

R16

III B.TECH I SEM

SUPPLEMENTARY EXAMINATIONS

MARCH / APRIL 2024



Subject Code: R16CE3105

III B.Tech I Semester Supple Examinations, March-2024
TRANSPORTATION ENGINEERING-I
(CE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.
Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Write about the classification of roads?
- (b) What are the important factors on which the highway geometric design depends?
- (c) Define spot speed, running speed, Space-Mean speed and Time Mean Speed?
- (d) List the tests on bitumen emulsion?
- (e) Write the points of difference on 'Flexible and Rigid pavements'?
- (f) List various types of rigid pavement failures.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Discuss the second twenty year road plan of 1961-81 and its salient features?
- (b) What are various surveys to be carried out before planning a highway system explain briefly?
3. (a) Derive an expression for calculating the overtaking sight distance on a highway.
- (b) Calculate the extra width of pavement required on a horizontal curve of radius 700m on a two lane highway, the design speed being 80 kmph. Assume wheel base $l = 6$ m.
4. (a) Explain how the speed and delay studies are carried out. What are the various uses of speed and delay studies?
- (b) Explain about the concept of level of service.
5. (a) What are the factors on which the strength characteristics of soil depend?
- (b) List different tests on road aggregates and mention their advantages and limitations.
6. (a) Explain CBR method of pavement design. How is this method useful to determine thickness of component layers as per IRC recommendations?
- (b) Describe Westergaard's stress equation for wheel loads in CC pavements.
7. (a) Write down the construction procedure for water bound macadam road.
- (b) Explain the features, characteristics and advantages of the following types of overlays over CC pavements: (i) bituminous pavement layers (ii) un – bonded CC overlay (iii) partially bonded CC overlay.

Subject Code: R16EE3101

III B.Tech I Semester Supple Examinations, March-2024

• POWER SYSTEM TRANSMISSION LINES

(EEE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of Part-A and Part-B.

Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

[2+2+2+2+2]

1. (a) Write the draw backs of the solid conductors?
- (b) Write the classification of the transmission lines based on the transmission voltage?
- (c) What are the parameters of the long transmission lines?
- (d) Define the travelling wave on the transmission lines?
- (e) What is meant by the power loss due to corona?
- (f) Where the pin type of insulator is used in the power system network?

PART-B

4 X 12 = 48

2. (a) Derive the expression for the inductance of a three phase double circuit lines with un symmetrical spacing and transposed conductors?
- (b) A single phase 16km line is 7m above the ground and the diameter of the conductor is 1.8cm and are separated by 4.5cm horizontally. Determine the capacitance between the conductors, capacitance between phase and neutral, capacitance when the effect of earth is neglected and the charging current when the line is charged at 33kV, 50Hz supply?
3. (a) Analyze the nominal ' π ' network of the transmission line and derive the A, B, C, D constants?
- (b) An over head transmission line delivers 6800kW at 33kV at 0.86 power factor lagging. The resistance and reactance of each conductor is 4.9 ohms and 6.11 ohms respectively. Find the sending end voltage, percentage regulation and the transmission efficiency?
4. (a) State and prove the Ferranti effect by using the relevant equations?
- (b) Explain the importance of surge impedance and surge impedance loading on the transmission lines?
5. (a) Analyze the reflection and refraction waves of the transmission line ended with a short circuit?
- (b) An over head transmission line with inductance and capacitance per kilo meter length of 1.2mH and 0.06 microfarad respectively connected in series with an underground cable having the inductance and capacitance of 0.04mH/km and 0.5 microfarads respectively. Find the values of reflected and transmitted waves of the voltage and current at the junction due to a voltage surge of 120kV travelling into the junction along the line towards the cable and along the cable towards the line?
6. (a) Explain the need and methods of voltage control in the power system network?
- (b) A synchronous condenser improves the power factor of the load of a 220kW from 0.6 lagging to 0.86 lagging. In addition the motor carries a load of 50kW. Find the leading kVAR taken by the motor, kVA rating of the motor and the power factor at which the motor operates?
7. (a) Analyze the effect of Ice and wind pressure on the calculation of the sag of the conductors?
- (b) Explain the effect of Guard ring to improve the string efficiency of the insulators with necessary equations?



Subject Code: R16EE3102

III B.Tech I Semester Supple Examinations, March-2024

POWER ELECTRONICS

(EEE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Compare Power MOSFET and IGBT
 - (b) What are the drawbacks of source inductance on the performance of phase controlled rectifiers?
 - (c) Compare non circulating and circulating mode of dual converter
 - (d) What is meant by integrated cycle control
 - (e) List the applications of step-up choppers
 - (f) A $1-\phi$ half bridge inverter has a resistive load of $R = 2.4\Omega$ and the D.C. input voltage is $V_s = 48V$. Calculate rms value of output voltage
- [2+2+2+2+2+2]**

PART-B

4 X 12 = 48

2. (a) Describe the different modes of operation of a thyristor with the help of its V-I characteristics? [6]
- (b) Discuss how SCRs suffer from unequal voltage distribution across them during their turn on- and then-off process. [6]
3. (a) What is a freewheeling diode? Draw the circuit diagram of single phase fully controlled bridge rectifier with and without freewheeling diode and explain the operation of the circuit with the help of necessary waveforms. [8]
- (b) A single phase 220 V, 1 kW heater is connected to a half- wave controlled rectifier and fed from a 220 V, 50 Hz ac supply, Determine the power absorbed by the heater when the firing angle $\alpha = 30^\circ$ [4]
4. (a) Explain the principle of working of a three phase half controlled converter supplying to RL load at firing angle of 60° and derive an expression for average load voltage. [8]
- (b) A three phase full converter bridge is connected to a supply voltage of 230v, 50Hz. The source inductance is 4mH. The load current of 20A is constant and ripple free. Determine the overlap angle when the firing angle delay is 20° . [4]
5. Describe the basic principle of working of a 1ϕ to 1ϕ step down cycloconverter for both continuous and discontinuous conduction for a bridge-type cycloconverter at $f_o = f_s/4$ [12]

6. (a) Discuss the operation of buck- boost converter with help of neat circuit diagram and waveforms. [6]
- (b) The boost converter has an input voltage of 6V and average output voltage is 15V, the average load current is 0.5 A at a switching frequency of 20 kHz. If $L = 250 \mu\text{H}$ and $C = 440 \mu\text{F}$. Determine (i) duty cycle (ii) peak value of inductor current (iii) the ripple voltage in filter capacitor [6]
7. (a) Explain the operation of a parallel inverter and mention its merits. [6]
- (b) Explain sinusoidal pulse modulation used for PWM inverters. Write the important features of the same. [6]



Subject Code: R16EE3103

III B.Tech I Semester Supple Examinations, March-2024
ELECTRICAL MEASUREMENTS
(EEE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) How the current transformer and potential transformer are connected in a circuit?
- (b) List the various types of errors in dynamometer type Wattmeter's.?
- (c) How the phase angle is measured in polar type potentiometers?
- (d) What are the different types of resistances?
- (e) List out various bridges used by capacitance measurement and their applications?
- (f) What are the advantages of a digital voltmeter?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

- 2.(a) Derive the necessary torque equation of PMMC instruments and explain in brief the effect of temperature changes in Ammeters.
- (b) Draw the equivalent circuit and phasor diagram of a CT. Derive the expression for its ratio and phase angle errors.
3. (a) Explain testing of single phase energy meter by phantom loading using R.S.S.meter.?
- (b) A dynamometer type wattmeter with its voltage coil connected across the load side of the instrument reads 250 watts. If the load voltage be 200 volts, what power is being taken by load? The voltage coil branch has a resistance of 2000 ohms
4. (a) Explain the term standardization and describe the procedure for standardization for a DC potentiometer.
- (b) Explain the working of a polar type potentiometer with a neat diagram.
5. (a) Explain the procedure for measuring a low resistance with the help of kelvin's double bridge. Derive the relation for finding the unknown resistance.
- (b) Explain the Maxwell's bridge and Schering Bridge?
6. (a) Explain the Ballistic galvanometer with neat sketch.
- (b) Discuss how iron loss of bar samples is determined.
7. (a) Explain the Hysteresis loop using lissajous patterns in CRO?
- (b) Explain the Digital frequency meter and Digital Tachometer?



Subject Code: R16EE3104

III B.Tech I Semester Supple Examinations, March-2024

MICROPROCESSOR AND MICROCONTROLLERS

(EEE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) What is Accumulator?
- (b) What is a subroutine program?
- (c) Define instruction cycle.
- (d) Write a program to add a data byte located at offset 0500H in 2000H segment to another data byte available at 0600H in the same segment and store the result at 0700H in the same segment.
- (e) What is the address stored in stack pointer and program counter after 8051 is reset?
- (f) Give the applications of Micro-Controllers.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain the internal hardware architecture of 8086 microprocessor with neat diagram? [12M]
3. (a) Explain the various addressing modes of 8086 microprocessor with examples? [6M]
- (b) Write an 8086 ALP to find the sum of numbers in the array of 10 elements? [6M]
4. (a) . Explain the 8086 modular programming in detail? [6M]
- (b) Define interrupt and their two classes? Write in detail about interrupt service routine of 8086? [6M]
5. (a) Explain byte and string manipulation of 8086 with examples? [6M]
- (b) Write an assembly language programme to find the largest number and smallest number in the array? [6M]
6. (a) Write the assembly language programme for 8051 to transfer message "SPPUP" serially to 9600 baud, 8 bit data. 1 stop bit continuously. [6M]
- (b) Write a short notes on factors that affect the delay size of 8051. [6M]
7. (a) Explain in details about LED interfacing to 8051. [6M]
- (b) Explain in details about seven segment display interfacing to 8051. [6M]

Subject Code: R16EE3105

III B.Tech I Semester Supple Examinations, March-2024
SIGNALS AND SYSTEMS
(EEE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of Part-A and Part-B.
 Answering the question in Part-A is Compulsory & Four Questions should be answered from Part-B
 All questions carry equal marks of 12.

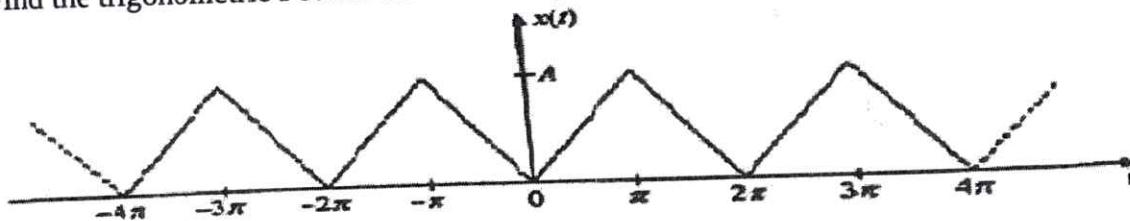
PART-A

1. (a) Plot unit step function advanced in time by 4 seconds. (2M)
- (b) Mention the relationship between trigonometric and exponential Fourier series coefficients. (2M)
- (c) Explain the Dirichlet's conditions of Fourier Transform. (2M)
- (d) Define Transfer function of a system. (2M)
- (e) State the Sampling Theorem. (2M)
- (f) Explain any two properties of convolution. (2M)

PART-B

2. (a) Prove that $\cos(n\omega_0 t)$ and $\sin(m\omega_0 t)$ are orthogonal over any interval $(t_0, t_0 + 2\pi/\omega_0)$ for integral values of n and m . (6M+6M)
- (b) Estimate the mean square error value of a function $x(t)$. When represented in terms of $x_1(t)$

3. Find the trigonometric Fourier series for the periodic signal $x(t)$ as shown in fig (12M)



4. (a) Find the Fourier transform of $x(t) = te^{-at} u(t)$. (6M)
- (b) State and prove the following properties of Fourier Transform (6M)
 - (i) Differentiation in time domain (ii) Parseval's energy theorem
5. (a) Explain the characteristics of Ideal Low pass, high pass, and Band pass filters? (6M)
- (b) Derive the Relationship between bandwidth and rise time. (6M)
6. (a) State and Prove Sampling Theorem for Band Limited signals. (6M)
- (b) Explain the reconstruction process of the signals in sampling. (6M)
7. (a) Compute the convolution $y(t)$ of the given signals $x(t) = 3u(t-4) - 4u(t-6)$, $h(t) = 3u(t)$. (6M)
- (b) List the properties of auto correlation function. (6M)



Subject Code: R16EE3106

III B.Tech I Semester Supple Examinations, March-2024
RENEWABLE ENERGY SOURCES
(EEE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Distinguish between diffuse radiation and beam radiation.
- (b) Define Sensible in solar energy storage.
- (c) What are the constituents of biogas?
- (d) What are the main types of OTEC power plants?
- (e) What is the difference between See-beck and Peltier effect?
- (f) What is seeding in MHD power generation?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain the different angles that are used in solar radiation geometry. [6]
- (b) Explain in detail, the solar radiation on tilted surfaces. [6]
3. (a) What are the applications of solar ponds? [6]
- (b) What are the advantages and disadvantages of PV solar energy conversion system? [6]
4. (a) Explain the working of Wind Energy Conversion System (WECS) with main components. [6]
- (b) Discuss briefly different methods used for extracting energy from Biomass. [6]
5. (a) Explain about the nature of Geothermal fields. [4]
- (b) Explain in brief the principles of obtaining energy from the tides. [4]
- (c) Derive the expressions for P.E and K.E of the wave energy. [4]
6. (a) What are the advantages and disadvantages of Thermo electric Power generation? [6]
- (b) Explain the working of Thermo electric Power generator. [6]
7. (a) What are MHD generators? Explain its principle and working. [6]
- (b) What are the advantages and limitations of MHD systems? [6]



Subject Code: R16ME3104

III B.Tech I Semester Supple Examinations, March-2024

PRINCIPLES OF MACHINE DESIGN

(ME)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) What do you mean by factor of safety?
 - (b) Write a note on the influence of various factors of the endurance limit of a ductile material.
 - (c) Differentiate between riveted and welded joint.
 - (d) What are the applications of a cottered joint ?
 - (e) What is the effect of keyway cut into the shaft ?
 - (f) What is the function of a spring? In which type of spring the behaviour is non-linear?
- [2+2+2+2+2+2]**

PART-B

4 X 12 = 48

- 2 (a) Write short notes on the following: **[6]**
 - (i) Interchangeability
 - (ii) Tolerance
 - (iii) Allowance
- (b) A mild steel rod of 12 mm diameter was tested for tensile strength with the gauge length of 60 mm. Following observations were recorded: **[6]**

Final length= 80 mm
Final diameter= 7 mm
Yield load= 3.4 kN and
Ultimate load= 6.1 kN.
Calculate:

 1. yield stress,
 2. ultimate tensile stress,
 3. percentage reduction in area, and
 4. percentage elongation
- 3 (a) A machine component is subjected to a flexural stress which fluctuates between + 300 MN/m² and – 150 MN/m². Determine the value of minimum ultimate strength according to **[8]**
 1. Gerber relation
 2. Modified Goodman relation and
 3. Soderberg relation.

Take yield strength=0.55 Ultimate strength; Endurance strength=0.5 Ultimate strength; and factor of safety = 2.
- (b) Illustrate how the stress concentration in a component can be reduced. **[4]**

- 4 (a) Enumerate the list of failures of riveted joints. [4]
- (b) A double riveted double cover butt joint in plates 20 mm thick is made with 25 mm diameter rivets at 100 mm pitch. The permissible stresses are: $\sigma_t = 120$ MPa; $\tau = 100$ MPa; $\sigma_c = 150$ MPa. Find the efficiency of joint, taking the strength of the rivet in double shear as twice than that of single shear. [8]
- 5 (a) Design and draw a cotter joint to support a load varying from 30 kN in compression to 30 kN in tension. The material used is carbon steel for which the following allowable stresses may be used. The load is applied statically.
Tensile stress = compressive stress = 50 MPa ; shear stress = 35 MPa and crushing stress = 90 MPa. [8]
- (b) A solid shaft is transmitting 1 MW at 240 r.p.m. Determine the diameter of the shaft if the maximum torque transmitted exceeds the mean torque by 20%. Take the maximum allowable shear stress as 60 MPa. [4]
- 6 Design and draw a bush type flexible flange coupling to transmit 15Hp at 960 rpm allowable shear stress for the shaft and key may be taken as 53.5N/mm^2 . The shear stress in the bolts should not exceed 35N/mm^2 . The bearing pressure between the bush and coupling should be 2N/mm^2 . [12]
- 7 (a) Find the maximum shear stress and deflection induced in a helical spring of the following specifications, if it has to absorb 1000 N-m of energy. [6]
Mean diameter of spring = 100 mm
Diameter of steel wire, used for making the spring = 20 mm
Number of coils = 30
Modulus of rigidity of steel = 85 kN/mm^2
- (b) Discuss the materials and practical applications for the various types of springs. [6]



Subject Code: R16ME3105

III B.Tech I Semester Supple Examinations, March-2024

OPERATIONS RESEARCH

(ME)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) list out any four Operations Research models.
- (b) Explain how to solve an unbalanced Transportation Problem.
- (c) Enumerate the conditions to be verified to convert a 3machine sequencing problem into 2 machine problem?
- (d) Write any 2 applications of Waiting line theory.
- (e) Whai is dominance principle
- (f) What are the phases of Simulation?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. Solve the following LPP using Big-M method.

$$\text{Maximize } Z = 5x_1 + 3x_2$$

subjected

$$x_1 + 2x_2 \leq 12$$

$$2x_1 + 3x_2 = 14$$

$$3x_1 + 4x_2 \geq 16$$

$$x_1 \geq 0, x_2 \geq 0$$

3. Obtain an optimal solution to the following transportation problem if the cell entries represent transportation cost/unit.

	Destination				
Origin	1	2	3	4	Supply
1	20	22	17	4	120
2	24	37	9	7	70
3	32	37	20	15	50
Demand	60	40	30	110	

4. There are 7 jobs each of which must go through the machines A and B in the order AB. Processing times in hours are given as

Job No:	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

5. Determine the optimal sequence of these jobs that will minimize the total elapsed time. find idle time for each machine. Consider the following data of a project.

Activity	Predecessor	Duration (weeks)		
		t_o	t_m	t_p
A	-	3	5	8
B	-	6	7	9
C	A	4	5	9
D	B	3	5	8
E	A	4	6	9
F	C, D	5	8	11
G	C, D, E	3	6	9
H	F	1	2	9

- Construct the project network.
- Find the expected duration and variance of each activity.
- Find the critical path and the expected project completion time.
- What is the probability of completing the project on or before 30weeks?

6. The arrival rate and service rate are 25 customers per hour and 35 customers per hour, respectively. Find the following:

- Traffic intensity (utilization factor) of the booking clerk
- Average no. of customers waiting in the system and Queue
- average waiting time per customer in the system and in Queue

7. Reduce the following game by dominance principle and find the value of the game.

		<i>Player B</i>			
		<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>
<i>Player A</i>	<i>I</i>	3	2	4	0
	<i>II</i>	3	4	2	4
	<i>III</i>	4	2	4	0
	<i>IV</i>	0	4	0	8



Subject Code: R16EC3101

III B.Tech I Semester Supple Examinations, March-2024

LINEAR AND DIGITAL IC APPLICATIONS

(ECE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Explain the open loop and closed loop operations of an Op-amp
- (b) List out and compare different types of A/D converters
- (c) List the application of IC 565PLL
- (d) Define Sinking and sourcing currents?
- (e) List out few applications of Comparators
- (f) What is Logic Synthesis?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Draw the basic circuit diagram of an Op-amp differentiator and explain its operation and stability
- (b) What is a voltage follower? What are its features and applications? [6+6]
3. (a) Explain the operation of an Op-amp based weighted resistor Digital to Analog converter through a neat circuit diagram. [6+6]
- (b) Describe in detail the operation of a dual slope Analog to digital converter
4. (a) Explain the functional block diagram of PLL emphasizing the importance of capture range and Lock range [6+6]
- (b) Draw the block diagram of Voltage Controlled Oscillator and explain its operation
5. (a) Draw the Emitter coupled logic circuit diagram and explain its operation
- (b) List out few Comparison of CMOS, TTL and ECL [6+6]
6. (a) Design of Priority encoders and explain its operation [6+6]
- (b) Draw the circuit diagram of Bi-directional Shift Register and explain its operation
7. (a) Draw and explain the Design flow of VHDL [6]
- (b) Explain the following terms in detail [3+3]
 - (i) Objects and Classes
 - (ii) Packages



Subject Code: R16EC3102

III B.Tech I Semester Supple Examinations, March-2024

DIGITAL COMMUNICATIONS

(ECE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) State Sampling Theorem.
(b) List the advantages of QPSK.
(c) What is coherent reception?
(d) Define entropy and give its equation.
(e) What are Hamming codes?
(f) How are convolutional codes different from block codes? Describe.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain the operating principle of Delta Modulation (DM) with necessary equations. Also explain the operation of DM transmitter and receiver with neat diagrams. [8M]
(b) A television signal with a bandwidth of 4.2 MHz is transmitted using binary PCM. The number of quantization levels is 512. Calculate code word length and transmission bandwidth. [4M]
3. (a) Discuss in detail about the principle, generation and reception of BPSK. [8M]
(b) Draw and explain the signal space representation of QPSK signal. [4M]
4. (a) Calculate the error probability of ASK. [6M]
(b) Explain briefly about matched filter and its impulse response. [6M]
5. (a) Explain Shannon-Fano coding with an example. [8M]
(b) What is mutual information? State its properties. [4M]
6. (a) Discuss the error detection and error correction capabilities of linear block codes. [8M]
(b) Write short notes on BCH codes. [4M]
7. (a) Describe in detail about Viterbi decoding algorithm with an example. [8M]
(b) Draw the state diagram and tree diagram for $k=3$, rate $1/3$ code generated by $g_1(X) = X + X^2$, $g_2(X) = 1 + X$ and $g_3(X) = 1 + X + X^2$. [4M]

Subject Code: R16EC3103

III B.Tech I Semester Supple Examinations, March-2024
ANTENNA AND WAVE PROPAGATION
(ECE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

- (a) Outline the conditions for radiation from a single wire.
(b) Draw the current distribution from a centre-feed linear dipole, if the length of the dipole is $\lambda/2$.
(c) Given a linear, broadside, uniform array of 10 isotropic elements ($N = 10$) with a separation of $\lambda/4$ between the elements, find the directivity of the array.
(d) Design '3' element Yagi Antenna to operate at a frequency of 172MHz.
(e) List the applications of the Horn antenna.
(f) Explain the terms skip distance and critical frequency with suitable sketches.

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

- (a) Develop the relation between maximum effective area and maximum directivity of an antenna. [6+6]
(b) Find the Directivity, Beam Width, HPBW for source having radiation intensity of $U(\theta, \Phi) = 5\cos^2\theta$
- Derive the expression for radiation resistance of a short (Hertzian) electric dipole starting from far field expressions. [12]
- (a) Show that the peaks of the array factor of an N-element uniform array are given by the solution [6+6]

$$AF = \frac{\sin(N\psi/2)}{N \sin \psi/2}$$

- (b) Explain in detail the design procedure of a binomial array.
- (a) With neat sketches, discuss about the folded dipole and its input impedance. [6+6]
(b) Design a helical antenna operating in the axial mode that gives a directivity of 14 dB at 2.4 GHz. For this helical antenna, calculate the input impedance, half-power beamwidth, beamwidth between the nulls, and the axial ratio. (Note: Assume Circumference $C : 0.8$ to 1.2 and Pitch angle : 12 to 14 degree)
- (a) How the radiation pattern of the antenna under test is measured? Explain the complete setup of radiation pattern measurement. [6+6]
(b) Classify different feeding methods for microstrip antenna
- (a) Calculate the maximum single-hop distance for skywave propagation over spherical earth. [6+6]
(b) Write short notes on the following topics:
 - M-curve Propagation
 - Duct Propagation



Subject Code: R16EC3104

III B.Tech I Semester Supple Examinations, March-2024
COMPUTER ORGANIZATION AND MICROPROCESSORS
(ECE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from **Part-B**
All questions carry equal marks of 12.

PART-A

1. (a) Explain various Computer Registers in Computer Organization
- (b) Explain the importance of interrupt service routine
- (c) Differentiate the operation of SRAM and DRAM
- (d) Explain Bus generation operation in 8086
- (e) Tabulate the differences between microcontroller and microprocessor
- (f) Explain the modes of operation of 8279 chip

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

2. (a) Explain the design of Control Unit for Computer Organization [6]
(b) Apply the 1's complement and 2's complement method for the following subtraction operation $(1010110001)_2 - (0101001101)_2$. [6]
3. (a) With neat sketch explain Instruction Cycle of Computer Organization ? [6]
(b) Explain the differences between RISC and CISC processor [6]
4. (a) Compare the operation of Synchronous DRAM and Rambus DRAM [6]
(b) Write an ALP to move 10 blocks of data from one memory to another [6]
5. (a) Explain with neat sketch I/O addressing of 8086 ? [6]
(b) Explain the purpose of flag register in 8086? Mention the different bits of flag register in 8086 [6]
6. (a) Explain the various instruction formats of 8086 processor with examples? [6]
(b) Summarize the timing diagrams of Maximum Mode of 8086 for the following [6]
 - i) Read operation
 - ii) Write operation
 - iii) $\overline{RQ}/\overline{GT}$
7. (a) Explain the interfacing of DMA Controller 8257 with 8086 processor [6]
(b) Demonstrate the interfacing mechanism of 8279 for the keyboard application. [6]

III B.Tech I Semester Supple Examinations, March-2024

AUTOMOTIVE ELECTRONICS (OPEN ELECTIVE-I)

(ECE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

[2+2+2+2+2+2]

1.	(a)	Mention the use of 'Electronics in the Automobile'.	[2M]
	(b)	Define Combinational and sequential circuits.	[2M]
	(c)	Describe the purpose of accumulator registers in CPU operations.	[2M]
	(d)	What is Brake Specific Fuel Consumption (BSFC), and how is it measured?	[2M]
	(e)	How do solenoids contribute to the operation of automotive systems?	[2M]
	(f)	What are the primary advantages of using fiber optics inside vehicles?	[2M]

PART-B

4 X 12 = 48

2.	(a)	Explain the role of the cylinder head in an internal combustion engine and its importance in the combustion process.	[6M]
	(b)	Describe the components of the high-voltage circuit in an ignition system and their functions in delivering electricity to the spark plugs.	[6M]
3.	(a)	Explain the operation principles of a field-effect transistor (FET) and how it differs from a standard transistor?	[6M]
	(b)	Describe the internal structure and operation of a decade counter, such as the IC 7490.	[6M]
4.	(a)	Explain the role of the central processing unit (CPU) in a computer system and how it interacts with other components.	[6M]
	(b)	How does a Digital-to-Analog Converter (DAC) convert digital signals into analog signals?	[6M]
5.	(a)	What are exhaust emissions, and why are they a concern in automotive engineering and environmental science?	[6M]
	(b)	Discuss the importance of accurately defining parameters and variables in the design and analysis of control systems.	[6M]
6.	(a)	Describe the role of sensors in automotive control systems and their importance in monitoring various parameters and conditions.	[6M]
	(b)	What is a relay, and how does it function in electrical systems?	[6M]
7.	(a)	Explain the benefits of telematics systems in enhancing vehicle safety, efficiency, and convenience for drivers and passengers.	[6M]
	(b)	What is a GPS navigation system, and how does it function to provide location information and route guidance?	[6M]



III B.Tech I Semester Supple Examinations, March-2024

DESIGN AND ANALYSIS OF ALGORITHMS

(CSE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

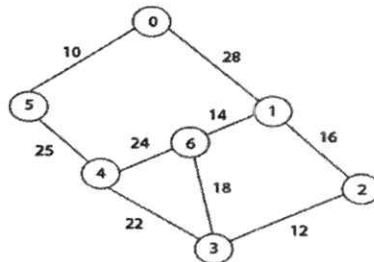
[2+2+2+2+2+2]

1. (a) What is the need for an algorithm.
- (b) What are the advantages of divide and conquer.
- (c) List the applications of greedy algorithms.
- (d) What are the two approaches to dynamic programming. And compare them.
- (e) Define backtracking.
- (f) Write the difference between dynamic programming and the greedy method.

PART-B

4 X 12 = 48

2. (a) Explain the algorithm design techniques in brief
- (b) What are the various asymptotic notations and give suitable examples.
3. (a) Write the quick sort algorithm.
- (b) Apply the quick sort algorithm for the elements 44, 33, 11, 55, 77, 90, 40, 60, 99, 22, 88
4. (a) Utilize the Greedy method to determine an optimal solution to the Knapsack instance $n=3$, $m=20$, $(P_1, P_2, P_3)=(25, 24, 15)$ and $(P_1, P_2, P_3)=(25, 24, 15)$
- (b) What is a minimum spanning tree? Apply Prim's algorithm for the given example.



5. (a) Solve the following instance of 0/1 Knapsack problem using Dynamic programming $n=3$, $M=4$, $(W_1, W_2, w_3) = (3, 5, 7)$ and $(P_1, P_2, P_3) = (3, 7, 12)$.
- (b) Explain the Travelling Sales Person with a suitable example.
6. (a) What are the applications of backtracking and apply backtracking to any one of the applications?
- (b) Examine an algorithm for placing 4-queens on 4×4 chess board using backtracking.
7. (a) Distinguish between a branch and bound vs backtracking with an example.
- (b) Apply the Travelling Sales Person problem using branch and bound.

	1	2	3	4	5
1	∞	20	30	10	11
2	15	∞	30	10	11
3	3	5	∞	2	4
4	19	6	18	∞	3
5	16	4	7	16	∞



Subject Code: R16CS3103

III B.Tech I Semester Supple Examinations, March-2024

COMPILER DESIGN

(CSE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from **Part-B**

All questions carry equal marks of 12.

PART-A

1. (a) What is a pre-processor? Mention its objectives.
- (b) What is recursive decent parsing?
- (c) Define inherited and synthesized attributes.
- (d) What is three-address code? Give an example.
- (e) Draw the typical structure of an activation record.
- (f) What is dead code?

[2+2+2+2+2+2]

PART-B

4 X 12 = 48

1. (a) Describe the phases of a compiler and show the transformation that takes after each phase in translating the statement:
 $S=(a+b+c)/2$. Assume that all variables are double. [6]
- (b) Write regular expressions & FA for the following informally described languages: [6]
All strings of a's and b's with the subsequence abb.
All strings of a's and b's with an even number of a's and an odd number of b's..
2. (a) Explain the procedure for eliminating ambiguity and eliminating left recursion from a grammar. Give an example. [6]
- (b) Consider the grammar [6]
 $E \rightarrow E + T \mid E - T \mid T, T \rightarrow T * F \mid T / F \mid F, F \rightarrow (E) \mid id$
Show the sequence of moves made by shift reduce parser for the input string $id1+id2*id3$ is accepted or not.
3. Write the procedure for constructing CLR parsing table and construct canonical LR(1) items for the grammar [12]
 $S \rightarrow B B, B \rightarrow a B \mid b$
4. (a) Write the quadruples, triples and indirect triples for the expression [8]
 $-(a+b)*(c+d)-(a+b+c)$
- (b) Discuss syntax directed definition by defining synthesized and inherited attributes. [4]
5. (a) What are the principles associated with designing calling sequences and the layout of activation records? [6]
- (b) Explain peep-hole optimization and loop optimization. [6]
6. (a) How to access non-local data? Explain implication details with example [6]
- (b) Explain the following i) Instruction Scheduling ii) Elimination of Loop invariant variable.[6]
