which they differ.
(b) Describe the Link State Routing algorithm.
- 12 (a) Define Packet Fragmentation. Compare various Fragmentation techniques.
(b) Explain IP protocol and IP Header.
- 13 (a) Explain window management in TCP.
(b) Why is RTP typically implemented over UDP and not TCP? Identify some conditions under which an application may use RTP implemented over TCP.

- 14 (a) Explain DNS with respect to domain space, resource records and name resolution.
(b) Explain the architecture of the email system.
- 15 (a) Write down the elementary socket system calls. Explain briefly.
(b) Write short notes on Reserved Ports.
- 16 (a) Compare the broadcast and multicast routings algorithms.
(b) Explain about three-way hand shaking mechanism in transport layer for connection establishment.
- 17 (a) Write short notes on RSVP.
(b) Compare the IPv4 and IPv6 header formats.

FACULTY OF ENGINEERING

B. E. 3/4 (IT) II – Semester (Backlog) Examination, September 2021

Subject: Computer Networks

Time: 2 hours

Max. Marks: 75

Note: (Missing data, if any, may be suitably assumed).

PART – A

Answer any seven questions.

(7x3 = 21 Marks)

1. Write three major differences between ISO-OSI and TCP/IP reference models.
2. State the Principle of Optimality and give example.
3. Distinguish between Transparent and Non-Transparent Packet Fragmentation.
4. List the FOUR parameters of a Flow that characterize QoS.
5. Describe IPv4 Socket Address Structure.
6. Define scatter I/O/Gather I/O methods i.e. readv/writev.
7. Differentiate between SMTP, IMAP AND POP3 protocols.
8. Describe DNS Domain Resource Record fields.
9. Describe the function of a Firewall.
10. Define DNS Spoofing.

PART – B

Answer any three questions.

(3x18 = 54 Marks)

11. (a) Explain the steps in Link State Packet routing algorithm with example.
(b) Describe the Load Shedding approach for Congestion Control.
12. (a) Describe IPv4 Address Classes. Convert the IP address C22F1582 to dotted decimal notation and state which class it belongs to.
(b) Depict the different Connection Release Scenarios in Transport Layer.
13. Explain the elementary Socket System Calls for Connection-Oriented and Connectionless Communication protocols.

14. (a) Write about the different Connection types and Request methods of HTTP protocol.
- (b) Describe DNS Name Resolution approaches.
15. (a) Explain Symmetric-Key Digital Signature approach.
- (b) Describe Public Key Infrastructures (PKI).
16. (a) Explain Border Gateway Protocol. (BGP).
- (b) Explain the different types of routers used in OSPF and the relationship between them.
17. (a) Define Sink Tree. With example show how it is used in Reverse Path Forwarding routing algorithm.
- (b) Describe Window management in TCP.
