

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

1. Explain briefly the phenomenon of pseudo phase diagram?
2. An undisturbed sample of soil has a volume of 1000cm³ and mass of 190g. On oven drying for 24 hours, the mass is reduced to 160g. If the specific gravity of grains is 2.68, determine the water content, void ratio & degree of saturation?
3. What is the validity of Darcy's law?
4. Differentiate between "Seepage velocity" with "Discharge velocity". Which of these is always higher than the other and why?
5. What do you understand on normally consolidated soil and over consolidated soil?
6. What are the types of rollers used for compacting different types of soils in the field?
7. Differentiate between "UU test" with "CD test". Which of these provide effective shear parameters?
8. A cohesionless soil sample failed at a deviator stress of 600 kN/m² when the cell pressure was 100 kN/m². Determine the shear parameters c, ϕ ?
9. Distinguish between active and passive earth pressure?
10. Calculate the factor of safety with respect to cohesion, of clay slope laid at 1 in 2 to a height of 10m, if the angle of internal friction $\phi=10^\circ$, $c=25$ kN/m² and $\gamma = 19$ kN/m³?

PART – B**Answer any three questions.****(3 x 18 = 54 Marks)**

11. (a) Derive $\gamma = \frac{(1 - n_o) GY_w}{1 + Gw}$ with standard notations.

(b) The results of a sieve analysis of a soil are given below. Total mass of sample = 900gm.

IS sieve	20mm	10mm	4.75mm	2mm	1.0mm	0.6mm	4.25 μ	212 μ	150 μ	75 μ	Pan
Mass of soil retainer (gm)	35	40	80	150	150	140	115	55	35	25	75

Draw the particle size distribution curve and hence determine the uniformity coefficient and coefficient and the coefficient of curvature.

12. (a) What is quick sand phenomenon and in which type of soils and under what situation may this occur.
- (b) A 30cm well completely penetrates an unconfined aquifer of depth 40m. After a long period of pumping at a steady rate of $1.5\text{m}^3/\text{min}$, the drawdown in two observation wells 25m and 75m from the pumping were found to be 3.5m and 2.0m respectively. Determine the transmissibility of the aquifer. What is the drawdown at the pumping well.
13. (a) Write a brief note on Standard proctor compaction test?
- (b) A soil sample has compression index of 0.30. If the void “e” at stress of 1.40 kg/m^2 , is 0.50. Compute the i) Void ratio if the stress is increased to 2 kg/m^2 . And ii) Settlement of soil stratum 4m thick.
14. (a) Explain the procedure of “Triaxial Compression Test” for determination of shear parameters and compare its merits over Direct Shear Test?
- (b) Undrained triaxial test are carried out on four identical samples of silty clay, and the following results are obtained.

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

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

15. (a) What is coulomb’s wedge theory of earth pressure? Explain the conditions to obtain the maximum earth pressure?
- (b) A rigid retaining wall 6m height supports a backfill of cohesion less soil with $\phi=35^\circ$. The water table is below the base of the wall. The backfill is dry and has a unit weight of 20kN/m^3 . Determine Rankine’s passive earth pressure per meter length of the wall.
16. (a) Explain the laboratory methods that are commonly use for the determination of the coefficient of consolidation?
- (b) A flownet consists of 9 flow lines and 16 equi-potential lines. The total head causing flow if 12m. the average size of any fielf is 0.8m. However, the minimum size of any field at downstream end is 0.6m. The average permeability of soil is given as $3.6 \times 10^{-3}\text{ cm/sec}$. Calculate i) the discharge of seepage flow ii) the exit gradient?
17. (a) What are the methods used to find out permeability in lab and in field? Explain any one of the method?
- (b) What are the factors that affect shear strength of cohesion-less and cohesive soil?

FACULTY OF ENGINEERING
BE 3/4 (EEE) II – Semester (Backlog) Examination, March/April 2021
Subject: Digital Signal Processing

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 Test whether the following systems are causal or not?
 - (i) $y(n) = x(n) + x^2(n-1)$
 - (ii) $y(n) = x(2n)$
- 2 For each of the following systems described by difference equations, determine whether the system Time Invariant or not?
 - (i) $y(n) = nx(n)$
 - (ii) $y(n) = e^{x(n)}$
 - (iii) $y(n) = \cos[x(n)]$
- 3 Distinguish between linear convolution and circular convolution.
- 4 Find the DFT of the sequence $x(n) = \{1,3\}$
- 5 Find the Z-Transform of the sequence $x(n) = na^n u(n)$
- 6 A discrete time signal $x(n) = \{-2,-1,0,1,-1,1\}$ is multiplied by $u(-n-2)$. What is the resulting sequence?
- 7 What is meant by frequency warping?
- 8 For given $H(s) = \frac{2}{(s+1)(s+2)}$. Obtain $H(Z)$ using impulse invariant technique
- 9 Compare FIR and IIR filters
- 10 Mention the need for employing window technique in FIR filter Design.

PART – B

Answer any three questions.

(3x18=54 Marks)

- 11 i) Define stability and causality?
 ii) Derive the expression for condition for stability?
 iii) Write short notes on sampling of continuous time signals?
- 12 i) Compute DFT of the sequence
 $x(n) = \{1,1,1,1,1,1,1,1\}$
 ii) Perform the circular convolution on the following sequences using matrix method
 $x_1(n) = \{1,0,1,1\}$ $x_2(n) = \{1,2,1,2\}$

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- 13 Explain in detail the Decimation-in- Time (DIT) FFT Algorithm and also draw the butterfly diagram for 8-point sequence using Decimation-in- Time (DIT) FFT Algorithm.
- 14 a) Compute the response of the system
 $y(n)=0.7y(n-1)-0.12y(n-2)+x(n-1)+x(n-2)$ to input $x(n)=nu(n)$.
 Is the system stable or not?
- b) Realize the following system function using minimum number of Multipliers $H(Z)=1+1/3Z^{-1}+1/4Z^{-2}+1/4Z^{-3}+1/3Z^{-4}+Z^{-5}$
- 15 Design a digital Butterworth filter satisfying the constraints
 $0.8 \leq |H(e^{j\omega})| \leq 1$ for $0 \leq \omega \leq 0.2\pi$
 $|H(e^{j\omega})| \leq 0.2$ for $0.6\pi \leq \omega \leq \pi$
 With $T=1$ sec using Impulse Invariant Transformation
- 16 Design an ideal high pass FIR filter with frequency response
 $H_d(e^{j\omega}) = 1$ for $-\pi/4 \leq \omega \leq \pi$
 $= 0$ for $|\omega| \leq \pi/4$
 Find the values of $h(n)$ for $N=11$ and also $H(z)$ using Hamming Window
17. i) Draw the architecture of TMS 320C54X DSP Processor
 ii) Mention the applications of DSP

FACULTY OF ENGINEERING
B.E. 3/4 (Inst.) II-Semester (Backlog) Examination, March/April 2021

Subject : Digital Signal Processing

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 periodic and non-periodic signal.
- 2 Define a stable system and what is the condition for stability?
- 3 Determine the Z-transform and ROC of the signal $x(n) = a u(n)$.
- 4 State and Prove Time shifting property of DFT.
- 5 Write the initial value and final value theorem of Z –transform
- 6 Distinguish between FIR and IIR filters.
- 7 How is FFT computationally efficient?
- 8 Write the expression for Hamming window.
- 9 State Parseval's theorem.
- 10 Explain the concept of pipelining in DSP Processor

PART – B

Answer any three questions.

(3x18=54 Marks)

- 11 Determine whether the following system is linear, stable, causal and time Invariant using appropriate tests:
 - a) $y(n) = n x(n) + x(n+2) + x(n-2)$
 - b) $y(n) = e^{x(n)}$ c) $y(n) = \cos(x(n))$.
- 12 Find 8-point DFT of sequence $x(n) = \{2, 1, 2, 1, 2, 1, 2, 1\}$ by using Radx-2 DIT FFT.
- 13 Determine the output response $y(n)$ of $x(n) = \{1, 2, 3, 1\}$ and $h(n) = \{1, 1, 1\}$ by using
 - a) Linear convolution
 - b) Circular convolution and
 - c) Circular convolution with zero padding.
- 14 Design a Butterworth digital filter using the bilinear transformation. The specifications of the desired low-pass filter are

$$0.9 \leq |H(\omega)| \leq 1; \quad 0 \leq \omega \leq \pi/2$$

$$|H(\omega)| \leq 0.2; \quad 3\pi/4 \leq \omega \leq \pi$$
- 15 Design a low pass filter using Rectangular window for $N=9$ and with cut-off frequency of 1.2 rad/sec
- 16 Explain the architecture of TMS320C5x DSP Processor with neat diagram
- 17 Write short notes on:
 - a) Harvard Architecture
 - b) Step invariance method

FACULTY OF ENGINEERING

B.E. III/IV (EIE) II – Semester (old) Examination, March / April 2021

Subject: Digital Signal Processing & 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 system and how discrete time systems are classified.
- 2 Define a energy and power signal.
- 3 Distinguish between causal and non-causal systems.
- 4 Find the circular convolution of $x(n)=\{1,2,3,4\}$ and $h(n)=\{1,-2,2,-1\}$ signals.
- 5 Define discrete time Fourier transform (DTFT).
- 6 Explain the convolution property of DFT.
- 7 Write the properties of ROC in Z-transform.
- 8 Draw the frequency response of Chebyshev low pass filter.
- 9 Write the relation between analog and digital frequencies in bilinear transformation.
- 10 Write the Kaiser Window function.

PART – B

Answer any three questions.

(3x18=54 Marks)

- 11 a) Check whether the following signals are periodic or not: if periodic, determine the fundamental period. a) $\sin \frac{4\pi n}{3} + \cos \frac{2n}{3}$ b) $e^{j\left(\frac{\pi}{3}\right)n}$.
- b) Determine the response of the system characterized by the impulse response $h(n) = \left(\frac{1}{2}\right)^n$ to the input signal $x(n) = 2^n u(n)$.
- 12 a) Explain the advantages of Z-transform.
- b) Explain the linearity and time shifting property of Z-transform.
- 13 a) State and prove the time reversal and differentiation in frequency domain properties of DTFT.
- b) Find the frequency response of the causal system $y(n)-y(n-1)+3y(n-2)=x(n)-2x(n-1)$.
- 14 a) Explain the DIT FFT algorithm to find DFT of a sequence.
- b) Find the 4-point DFT of $x(n)=\{1,2,3,4\}$ using DIF FFT method.
- 15 a) Differentiate between cascade form and parallel form structures.
- b) Explain the linear phase realization of FIR system.
- 16 a) Explain the design procedure for low-pass digital chebyshev IIR filter.
- b) Determine the lowest order of a low-pass chebyshev filter that meets the following specifications: i) 1 dB ripple in the pass band $0 \leq \omega \leq 0.35\pi$, ii) at least 60 dB attenuation in the stop band $0.35\pi \leq \omega \leq \pi$.
- 17 a) Explain the design steps of FIR filter using windows.
- b) Explain the architecture of digital signal processor.

FACULTY OF ENGINEERING**B.E. 3/4 (ECE) II - Semester (Backlog) Examination, March/April 2021****Subject : Digital Communication****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 significance of eye pattern in PCM.
- 2 Write the μ -law and A-law of compounding.
- 3 Define mutual information and give its properties.
- 4 A DMS with five symbols X_1 to X_5 having probabilities $1/2, 1/4, 1/8, 1/16$ & $1/16$ respectively is transmitted. Calculate the Entropy.
- 5 Write merits of BCH codes.
- 6 Differentiate between Linear Block codes and Convolution codes.
- 7 Write the Probability of Error expression for BPSK.
- 8 Compare a correlation receiver and a matched filter.
- 9 Distinguish between jamming margin and processing gain.
- 10 List out the advantages of spread spectrum technique.

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

- 11 a) With neat diagram explain the working of a Delta Modulation system.
b) Mention differences between DPCM and DM.
c) Suggest a solution for controlling the granular noise at the output of a delta modulator.
- 12 a) State and explain Shannon-Fano encoding theorem.
b) Apply the Shannon-Fano coding procedure for the following messages with respective probabilities and find the efficiency and redundancy.

X_i	x_1	x_2	x_3	x_4	x_5	x_6	x_7
$P(x_i)$	0.35	0.30	0.20	0.10	0.04	0.005	0.005

- 13 The generator polynomial of a (7, 4) cyclic code is $g(x) = 1 + x + x^3$. Find the codes words in systematic and non-systematic methods for the message vectors 1110, 1010 and 1101.
- 14 a) Define Hamming code and give its error detection and correction capabilities.
b) Construct the standard array for a (6, 3) block code and find whether the received message 1 0 1 1 0 1 is erroneous or not.
- 15 a) Explain with neat block diagram the modulation and demodulation of FSK.
b) Derive probability of error (P_e) for non-coherent phase shift keying.
- 16 a) Explain in detail the Frequency Hopping Spread Spectrum (FH-SS).
b) Explain acquisition and tracking of a direct sequence spread spectrum signal.
- 17 Write short notes on :
 - a) Shannon-Hartley Law
 - b) Syndrome decoding and Parity Check matrix, H
 - c) Generation of PN sequence

FACULTY OF ENGINEERING
BE 3/4 (M/P) II-Semester (Backlog) Examination, March/April 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 Define the terms free length and spring index.
- 2 What is a concentric spring? Enumerate the advantages
- 3 Compare the beam strength of spur and helical gears.
- 4 Sketch the pressure distribution in a journal bearing with thick film lubrication in Axial and Radial directions.
- 5 Explain the bearing designation 6205.
- 6 Define the terms "Bearing modulus" and "Sommerfeld number".
- 7 Why the area of the inlet valve port is made larger than the area of the exhaust valve in an I C engine.
- 8 Name the possible modes of failures to be considered for the design of
i) piston pin ii) crank pin.
- 9 Mention the criteria for the design of machine frame.
- 10 Explain the various stresses induced in curved beams.

PART – B

Answer any three questions.

(3x18=54 Marks)

- 11 A Vertical spring loaded valve is required for a compressed air receiver. The valve is to start opening at a pressure of 1 N/mm² gauge and must be fully open with a lift of 5mm at a pressure of 1.5 N/mm² gauge .The diameter of the port is 30mm, assume the allowable shear stress in steel as 480Mpa and shear modulus as 80 KN/mm² .Design a suitable closely coiled helical spring having squared and grounded ends. Also specify the initial compression and free length of the spring
- 12 A worm gear drive transmits 15KW to a machine. The worm speed and the gear speeds are 2000 rpm and 50 rpm respectively. The worm is triple threaded and has a pitch diameter of 65mm. the gear has 120 teeth of 6mm module. The tooth form is 20° full depth involute and coefficient of friction 0.1.find i) Tangential force acting on the worm ii) Axial thrust on the worm iii) separating force on the worm iv) Efficiency of the worm
- 13 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 0.012kg/m-sec at the operating temperature of 125°C .The Diametrical 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 W/m²/°C.
- 14 Design an overhung crank shaft with two main bearings and a flywheel in between them for an I.C Engine, single cylinder 0.25m X 0.30m. The flywheel weighs 29KN. The maximum pressure 2.1 MPa. The tensional moment is maximum when the is at 35° from the I.D.C. while the pressure is 1.04MPa. Assume the missing data.

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- 15 An electric motor drives a punching machine. A flywheel fitted to the machine has a radius of gyration of 0.6 m and runs at 300 rpm. The machine can punch 600 holes/hr; each punching operation taking 2.0 seconds and requiring 20000N-m of work. Determine power required to operate the machine and mass of the flywheel, if the speed of the flywheel should not drop below 220rpm
- 16 A rolling contact ball bearing is to be selected to support the overhung crankshaft. The shaft speed is 750 rpm; the bearings are to have 99% reliability corresponding to a life of 26000 hours. The bearing is subjected to an equivalent radial load of 2 KN; consider life adjustment factors for operating condition and material as 0.9 and 0.85 respectively. Find the Basic dynamic load rating of the bearing from the manufacturer's catalogue, specified at 90% reliability
- 17 Write short notes on
- End connections for compression helical springs
 - Stresses induced in a flywheel.
 - Properties of lubricants used in bearings.

FACULTY OF ENGINEERING**BE 3/4 (A.E.) II-Semester (Backlog) Examination, March/April 2021****Subject: Design of Automotive Components****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 Describe whipping stresses in connecting rod.
- 2 Discuss strength design and thermal design of piston head.
- 3 How to avoid buckling in compression springs?
- 4 What is nipping in leaf spring? Explain with neat sketch.
- 5 State the types of bearing failure.
- 6 What is the approximate relationship between SAE number and viscosity of lubricating oil?
- 7 What are preventive measures to avoid gear tooth failure?
- 8 Explain law of gearing.
- 9 Explain the terms 'Fast and loose pulley' with the help of a neat sketch.
- 10 Explain Hotchkiss Drive and Torque Tube Drive with neat sketch.

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

- 11 Design a connecting rod for a single cylinder four stroke diesel engine with following specifications: power = 10kW, Mechanical Efficiency = 85%, weight of reciprocating parts = 25N, length of connecting rod = 0.25m, speed = 1200 rpm with possible over speed of 2400 rpm. Assume suitable missing data.
- 12 Design head and ring section of cast iron piston for a four stroke IC engine, for the following specifications. Cylinder bore = 200 mm, stroke length 150mm, Max gas Pressure is 5 MPa, fuel consumption 0.25 kg/kW/hr, speed 2400 rpm, assume any other data necessary for the design.
- 13 A safety valve of 60mm diameter is to blow off at a pressure of 1.3N/mm². It is held on its seat by closely coiled helical spring. The maximum lift of the valve is 12mm. Design a suitable compression spring of spring index 5 and providing an initial compression of 30mm. The maximum shear stress in the material of the wire is limited to 400 MPa. The modulus of rigidity for the spring material is 81 kN/mm². Calculate (a) Diameter of the spring wire (b) Mean coil diameter (c) Number of active turns and (d) Pitch of the coil.
- 14 Design a leaf spring for the following specifications:
Total load = 140kN ; Number of springs supporting the load = 4 ; maximum number of leaves = 10; span of the spring = 1000 mm; permissible deflection = 80mm, take young's modulus E = 200 kN/mm² and allowable stress in the spring material as 600 MPa.
- 15 A full journal bearing of 50mm diameter and 100mm long has a bearing pressure of 1.5 N/mm². The speed of the journal is 1000 rpm and the ratio of journal diameter to the diameter clearance is 1000. The bearing is lubricated with oil whose absolute viscosity at the operating temperature of 75°C may be taken as 0.011 lg/m-s. The room temperature is 35°C. Find (i) The amount of artificial cooling required, and (ii) The mass of the lubricating oil required, if the difference between the outlet and inlet temperature of the oil is 12°C. Take specific heat of the oil as 1900 J/kg/°C.

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- 16 A pair of helical gears 300 helix angle is used to transmit 15kW at 10,000 rpm of the pinion. The velocity ratio is 4 : 1, both the gears are to be made of hardened steel of static strength 100 N/mm^2 . The gears are 20° stub and pinion is to have 24 teeth. The face width may be taken as 14 times the module, find the module and face width from standard point of strength and check for dynamic strength and wear strength.
- 17 A pair of worm and worm wheel is designated as 3/60/10/6. The worm is transmitting 5kW power at 440 rpm to the worm wheel. The coefficient of the friction is 0.1. And the normal pressure angle is 20° . Determine the components of the gear tooth force acting on the worm and worm wheel.

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FACULTY OF ENGINEERING
B.E. 3/4 (CSE) II-Semester (Backlog) Examination, March/April 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 Define the terms: Interface, Peer Entities, Protocol and Service.
- 2 Define Congestion and depict Congestion Collapse.
- 3 Define Subnet. State its purpose.
- 4 List the OSPF message types.
- 5 State the purpose of the different timers used in TCP.
- 6 Show the fields of UDP header with a neat diagram.
- 7 Explain the fields of DNS Resource Record.
- 8 List and explain the HTTP built in request methods.
- 9 List the fields of IPv4 socket address structure with a diagram and give its size.
- 10 List the byte ordering functions and state their purpose.

PART – B

Answer any three questions.

(3x18=54 Marks)

- 11 (a) Compare Virtual Circuit networks and Datagram networks.
(b) List the different approaches to handle congestion and explain Load Shedding.
- 12 (a) Solve using CIDR the following IP address allocation problem. A block of 8192 IP addresses is available starting at 194.48.0.0. Organizations A and B need 2048 addresses and 4096 addresses respectively. Give the first and last IP addresses allocated and the corresponding prefix address.
(b) Describe the IP Header.
- 13 (a) Explain the different fields of TCP segment header.
(b) Describe Timer Management in TCP.
- 14 (a) Describe HTTP protocol and HTTP built in request methods.
(b) Explain the two approaches used in DNS name resolution.
- 15 (a) Describe the use of socket systems calls with diagrams for connection-oriented and connectionless client-server communication.
(b) Describe Asynchronous I/O.
- 16 (a) Describe the steps of Link State routing and example.
(b) Explain the purpose and working of Address Resolution Protocol.
- 17 Describe briefly any two.
 - (a) Fields of UDP header with a neat diagram.
 - (b) SMTP, POP an IMAP.
 - (c) Internet Super Server (IIS or inetd).

FACULTY OF ENGINEERING
B.E. 3/4 (IT) II-Semester (Backlog) Examination, March/April 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 What is the need of adaptive routing Algorithms?
- 2 What is jitter control?
- 3 What is the need of ICMP?
- 4 Discuss briefly about DNS name space?
- 5 What are ports? Into how many types they are categorised.
- 6 What is a digital signature? What are the different methods of achieving the same?
- 7 What is the need of NAT? Justify with the neat diagram?
- 8 Can a machine with single DNS name have multiple IP addresses if so how could this occur.
- 9 Discuss briefly about any two Elementary sockets system calls.
- 10 Compare POP3 and IMAP.

PART – B

Answer any three questions.

(3x18=54 Marks)

- 11 a) Explain in detail about Quality of service in network layer?
b) Explain briefly about any three Congestion control algorithms for datagram subnets?
- 12 a) Explain Header format of IPV4 with a neat diagram?
b) Explain Fragmentation with an suitable example.
- 13 a) Illustrate establishing a connection scenario in TCP layer.
b) Explain the TCP segment header.
- 14 a) Discuss about Internet Control Protocols and their functionalities.
b) Explain about the protocol used by Mail Transfer Agent in E-mail.
- 15 a) Illustrate about the steps performed by the Internet super server.
b) what is the need of Advanced socket system calls? Explain the working of select system call.
- 16 a) Explain AES algorithm in detail.
b) What is IPsec? Discuss about the modes of IPsec.
- 17 Write notes on any two.
 - a) VOIP
 - b) Out-of-band data
 - c) I/O Multiplexing

FACULTY OF ENGINEERING
BE VI - Semester (CE) (CBCS) (Backlog) Examination, March / April 2021

Subject: Steel Structures

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 Briefly explain chemical composition of structural steel?
- 2 Define strength of bolt?
- 3 Draw any five cross sections of tension members?
- 4 Explain block shear with sketch?
- 5 what is effective throat thickness? Show it with a neat sketch.
- 6 Differentiate laterally supported and laterally unsupported beams?
- 7 Define effective length and slenderness ratio of columns?
- 8 What is the effective width of lacing?
- 9 Write about economical spacing of trusses?
- 10 What are the load combinations which are generally considered for truss analysis?

PART – B

Answer any four questions.

(4x15= 60 Marks)

- 11 Two steel plates 12mm thick are connected by butt joint, they carry a tensile force of 2000KN. Design the joint using M20 grade, 4.6 bolts if two cover plates of 10mm are used?
- 12 Design a double angle tension member to carry an axial tension of 480KN, using Fe410 grade steel. The effective length of member is 6m. The angles are to be connected on either side of 12mm gusset plate by fillet welding.
- 13 A simply supported beam of span 6m carries a factored UDL of 240KN and a central factored point load of 20KN. Design the beam, carry out necessary checks. Take grade of steel as Fe410? Use limit state method?
- 14 Design a battened 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 450 carries an axial compressive load of 1400KN. 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/m^2 . Design a channel section roof purlin?
- 17 (a) What are the different modes of failures of tension members? Explain with neat sketches?
 (b) Write short notes on limit state method and working stress method.

FACULTY OF ENGINEERING
B.E. VI – Semester (EEE) (CBCS) (Backlog) Examination, March / April 2021

Subject: Electrical Machines-III

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 are the advantages of the field on the rotor of the alternator?
2. What are the different methods of determining the voltage regulation of alternator?
3. What are the conditions for parallel operation of alternators?
4. What are the methods for starting synchronous motors?
5. How synchronous motor can be used to improve power factor?
6. What is the significance of SCR on synchronous generator?
7. What are the advantages and disadvantages of permanent magnet synchronous motors?
8. What are the expressions for the sub transient, transient and steady state reactance's of the synchronous machine?
9. What are the applications of BLDC motors?
10. Compare PM synchronous motor and BLDC motor.

Part-B

Answer any four questions

(4x15=60 Marks)

- 11.a) Derive the expression for the distribution factor of a synchronous machine winding.
 b) A 3ph star connected alternator is rated at 1600kVA, 13500V. The armature effective resistance/ ph= 1.5Ω , and synchronous reactance/ph= 30Ω . Using synchronous impedance method, calculate the percentage regulation for a load of 1280kW at P.F of (a) 0.8 leading, (ii) unity and (c) 0.8 lagging
- 12.a) Why does synchronous impedance method of voltage regulation of an alternator yield pessimistic result?
 b) Explain the steps for finding the voltage regulation by ZPFC of alternator.
- 13.a) Draw the vector diagram representing Blondel's two reaction concept of a synchronous motor.
 b) Using vector diagrams, describe the effects of change of excitation of a synchronous motor on its power factor for a constant load and draw the V curves for various loads.
- 14.a) Explain the sub transient, transient and steady state reactance's of the synchronous machine.
 b) Explain the principle of operation of permanent magnet synchronous motor and its constructional details.
- 15.a) Explain the construction and operation of brushless DC motor.
 b) Derive the expression for the torques in the reluctance motor and draw the torque angle characteristics.
- 16.a) A 400V, 50Kva, 0.8 PF leading, delta connected 50Hz synchronous machine has a synchronous reactance of 3Ω and negligible armature resistance. Its friction and windage losses are 2kW and core losses are 1.5kW. Initially the shaft load is 10kW and the PF of the motor is 0.8 leading. (i) Determine the line current, armature current, and the excitation voltage.
 b) Derive the expression for the real power input of salient pole synchronous motor in terms of X_d and X_q .
- 17.a) Explain the effect of armature reaction under UPF, lag and leading loads of a 2 pole synchronous generator with diagram.
 b) What are the different modes of switched reluctance motors?

FACULTY OF ENGINEERING
BE VI - Semester (EIE) (CBCS) (Backlog) Examination, March / April 2021

Subject: Bio-Medical 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 Bio-potential.
- 2 Define any two characteristics of biomedical instrument.
- 3 Define monopolar recording in EEG.
- 4 Draw the block diagram of Electromyograph.
- 5 Define cardiac cycle.
- 6 Define systolic and diastolic pressure.
- 7 Explain bremsstrahlung X-ray radiation.
- 8 List any four applications of laser in medical field.
- 9 Define threshold of perception.
- 10 Define leakage current.

PART – B

Answer any four questions.

(4x15= 60 Marks)

- 11 (a) Explain the need of carrier amplifier in biomedical recording system.
(b) Explain the need of phase detector in LVDT.
- 12 (a) Explain in detail mechanical conduction of heart with neat diagram.
(b) Explain in detail natural pacemaker.
- 13 (a) Explain Riva rocci method in detail.
(b) Discuss the generation and characteristics of heart sounds.
- 14 (a) List the advantages and disadvantages of laser surgery.
(b) Explain in detail image intensifier with neat sketch.
- 15 Explain micro shock and macro shock in detail and their effect on the physiological behavior of the patient.
- 16 (a) Discuss the plethysmographic technique for measuring blood flow in detail.
(b) Write advantages and disadvantages of CT scan.
- 17 (a) List the specifications of ECG recorder.
(b) Explain about collimators and grids.

FACULTY OF ENGINEERING
BE VI - Semester (ECE) (CBCS) (Backlog) Examination, March / April 2021

Subject: Digital Communication

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 are the advantages of digital over analog communication?
- 2 Briefly discuss the laws of companding.
- 3 Define the following terms:
 - (a) Uncertainty
 - (b) Information
- 4 Define source coding and line coding.
- 5 Explain the need for error control coding.
- 6 Differentiate between LBC's and convolutional codes.
- 7 What is base band digital transmission?
- 8 Explain matched filter receiver in brief.
- 9 Discuss the properties of PN sequences.
- 10 Define processing gain and jamming margin.

PART – B

Answer any four questions.

(4x15= 60 Marks)

- 11 (a) With a neat sketch explain the working of a PCM system.
 (b) In telephone channels, each and limited to 3.4 KHz, are to be time division multiplexed by using PCM. Calculate the band width of PCM system for 128 quantization levels and on 8 KHz sampling frequency.

- 12 Consider a sequence of letters of English alphabet with their probabilities of occurrence as given below

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

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

- 13 The generate polynomial of a (7,4) cyclic code is $g(x)=x^3+x+1$. Find the code words in systematic and non-systematic methods for the message vectors 1010,1100 and 1101.
- 14 With a neat block diagram explain the generation and demodulation of ASK and also calculate its probability of error P_e .
- 15 (a) With a neat diagram explain frequency hopping spread spectrum techniques.
 (b) Explain acquisition of DS signal using coarse synchronization.
- 16 (a) State and prove properties of mutual information.
 (b) What is meant by M-ary signalling? What are the advantages and disadvantages of M-ary signalling over binary signaling?
- 17 Write short notes on the following:
 - (a) Vocoders.
 - (b) BCH codes.

FACULTY OF ENGINEERING

B.E. VI - Semester (Mech.) (CBCS) (Backlog) Examination, March/ April 2021

Subject : Metal Cutting and Machine Tools

Time: 2 Hours

Max. Marks: 70

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

PART – A

Note: Answer any Five Questions

(5x2 = 10Marks)

- 1 Illustrate the applications of HSS material.
- 2 Show the nomenclature of SPC tool.
- 3 List the various tool wear observed during orthogonal cutting
- 4 What is tool life? Discuss
- 5 Contrast up milling with down milling process
- 6 Distinguish between shaper and slotter machines
- 7 What is honing process?
- 8 Summarize buffing process
- 9 List the merits and demerits of AJM
- 10 Compare jig with fixture

PART – B

Note: Answer any Four Questions

(4x15 = 60Marks)

- 11 a) Contrast continuous chips with discontinuous chips
b) Explain Merchant Circle of machining forces
- 12 a) Demonstrate various mechanisms of tool wear.
b) Explain different techniques of cutting fluids applications.
- 13 a) Explain any four operations on drilling machine.
b) Describe any one mechanism of shaper quick return machining
- 14 a) Explain gear grinding process.
b) Explain centerless grinding process.
- 15 a) Discuss working of EDM
b) Explain the principle of 6 points (3-2-1) location of a component.
- 16 a) Build nomenclature of SPCT by ASA method.
b) Contrast between Capstan and Turret Lathes.
- 17 a) Write Short Notes on ECM
b) Describe Thread rolling Process

FACULTY OF ENGINEERING
BE VI - Semester (Prod) (CBCS) (Backlog) Examination, March / April 2021

Subject: Metal Casting & Welding

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 Distinguish between pattern and casting.
- 2 Define the term gating ration used in gating system.
- 3 Explain the requirement of riser.
- 4 What normally constitute the charge in a cupola furnace?
- 5 Give reasons for occurrence of weld spatter.
- 6 In which welding process flux is used in the form of granules.
- 7 What is the principle of thermit welding?
- 8 Differentiate between brazing and soldering operations.
- 9 Define weld ability
- 10 Explain the objectives of weld ability testes.

PART – B

Answer any four questions.

(4x15= 60 Marks)

- 11 (a) Describe various pattern materials and give their applications.
(b) Distinguish between progressive and directional solidification.
- 12 (a) Explain Die casting process mentioning its advantages, disadvantages and applications.
(b) Write short notes on liquid penetrant testing.
- 13 (a) Describe SMAW process with neat sketch and give its applications.
(b) Describe process oxyacetylene welding and sketch different types of flames.
- 14 (a) Sketch and explain resistance projection welding process.
(b) Explain various welding defects and mention their causes and remedies.
- 15 (a) Distinguish between thermoplastic and thermosetting plastics.
(b) Explain the process of plastic extrusion with the neat sketch and mention its applications.
- 16 (a) Explain the use of cores in making castings and mention is types.
(b) Compare straight polarity ad reverse polarity in arc welding.
- 17 Write short notes on any two of the following:
 - (a) GFN.
 - (b) Cruciform test.
 - (c) Welding defects & remedies.

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

1. List out the materials used for (a) connecting rod (b) Crank shaft.
2. What is meant by whipping of a connecting rod and what is its effect?
3. What is nipping in a leaf spring?
4. Sketch a semi elliptical leaf spring assembly and identify various parts in it.
5. Explain the following terms as applied to rolling contacts bearings. (a) Static load carrying capacity (b) Dynamic load carrying capacity.
6. Define basic load rating of a ball bearing.
7. State the fundamental law of gearing.
8. What is herringbone gear? Where they are used?
9. State any four advantages of gear drive over other types of drives.
10. What is Ray-diagram of a gear box.

PART – B**Answer any four questions.****(4 x 15 = 60 Marks)**

11. Design a cast iron piston for single acting four stroke engine for the following specifications: Cylinder bore = 100mm; Stroke = 120 mm, Maximum gas pressure = 5 N/mm²; Break mean effective pressure = 0.65 N/mm²; fuel Consumption = 0.23 Kg/KW/hr Speed = 2200rpm.
12. A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75mm. 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. Design a leaf spring for the following specifications: Total load = 140 kN; No. of springs supports the load = 4; Max No. of leaves = 10, Span of spring is 1000mm. Permissible deflection = 80 mm, G=200kN/mm², allowable stress in spring material as 600 MPa.
14. A journal bearing 60mm 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.
15. A ball bearing is operating on a work cycle consists of three parts as follows. A radial load of 2500 N at 1200 rpm for one quarter cycle. A radial load of 4500 N at 900 rpm for one 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.
16. Discuss the design procedure of spur gears.
17. Explain the following: i) Thickness of the cylinder wall ii) Bore and length of the cylinder iii) Cylinder flange and studs iv) Cylinder head.

FACULTY OF ENGINEERING
BE VI - Semester (CSE) (CBCS) (Backlog) Examination, March / April 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 Explain asymptotic notations?
- 2 What is weighting union?
- 3 Define principle of optimity?
- 4 What is Hamiltonian cycle?
- 5 Define polynomial equivalence of problems?
- 6 What is DFS? And list its applications?
- 7 What is depth first search?
- 8 List out the NP-Hard code generation problems?
- 9 Define the properties of LC-Search?
- 10 State purging rule and list out its applications?

PART – B

Answer any four questions.

(4x15= 60 Marks)

- 11 Write an algorithm to sort the given number using sort and derive the complexity.
12,15,4,11,13,10
- 12 (a) Write an algorithm to delete an element from max heap?
(b) Construct a hash table of size 10 for the given keys by using the hash function $H(k)=k \bmod 10$ and using linear probing 15,17,8,25,36,75,95,1.
- 13 (a) Explain what are NP-Hard and NP-Complete problems?
(b) Explain node cover decision problem?
- 14 Explain the purpose of solving single source shortest path using greedy method?
- 15 State and explain cook's theorem?
- 16 Draw the portion of the state space generated by LCBB for the knapsack instance. $n=4, (p_1, p_2, p_3, p_4)=(10, 10, 12, 18), (w_1, w_2, w_3, w_4)=(2, 4, 6, 9)$ and $m=15$.
- 17 Write short notes on any two:
 - (a) Control abstraction for dynamic programming
 - (b) Node cover decision problem
 - (c) Graph colouring

FACULTY OF ENGINEERING
BE VI - Semester (IT) (CBCS) (Backlog) Examination, March / April 2021

Subject: Design & Analysis of Algorithms

Time: 2 Hours

Max .Marks: 70

PART – A

Answer any five questions.

(5x2=10 Marks)

- 1 Arrange the following function increasing order n , n^2 , $\log n$, $n \log n$, n^3
- 2 Show that if $f(n) = a_m n^m + \dots + g_1 n + a_0$ then $f(n) = O(n^m)$.
- 3 Write any two characteristics of greedy algorithm?
- 4 Differentiate subset para diagram & ordering para diagram.
- 5 State and explain principle of optimality
- 6 Explain the properties of strongly connected components
- 7 How can we represent the solution for 8 queen problem?
- 8 Write the control algorithm for Lc search.
- 9 What is meant by non-dilemmatic algorithm?
- 10 What is the related b/n WP hand & WP cup cute?

PART – B

Answer any four questions.

(4x15= 60 Marks)

- 11 (a) Show that $f(n)+g(n)=o(n^2)$ where $f(n)=3n^2 - n+4$ and $g(n)=n \log n +5$
 (b) Explain how time complexity of an algorithm is computed?
- 12 (a) Differentiate between divide & longer method and greedy method.
 (b) State the greedy knapsack? Find an optimal solution to the knapsack mistral $n=3$, $m=20$
 $(p_1, p_2, p_3) = (25, 24, 15)$ & $(w_1, w_2, w_3) = (18, 15, 10)$
- 13 Write dynamic programming solution for the travelling sales person problem for the network with cost adjacency matrix. Assume node 1 as the home city

[0	10	15	30]
	4	0	9	11	
	5	13	0	10	
	7	7	8	0	
- 14 (a) Define backtracking. Describe the 4 queen's problem using backtracking?
 (b) Briefly explain graph coloring using backtracking?
- 15 (a) Compare and construct between NP-hard and NP-complete.
 (b) Briefly explain cooks-theora
- 16 (a) What is minimum spanning tree? Explain the kruskal's algorithm to find the minimum spanning tree by taken an illustrative graph?
- 17 Give short notes on:
 - (a) Hashing
 - (b) H cap
 - (c) State space tree