MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year II Semester (R18) Supplementary End Semester Examinations – March

ECONOMICS & FINANCIAL ACCOUNTING FOR ENGINEERS

(Common to ME, CSE, CSIT, CST)

Time: 3Hrs   Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q. no 1 are compulsory. In Q. no 2 to 6 answer either Part-A or B only**

Q.1	i.	What are the elements of market economy?	1M
	ii.	Demonstrate Law of Supply.	1M
	iii.	Outline Constant returns to scale.	1M
	iv	Discuss the slope of Iso-quant.	1M
	v.	Define Production Function.	1M
	vi	Illustrate features of Monopoly.	1M
	vii.	Write the uses of Accounting.	1M
	viii	What is a Ledger?	1M
	ix.	State the formula of Current Ratio.	1M
	x.	What is ARR?	1M

Q.2(A)	Determine the problem of scarcity with Illustrations.	10M
	OR	
Q.2(B)	What are the types of Demand? How do you classify the factors that influence Demand?	10M
Q.3(A)	What is Cobb- Douglas production function? Examine he types of Returns to scale.	10M
	OR	
Q.3(B)	Given the following information below: Fixed Cost = Rs.40,000, Profit = Rs. 20,000 and B.E.P. = Rs. 80,000 Find out: a. P/V Ratio , b. Sales and c. Margin of Safety	10M
Q.4(A)	Define Oligopoly. Elucidate features of Oligopoly competition.	10M
	OR	
Q.4(B)	What is Monopoly? Examine price output determination under Monopoly.	10M
Q.5(A)	What is Accounting? Write the differences between Book-Keeping and Accounting.	10M
	OR	
Q.5(B)	Can you Journalize entries from the following transactions: On **April 01, 2016** Anees started business with Rs. 100,000 and other transactions for the month are: **2.** Purchase Furniture for Cash Rs. 7,000. **8.** Purchase Goods for Cash Rs. 2,000 and for Credit Rs. 1,000 from Khalid Retail Store. **14.** Sold Goods to Khan Brothers Rs. 12,000 and Cash Sales Rs. 5,000. **18.** Owner withdrew of worth Rs. 2,000 for personal use. **22.** Paid Khalid Retail Store Rs. 500. **26.** Received Rs. 10,000 from Khan Brothers. **30.** Paid Salaries Expense Rs. 2,000	10M

Q.6(A) How do you categorize Liquidity and Profitability Ratios?   10M

OR

Q.6(B) **The following is the Profit and Loss Account of Burn Ltd.**   10M

	Rs		Rs
To Opening Stock		By Sales	12,70,000
Materials	60,000	By Closing Stock-	
Finished Goods	80,000	Materials	70,000
To Purchases	6,00,000	Finished Goods	1,00,000
(Raw Materials)			
To Factory	1,00,000		
Expenses	3,00,000		
To Wages	2,00,000		
To Other Expenses	1,00,000		
To Net Profit			
Total	14,40,000	Totals	14,40,000

You are required to calculate the following-
1. Stock Turnover Ratio
2. Raw Materials Turnover Ratio
3. Average Material Holding

END

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – March 2021

PRINCIPLES OF MANAGEMENT
(Common to CE, EEE & ECE)

Time: 3Hrs   **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1			
	i.	List out the differences between Organising and Organization.	1M
	ii.	What do you know about Business Ethics.	1M
	iii.	What is confirmation Bias	1M
	iv.	What is Vision?	1M
	v.	Explain Job Enlargement.	1M
	vi.	Distinguish between Innovation Vs Imitation	1M
	vii.	Explain Two factor Theory of motivation.	1M
	viii.	What is Leading?	1M
	ix.	Feed Forward control	1M
	x.	Define Feedback control.	1M

Q.2(A)	Define Management. How would you summarize corporate social responsibility with relevant examples?	10M

OR

Q.2(B)	How would you classify the managerial functions?	10M

Q.3(A)	Write a note on the procedure of strategic management process.	10M

OR

Q.3(B)	What is decision making? Explain styles and conditions of decision making.	10M

Q.4(A)	Can you make use of the facts to explain the concept of Managing change and Innovation?	10M

OR

Q.4(B)	Define HRM. Write about various functions of Human Resource Management?	10M

Q.5(A)	Define Leader. Write about Leadership issues in twenty first century.	10M

OR

Q.5(B)	Can you make use of the facts to explain communication process?	10M

Q.6(A)	Explain in detail on Value chain management?	10M

OR

Q.6(B)	Elaborate feedback control, feed forward control and concurrent control.	10M

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – MARCH 2021

LIFE SCIENCES FOR ENGINEERS
(Common to ME, CSE & CST)

Time: 3Hrs
Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1	i.	Why mitochondria are treated as powerhouse of the cell?	1M
	ii.	Define taxonomy.	1M
	iii.	What are the monomers of proteins?	1M
	iv.	Write any two functions of antibody.	1M
	v.	What is glycolysis?	1M
	vi.	Draw the structure of neuron.	1M
	vii.	Name any one application of recombinant DNA technology.	1M
	viii.	Differentiate mitosis and meiosis processes.	1M
	ix.	Molecule known as energy currency in the cell is _____.	1M
	x.	What are the three main stages of Calvin Cycle?	1M

Q.2(A) (i) List out the differences between prokaryotes and eukaryotes. 10M
(ii) Name any two important discoveries in biology along with their importance.

OR

Q.2(B) (i) Bird flying has inspired and lead to the discovery of aircraft. Discuss the theory and 10M
principle involved in this process.
(ii) What are the characteristics of the cell?

Q.3(A) Discuss in detail the structure of proteins. 10M

OR

Q.3(B) Describe the role of following monomers in the formation of macromolecules: 10M
(i) Monosaccharides   (ii) Nucleotides

Q.4(A) Discuss tricarboxylic acid cycle with a neat diagram. Find out the ATP yield for this 10M
process.

OR

Q.4(B) What are neurons? Illustrate the mechanism of passing action potential through 10M
neuromuscular junction.

Q.5(A) i) Write elaborately on single gene disorders with a schematic illustration and suitable e 10M
(ii) What is DNA recombinant technology? Describe recombinant vaccines.

OR

Q.5(B) Elaborate on DNA replication, transcription & translation processes. 10M

Q.6(A) (i) Show that dismantling (decomposition) of glucose is energetically favourable. 10M
(ii) How cells stay out of equilibrium?

OR

Q.6(B) List out the processes involved in the breakdown of glucose to CO_2 and H_2O. 10M

END

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations –March 2021
ENGINEERING HYDROLOGY
(Civil Engineering)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1	i.	What is anticyclone?	1M
	ii.	What is orographic precipitation?	1M
	iii.	Distinguish between Actual and Potential Evapotranspiration	1M
	iv.	What is Pigmy meter?	1M
	v.	Give one example of recording type gauge for stream flow.	1M
	vi.	What do you mean by Unit Hydrograph	1M
	vii.	What is time of concentration?	1M
	viii.	Distinguish between channel and reservoir routing?	1M
	ix.	What is specific yield of an aquifer?	1M
	x.	What is perched Aquifer?	1M

Q.2(A) Discuss about different forms of precipitation. How do you estimate missing rainfall data? Explain in detail. **10M**

OR

Q.2(B) With suitable example discuss various methods of rainfall measurement. **10M**

Q.3(A) (i) Explain briefly the evaporation process. **3M**
(ii) Discuss the factors that affect the evaporation from water body. **3M**
(iii) What are the various methods of reducing evaporation loss from water body? **4M**

OR

Q.3(B) In a 140-min storm the following rates of rainfall were observed in successive 20-min intervals: 6.0, 6.0. 18.0, 13.0, 2.0, 2.0 and 12.0 mm/h. Assuming ø-index value as 3.0 mm/h and an initial loss of 0.8 mm. determine the total rainfall, net runoff and W-index of the storm. **10M**

Q.4(A) With the help of suitable diagram, explain the method of finding river discharge using area velocity method **10M**

OR

Q.4(B) i) What is Unit Hydrograph? What are the basic assumptions of Unit Hydrograph theory? **5M**
ii) If a 3-h unit hydrograph of triangular shape has time base of 30 hours and peak flow of 20m^3/s, estimate out the total runoff due to 3cm storm in 3 hours. **5M**

Q.5(A) i) What do you understand by the term "Flood Forecasting"? What are the various methods of forecasting flood? **5M**
ii) Using example discuss the Unit Hydrograph method of flood forecasting in brief. **5M**

OR

Q.5(B) Route the following flood hydrograph through a river reach for which K=10.0 h and   10M
x=0.20. At the start of the inflow flood, the outflow discharge is 10m³/s

Time (h)	0	6	12	18	24	30	36	42	48	52
Inflow (m³/s)	10	19	48	62	57	42	37	30	19	13

Q.6(A) Define and explain the following terms   10M
i)Vadose water and pellicular water
ii)Aquifers and Aquicludes
iii)Non-artesian and artesian wells
iv)Permeability and Transmissibility
v)Well losses

OR

Q.6(B) What do you mean by ground water recharge? Enumerate various methods which are   10M
used for this purpose and describe one of them briefly.

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations –March 2021
ENVIRONMENTAL ENGINEERING
(Civil Engineering)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1	i.	Define water demand with examples.	1M
	ii.	State the role of residual chlorine in water.	1M
	iii.	What is meant by detritus tank?	1M
	iv.	Differentiate between unit operations and unit processes in wastewater treatment.	1M
	v.	What are the three methods usually adopted for the disposal of septic tank effluent?	1M
	vi.	State the objectives of grit removal.	1M
	vii.	What is meant by air pollution?	1M
	viii.	Define noise. When a sound causes noise pollution?	1M
	ix.	What adverse effects can solid wastes cause?	1M
	x.	What is a municipal solid waste?	1M

Q.2(A) Design a rapid sand filter for the treatment of water required for a population of   10M
60,000 in a town. The rate of water supply is 180 liters per person per day. The filters
are rated to work at 3000 liters per hour per m2. Assume any other data if necessary
suitably. (Need not design the under water drainage system)

OR

Q.2(B) Why do we prefer rapid sand filter and back wash system and explain with help of a   10M
sketch.

Q.3(A) How to remove water from sludge? Name some of the dewatering techniques? List   10M
the factors affecting on the sludge digestion?

OR

Q.3(B) Describe conservancy and water carriage system and explain their relative advantages   10M
and disadvantages.

Q.4(A) i) Briefly explain biogas recovery.   3M
ii) List and explain the methods of sludge conditioning.   7M

OR

Q.4(B) Examine and design a septic tank for the following data:- i. No of persons = 140   10M
ii. Sewage contribution = 120 LPCD iii. Desludging period = 1 year iv. Length: Breadth
ratio = 1:2.5 v. Design a dispersion trench adopting infiltration rate as 1200 lit/m2 day.

Q.5(A) i) Enumerate the adverse effects and control measure for air pollution   7M
ii) Discuss the measures that should be taken to de-pollute noise pollution.   3M

OR

Q.5(B) i) Give the classification of air pollutants and sources of air pollution.   2M
ii) List the sources, effects and control measures of noise pollution.   8M

Q.6(A) i) List the various disposal techniques of MSW?   3M
ii) Explain the control and prevention measure of municipal solid wastes.   7M

OR

Q.6(B) Examine the characteristics of hazardous and non-hazardous waste and explain their ill effects.   10M

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations –March 2021
STRENGTH OF MATERIALS
(Civil Engineering)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1	i.	Write the definition of three elastic constants.	1M
	ii.	Define modulus of rigidity	1M
	iii.	What is meant by point of contra flexure?	1M
	iv.	Define Slenderness ratio	1M
	v.	Draw shear stress distribution diagram across an I-Section	1M
	vi.	What do you mean by neutral axis?	1M
	vii.	Write the formula for torque transmitted by a solid shaft	1M
	viii.	Write two applications of Mohr circle of stress	1M
	ix.	Write the relation between slope and deflection	1M
	x.	Mention the situations where we need conjugate beam method.	1M

Q.2(A) i. What do you mean by Resilience? Write its applications   4M
ii. Assuming the relation between Young's modulus and Bulk modulus, derive   6M
relationship among all three elastic moduli.

OR

Q.2(B) The compound tube consists of a steel tube 150mm internal diameter and 180mm   10M
external diameter. An outer brass tube 180mm internal diameter and 200mm
external diameter. The tubes are of the same length. The compound tube carries an
axial load of 40kN. Find the stresses and load carried by each tube and the amount of
shortening if length of tube is 140mm. take $E_S=2*10^5$ N/mm^2 and $E_B=1*10^5$ N/mm^2.

Q.3(A) Draw SFD and BMD for the beam shown in Figure.   10M
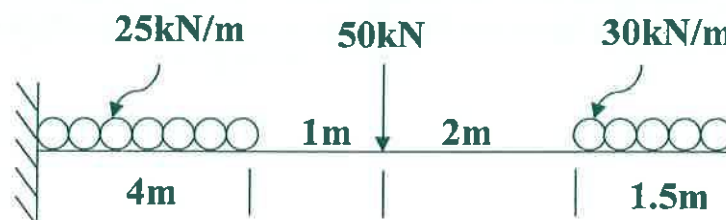

OR

Q.3(B) i. What are the Assumptions made in Euler's Theory   5M
ii. A strut 2.5m long is 60mm in diameter. One end of the strut is fixed while another   5M
end is hinged. Find the safe compressive load for the member using Euler's formula.
Allowing a factor of safety of 3.5.Take $E=2.1x10^5$ N/mm^2.

Q.4(A)   Derive the expression for maximum shear stress and draw the variation across the   10M
triangular section.

OR

Q.4(B)   Draw the shear stress variation diagram for the I-section shown in Figure, if it is   10M
subjected to a shear force of 150kN.
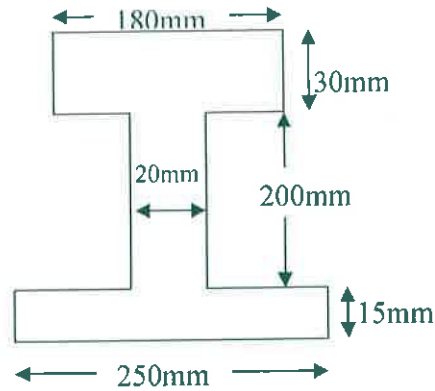
Q.5(A)   State the assumptions and derive the equation of pure torsion.   10M

OR

Q.5(B)   A rectangular block of material is subjected to a tensile stress of 110 N/mm^2 on one   10M
plane and a tensile stress of 47N/mm^2 on the plane right angles to the former. Each of
the above stresses is accompanied by a shear stress of 63N/mm^2. Find (i) the direction
and magnitude of Principal stress and (ii) the magnitude of greatest shear stress.

Q.6(A)   Using moment area method find maximum slope and deflection of (i) SSB subjected to   10M
eccentric pint load, (ii) Cantilever beam subjected to UDL over the entire span.

OR

Q.6(B)   A beam of length 20m is SS at its ends and carries two point loads of 40kN and 100kN   10M
at a distance of 8m and 12m from left end respectively. Calculate (i) deflection under
the each load, (ii) maximum deflection and its location, (iii) slopes at the ends

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations –March 2021
PROBABILITY AND STATISTICS
(Common to CE, EEE)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1	i. If $P(A) = 1/2$, $P(B) = 1/3$, $P(A\cap B)= 1/5$ then $P\left[\dfrac{B^C}{A}\right]$	1M
	ii. Define independence of events?	1M
	iii. Define probability density function?	1M
	iv. If $E(X) = 5$ then $E(7X+5) = ?$	1M
	v. Define continuous joint density function.	1M
	vi. Define covariance between two random variables	1M
	vii. X is the binomial variate with parameters n= 15 and p= 0.2 find variance of X	1M
	viii. Find the value of Z_1 such that $P[- Z_1< Z<Z_1]=0.95$	1M
	ix. Define critical region?	1M
	x. If P=0.5 and the sample size is 75 then the standard error is_____	1M

Q.2(A) (i) State and prove addition theorem on probability?   5M
(ii) A total of 28 percent of American males smoke cigarettes, 7 percent smoke cigars,   5M
and 5 percent smoke both cigars and cigarettes. What percentage of males smoke
neither cigars nor cigarettes?

OR

Q.2(B) In a bolt factory machines M_1, M_2, M_3 manufacture 25%, 35% and 40% of the total of   10M
their output 5%, 4% and 2% are defective bolts. A bolt is drawn at random from the
production and is found to be defective. What is the probability that it was
(i) manufactured by machine A? (ii) manufactured by machines B.

Q.3(A) If p.d.f of a random variable is $f(x) = ce^{-|x|}, -\infty < x < \infty$.   10M
Find i) c value ii) mean iii) variance.

OR

Q.3(B) When X represents the sum points when we roll two fair dice, Compute Mean,   10M
Variance and Standard Deviation of X. Also obtain distribution function of X.

Q.4(A) Given the following bivariate probability distribution, obtain (i) Marginal distributions   10M
of X and Y   (ii) the conditional distribution of X given Y=2

X\Y	0	1	2
-1	1/15	3/15	2/15
0	2/15	2/15	1/15
1	1/15	1/15	2/15

OR

Q.4(B) Verify that $f(x,y) = xye^{-x}e^{-y}$; $x > 0; y > 0$ satisfy the conditions necessary to be a density for a continuous random variable (X,Y). Find the marginal densities for X and Y. Are X and Y independent?   10M

Q.5(A) (i) Let X be a binomial random variable with $E(X) = 7$ and $Var(X) = 2.1$. Find (a) $P(X = 4)$ and (b) $Var(X) = 2.1$ $P(X > 12)$ 5M

(ii) A foundry ships engine blocks in lots of size 20. Before accepting a lot 3 items are selected and tested. Suppose that a given a given lot contains 5 defective items. Find its distribution function, moment generating function, mean and variance of the random variable X.   5M

OR

Q.5(B) (i) Let X be a Gamma random variable with $\alpha = 3, \beta = 4$ 5M
    a) What is the expression for the density for X?
    b) What is the Moment generating function for X?
    c) Find μ, σ^2, σ

(ii) Derive moment generating function of normal distribution?   5M

Q.6(A) (i) In a sample of 500 people from a state 280 take tea and rest take coffee. Can we assume that tea and coffee are equally popular in the state at 5% level of significance?   5M

(ii) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that the proportions of men and women in favour of the proposal, are same against that they are not, at 5% level.   5M

OR

Q.6(B) Samples of two types of electric light bulbs were tested for length of life and following data were obtained: 10M

	Type I	Type II
Sample size	$n_1 = 8$	$n_2 = 7$
Sample mean	$\overline{x_1} = 1,234 hrs$	$\overline{x_2} = 1,036 hrs$
Sample S.D.	$s_1 = 36 hrs$	$s_2 = 40 hrs$

Is the difference in the means sufficient to warrant that type I is superior to type II regarding length of life?

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – March 2021
ELECTROMAGNETIC FIELDS
(EEE)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1	i.	Write down the expression for conversion of Cartesian to Spherical system.	1M
	ii.	Show that the two vectors $A=6x_a+y_a-5z_a$ and $B=3(x_a-y_a+z_a)$ are perpendicular to each other.	1M
	iii.	What is the physical significance of div D?	1M
	iv	Determine the capacitance of a parallel plate capacitor with two metal plates of size 30cm x 30cm separated by 5mm in air medium.	1M
	v.	Distinguish between solenoid and toroid.	1M
	vi	State the Lorentz force equation.	1M
	vii.	Find the emf induced in a circuit having an inductance of 700μH if the current through it varies at the rate of 5000A/sec.	1M
	viii.	Write down the Maxwell"s equations in point form. From Ampere"s Law.	1M
	ix.	State Poynting theorem	1M
	x.	Write down the wave equations for E and H in a non-dissipative (free space) medium	1M

Q.2(A)	For a vector field A, show explicitly that $\nabla \cdot \nabla \times A = 0$; that is, the divergence of the curl of any vector field is zero.	10M
	OR	
Q.2(B)	i)Discuss vector transformation from spherical to cylindrical system.	6M
	ii)what is the significance of gradient operator	4M

Q.3(A)	Derive the capacitance of a coaxial cable.	10M
	OR	
Q.3(B)	Define Conduction current density and derive expression for point form of Ohm's law	10M

Q.4(A)	i) State Biot- savart's law.	3M
	ii) Obtain the self-inductance of Toroid by considering required dimensions	7M
	OR	
Q.4(B)	Derive the expression for Force on a straight conductor placed in a magnetic field.	10M

Q.5(A)	Derive the expression for displacement current.	10M
	OR	
Q.5(B)	Explain modification of Maxwell's equations for time varying fields.	10M

Q.6(A)	Explain the following in detail.	10M
	i)Skin Dept ii) Significance pointing theorem.	
	OR	
Q.6(B)	Discuss the Uniform Plane Wave Motion in Free Space in detail	10M

END

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Supplementary End Semester Examinations –March 2021

CONTROL SYSTEMS
(EEE)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1	i	Define open loop and close loop system.	1M
	ii	Write the basic components of block diagram.	1M
	iii	What is rise time tr?	1M
	iv	Define steady state error.	1M
	v	What is BIBO stability?	1M
	vi	State Nyquist stability Criteria.	1M
	vii	What is breakaway and breakin points?	1M
	viii	What is lead lag compensator.	1M
	ix	Define state of a system?	1M
	x	Write about State transition matrix.	1M

Q.2(A) (i) Write the steps for block diagram reduction technique.   5M

(ii)Obtain mason's gain formula   5M

OR

Q.2(B) Write the differential equations for the mechanical system shown in figure. Also   10M
obtain an analogous electrical circuit based on force-current analogy.
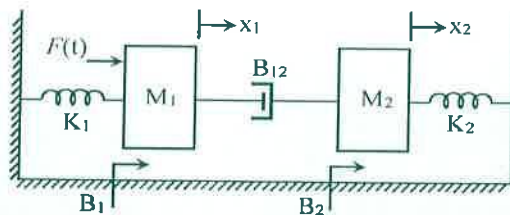
Q.3(A) Derive the expressions for step response of a second order system for different cases   10M
of damping ratio.

OR

Q.3(B) Derive the expressions for rise time, peak time and peak overshoot for under damped   10M
second order system.

Q.4(A) The characteristic equation of a system is $s^3 + Ks^2 + (K - 3)s + 4 = 0$. What will   10M
be the range of K for the system to be (a) Stable (b) Marginally stable

OR

Q.4(B) Sketch the root locus for unity feedback system with open loop transfer function   10M
$G(s) = \dfrac{K}{s(s^2 + 8s + 32)}$

Q.5(A) Draw the bode plot and find the gain margin and phase margin of a system   10 M
represented by

$$G(s)H(s) = \frac{10(s+1)}{s(s+0.05)(s+3)(s+5)}$$

OR

Q.5(B) The open loop transfer function of a unity feedback system is given by   10M
$G(s) = \frac{1}{s^2(1+s)(1+2s)}$.   Sketch the polar plot and determine the gain and phase
margin.

Q.6(A) Construct the state model for a system characterized by differential equation   10M

$$\frac{d^3y}{dt^3} + 6\frac{d^2y}{dt^2} + 11\frac{dy}{dt} + 6y = u$$

OR

Q.6(B) Obtain the state space representation of a field-controlled DC motor   10M

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B. Tech II Year II Semester (R18) Supplementary End Semester Examinations – March 2021
INDUCTION & SYNCHRONOUS MACHINES
(EEE)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1			
	i.	Define pitch factor .	1M
	ii.	A 4-pole alternator having 72 stator slots coil span is 1-15. Find the pitch factor of the winding	1M
	iii.	What is a Synchronous Condenser?	1M
	iv	Define Synchronous Impedance of an alternator.	1M
	v.	What is the effect of increase in the excitation of a synchronous motor?	1M
	vi	A synchronous motor runts at Ns at full load conditions, What will be its speed if the load is reached to half the full load	1M
	vii.	A 3-phase, 4-pole, 60Hz Induction motor has a full load slip of 4%, what is its actual speed.	1M
	viii.	What is an Induction Generator?	1M
	ix.	Give the limitations of stepper motor.	1M
	x.	Give the applications of SR motors.	1M

Q.2(A) (i) Calculate the distribution factor for a 3-phase distributed single layer winding of the armature of an alternator. The alternator has 2 poles and a total of 18 slots   **4M**
(ii) Describe the advantages of providing field winding on the rotor and armature winding on the stator in case of large synchronous machine   **6M**

OR

Q.2(B) (i) A 50 Hz, 3-phase, Y-connected alternator which generates 10 KV between lines on open-circuit, has a flux per pole of 1.5 mWb. If the distribution factor of the full-pitch coil is 0.96. Find the number of armature conductors in series per phase.   **6M**
(ii) Distinguish between   **4M**
   a) armature winding and field winding
   b) load current and exciting current

Q.3(A) A 3-phase, 50 Hz, 20-pole salient pole alternator with star-connected stator winding has 180 slots on the stator. Each slot consists of 8 conductors. The flux per pole is 25 mwb and is sinusoidally distributed. The coils are full pictched. Calculate (i) the speed of the alternator (ii) Winding factor (iii) generated emf per phase and (iv) Line voltage   **10M**

OR

Q.3(B) Two alternators working in parallel supply the loads: lighting load of 500 kW, 1000 kW at 0.9 pf lag, 500 kW at 0.9 pf lead and 800 kW at 0.8 pf lag. One alternator is supplying 1500 kW at 0.95 pf lag. Calculate the load on the other machines.   **10M**

Q.4(A) Explain the effects of varying excitation upon the armature current and power factor of a 3-ph synchronous motor when input power to the motor is maintained constant. Draw the "V" curves.   10M

OR

Q.4(B) A 20-pole, 30 kw, 660 V, 50 Hz, 3-ph, Y-connected synchronous motor is operating   5M
with its generated voltage per phase exactly equal to the phase voltage applied to its armature. At loaded condition the motor is retarded by 50 (mechanical) from its synchronous position. The synchronous reactance and armature resistance are 10 Ω and 1 Ω per phase. Calculate (a) armature current per phase (b) power per phase   5M
and total power drawn by the motor from the bus and (c) the developed power.

Q.5(A) A 3-phase 440 V, 50 Hz, 6-pole induction motor takes a power of 80 kW. The rotor   5M
emf is observed to make 100 complete alterations per minute. Calculate (a) Slip (b) the motor speed (c) mechanical power developed (d) the rotor copper losses per phase (e) the rotor resistance per phase if the rotor current is 65A   5M

OR

Q.5(B) A 4-pole 3-phase induction motor delivers 37 hp at the shaft at a speed of 1425 rpm   10M
on 500 V supply. The mechanical losses total 3 hp and power factor is 0.9. Calculate for this load (a) The slip (b) The copper losses (c) Total power input if the stator losses are 2500 W. (d) efficiency and (e) Line current

Q.6(A) (i) Explain construction and working principle of stepper motors?   5M
(ii) Explain about capacitor-start, capacitor-run single phase induction motors.   5M

OR

Q.6(B) A 230V,50Hz,4-pole, single phase induction motor has the following parameters.   10M
R1=2.51ohm, R2'=7.81 ohm, Xm=150.8 ohm, X1=4.62 ohm, X2'=4.62 ohm. Determine the main winding current and power factor when motor is running at a slip of 0.05.

END

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – March 2021
DIGITAL ELECTRONICS
(EEE)

Time: 3Hrs

Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.1			
	i.	Convert $(1110111)_2$ into gray code	1M
	ii.	Write any two properties of Boolean algebra.	1M
	iii.	List the applications of Multiplexers.	1M
	iv	What is a priority encoder?	1M
	v.	What are the different types of shift registers?	1M
	vi	What is a ripple counter?	1M
	vii.	Which logic family produces highest speed? Why?	1M
	viii.	Define the figure of merit of a logic family.	1M
	ix.	What is a PAL?	1M
	x.	What are the different types of ROM?	1M

Q.2(A) i. Add the following numbers using the 2's complement method.   4M
     a)   +49 and -37
     b)   -48 and +31
ii. Briefly explain about CMOS/TTL interfacing.   6M

OR

Q.2(B) $F = X\bar{Y}Z + \overline{XY}Z + \bar{W}XY + W\bar{X}Y + WXY$ 10M
     a)   Obtain the truth table of the above given function
     b)   Draw the logic diagram using original Boolean function
     c)   Simplify the function to a minimum number of literals using Boolean algebra

Q.3(A) i. Obtain simplified expression using K-map and draw its equivalent logic diagram.   5M
$$f(A,B,C,D) = \Sigma(7,13,14,15)$$
ii. Implement full adder using decoder and OR gates.   5M

OR

Q.3(B) Design a 4-bit BCD to gray code converter and draw its logic diagram.   10M

Q.4(A) Design a 4-bit synchronous counter with T flip-flops.   10M

OR

Q.4(B) Design a four-bit Universal Shift Register and explain its operation precisely with neat sketch.   10M

Q.5(A) Write Short notes on   10M

a) Jhonsons Counter   and   b) BCD Ripple Counter

OR

Q.5(B)   i. Draw the circuit diagram of 3-input ECL OR/NOR gate and explain its operation.   5M

ii. Discuss in brief error detection and correction codes.   5M

Q.6(A)   i. Obtain a 16 X 8 memory using 16 X 4 memory ICs.   5M

ii. Draw and explain the block diagram of CPLD.   5M

OR

Q.6(B)   Discuss in detail about the classification and characteristics of memories.   10M

END

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – March 2021

MECHANICS OF SOLIDS

(Mechanical Engineering)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1	i.	Define the term Poisson's ratio.	1M
	ii.	Define Hooke's law.	1M
	iii.	What do you mean by the point of contra flexure?	1M
	iv	List the types of supports.	1M
	v.	Write the relation between slope deflection and radius of curvature of a beam.	1M
	vi	What is meant by section modulus?	1M
	vii.	Write the assumptions in the theory of pure torsion.	1M
	viii.	Write torsion equation	1M
	ix.	What is slenderness ratio?	1M
	x.	Define the terms column and strut.	1M

Q.2(A) The tensile stresses at a point across two mutually perpendicular planes are $120 N/mm^2$ and $60 N/mm^2$. Determine the normal, tangential and resultant stresses on a inclined at 30^0 to the axis of the minor stress. **10M**

OR

Q.2(B) A steel tube of 30 mm external diameter and 20 mm internal diameter encloses a copper rod of 15 mm diameter to which it is rigidly joined at each end. If, at a temperature of 10^0 C there is no longitudinal stress, calculate the stresses in the rod and tube when the temperature is raised to 200^0 C. Take E for steel and copper as $2.1*10^5 N/mm^2$ and $1*10^5 N/mm^2$ respectively. The value of co-efficient of linear expansion for steel and copper is given as $11*10^{-6}$ per and $18*10^{-6}$ per ^{0}C respectively. **10M**

Q.3(A) A cantilever of length 2m carries a uniformly distributed load of 1kN/m run over a length of 1.5m from the free end. Draw the shear force and bending moment diagrams for the cantilever. **10M**

OR

Q.3(B) Draw the shear force and bending moment diagrams of a simply supported beam of length 7m carrying uniformly distributed loads as shown in figure. **10M**
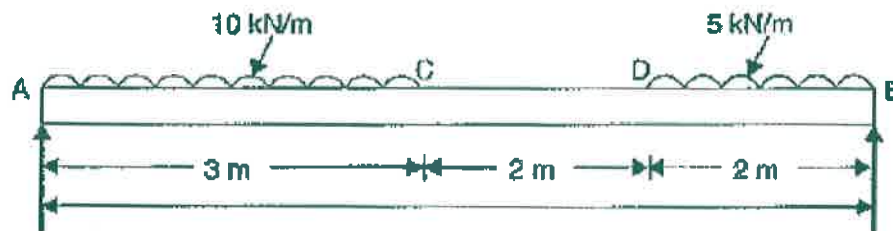
Q.4(A) What are the assumptions made in simple theory of bending? Derive relation   10M
        between bending moment and bending stress.

                                        OR

Q.4(B) A beam of uniform rectangular section 200 mm wide and 300 mm deep is simply   10M
        supported at its ends. It carries a uniformly distributed load of 9 kN/m run over the
        entire span of 5m. If the value of E for the beam material is $1*10^4$ N/mm^2, find:
        (i) The slope at the supports and (ii) Maximum deflection.

Q.5(A) Derive the torsion equation for a circular shaft of diameter (d) subjected to torque (T)   10M
        with usual notations.

                                        OR

Q.5(B) Determine the diameter of a solid shaft which will transmit 300 kW at 250 r.p.m. The   10M
        maximum shear stress should not exceed 30 N/mm^2 and twist should not be more
        than 1^0 in a shaft length of 2 m. Take modulus of rigidity = $1*10^5$ N/mm^2.

Q.6(A) A column of timber section 15 cm x 20 cm is 6 metre long both ends being fixed. If   10M
        Young's modulus for timber= 17.5 kN /mm^2, determine the Crippling load and Safe
        load for the column if the factor of safety= 3.

                                        OR

Q.6(B) A 1.5 m long column has a circular cross-section of 5 cm diameter. One of the ends of   10M
        the column is fixed in direction and position and another end is free. Taking factor of
        safety as 3, calculate the safe load using Rankine's formula, take yield stress,
        α_c = 560 N/mm^2 and Rankine's constant α =1/1600 for pinned ends.

                                   END

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – March 2021

MANUFACTURING PROCESS
(Mechanical Engineering)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1			
	i.	Define casting process.	1M
	ii.	List the various allowance in casting process.	1M
	iii.	What is the difference between brazing and soldering?	1M
	iv.	Why flux coatings are applied over the rods?	1M
	v.	Define spring back effect.	1M
	vi.	Differentiate between piercing and punching.	1M
	vii.	What are the specific merits of cold working over hot working?	1M
	viii.	Define cold drawing.	1M
	ix.	Define density & porosity.	1M
	x.	Mention the application of powder metallurgy?	1M

Q.2(A) Explain the steps involved in sand moulding process with a neat sketch?   10M

OR

Q.2(B) What is centrifuging? Explain the process in detail. How is centrifuging different from true and semi centrifugal process?   10M

Q.3(A) Explain the working principle of submerged arc welding and Friction stir welding with neat diagrams.   10M

OR

Q.3(B) Describe the various welding defects. Explain causes and remedies for welding defectives.   10M

Q.4(A) i. With a simple sketch, explain stretch forming process and their merits.   5M
ii. Estimate the force required in punching 25 mm^2 area square hole with 2mm thickness and UTS of the material is 1000 MPa.   5M

OR

Q.4(B) Explain superplastic forming in details. How is it different from hydro forming?   10M

Q.5(A) Explain with neat sketch, basic principle of rolling. Describe its applications in industry.   10M

OR

Q.5(B) What is forging? What is the difference between open die forging and closed die forging? Explain upset forging with a neat diagram   10M

Q.6(A) Explain the detailed steps involved in Powder Metallurgy technique.   10M

OR

Q.6(B) Discuss in detail about hot isostatic pressing and how are they advantageous?   10M

*** END ***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – March 2021

THEORY OF MACHINES

(Mechanical Engineering)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
**All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.1	i.	Differentiate between closed pair and unclosed pair.	1M
	ii.	List out various inversions of slider crank mechanism.	1M
	iii.	How would you describe coincident points?	1M
	iv.	What are fixed centrode and moving centrode?	1M
	v.	What is meant by Applied torque and Reaction torque?	1M
	vi.	Define the term pitch circle.	1M
	vii.	How the different masses rotating in different planes are balanced?	1M
	viii.	Explain briefly about Tangent Cam.	1M
	ix.	Distinguish between Longitudinal and Transverse vibrations.	1M
	x.	Define Damping co-efficient.	1M

Q.2(A) In a crank and slotted lever quick return motion mechanism, the distance between the fixed centres is 240 mm and the length of the driving crank is 120 mm. Find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. If the length of the slotted bar is 450 mm, find the length of the stroke if the line of stroke passes through the extreme positions of the free end of the lever.   10M

OR

Q.2(B) Explain about Whitworth quick return motion mechanism with a neat sketch.   10M

Q.3(A) Locate all the instantaneous centres of the slider crank mechanism as shown in Fig. The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s, find: 1. Velocity of the slider A, and 2. Angular velocity of the connecting rod AB.   10M
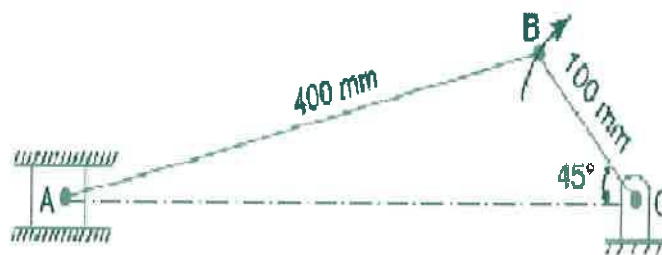
OR

Q.3(B) An engine mechanism is shown in Fig. The crank CB = 100 mm and the connecting rod BA = 300 mm with centre of gravity G, 100 mm from B. In the position shown, the crankshaft has a speed of 75 rad/s and an angular acceleration of 1200 rad/s². Find:1. velocity of G and angular velocity of AB, and 2. acceleration of G and angular acceleration of AB. **10M**

Q.4(A) A four-wheeled trolley car of mass 2500 kg runs on rails, which are 1.5 m apart and travels around a curve of 30 m radius at 24 km / hr. The rails are at the same level. Each wheel of the trolley is 0.75 m in diameter and each of the two axles is driven by a motor running in a direction opposite to that of the wheels at a speed of five times the speed of rotation of the wheels. The moment of inertia of each axle with gear and wheels is 18 kg-m². Each motor with shaft and gear pinion has a moment of inertia of 12 kg-m². The centre of gravity of the car is 0.9 m above the rail level. Determine the vertical force exerted by each wheel on the rails taking into consideration the centrifugal and gyroscopic effects. State the centrifugal and gyroscopic effects on the trolley. **10M**

OR

Q.4(B) Two gear wheels mesh externally and are to give a velocity ratio of 3 to 1. The teeth are of involute form ; module =6mm, addendum = one module, pressure angle = 20°. The pinion rotates at 90 r.p.m. Determine : **10M**
1. The number of teeth on the pinion to avoid interference on it and the corresponding number of teeth on the wheel,
2. The length of path and arc of contact,
3. The number of pairs of teeth in contact, and
4. The maximum velocity of sliding.

Q.5(A) A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and respectively. The planes in which the masses revolve are spaced 600 mm apart and the ma and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angula of the four masses so that the shaft shall be in complete balance. **10M**

OR

Q.5(B) A cam rotating clockwise at a uniform speed of 1000 r.p.m. is required to give a roller follower the motion defined below : **10M**
1. Follower to move outwards through 50 mm during 120° of cam rotation,
2. Follower to dwell for next 60° of cam rotation,
3. Follower to return to its starting position during next 90° of cam rotation,
4. Follower to dwell for the rest of the cam rotation.
The minimum radius of the cam is 50 mm and the diameter of roller is 10 mm. The line of stroke of the follower is off-set by 20 mm from the axis of the cam shaft. If the displacement of the follower takes place with uniform and equal acceleration and retardation on both the outward and return strokes, draw profile of the cam and find the maximum velocity and acceleration during out stroke and return stroke.

Q.6(A) An instrument vibrates with a frequency of 1 Hz when there is no damping. When the   10M
damping is provided, the frequency of damped vibrations was observed to be 0.9 Hz.
Find 1. the damping factor, and 2. logarithmic decrement.

OR

Q.6(B) A vertical shaft of 5 mm diameter is 200 mm long and is supported in long bearings at its   10M
ends. A disc of mass 50 kg is attached to the centre of the shaft. Neglecting any increase in
stiffness due to the attachment of the disc to the shaft, find the critical speed of rotation
and the maximum bending stress when the shaft is rotating at 75% of the critical speed.
The centre of the disc is 0.25 mm from the geometric axis of the shaft. $E = 200 \, GN/m^2$.

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – March 2021
FLUID MECHANICS & HYDRAULIC MACHINERY
(Mechanical Engineering)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1	i.	Define Density.	1M
	ii.	What is buoyancy force?	1M
	iii.	Define mass equation.	1M
	iv.	When is the flow through a control volume steady?	1M
	v.	What do you understand by turbulent flow?	1M
	vi.	What are the minor losses?	1M
	vii.	Express the equation of force exerted by fluid jet on a stationary flat plate inclined at an angle Θ to the jet.	1M
	viii.	What is hydraulic efficiency?	1M
	ix.	Write the expression of manometric efficiency of a centrifugal pump	1M
	x.	Express the equation of work done by a reciprocating pump.	1M

Q.2(A) Calculate specific weight, density and weight of two liters of a petrol of specific gravity 10M
0.7 N.

OR

Q.2(B) A 25-mm diameter shaft is pulled through a cylindrical bearing as shown in Figure 10M
below. The lubricant that fills the 0.3 mm gap between the shaft and bearing is an oil
having a kinematic viscosity of $8.0\times 10^{-4} m^2/s$ and a specific gravity of 0.91.
Determine the force P required to pull the shaft at a velocity of 3 m/s. Assume the
velocity distribution in the gap is linear.
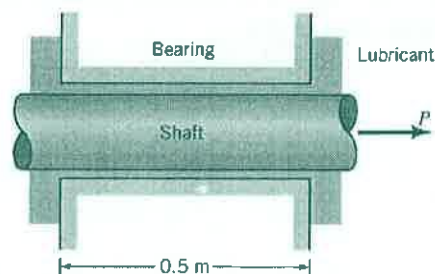
Q.3(A) A large tank open to the atmosphere is filled with water to a height of 5 m from the 10M
outlet tap. A tap near the bottom of the tank is now and opened, water flows out
from the smooth and rounded outlet. Determine the water velocity at the outlet

OR

Q.3(B) State the assumptions of Bernoulli's theorem and derive the Bernoulli's theorem. 10M

Q.4(A)   A Venturi meter equipped with a differential pressure gage is used to measure the   10M
flow rate of water at 15°C (ρ = 999.1 kg/m^3) through a 5-cm-diameter horizontal pipe.
The diameter of the Venturi neck is 3 cm, and the measured pressure drop is 5 kPa.
Taking the discharge coefficient to be 0.98, determine the volume flow rate of water
and the average velocity through the pipe.

OR

Q.4(B)   Derive an expression for to the loss of head due to friction in flow through circular   10M
pipes.

Q.5(A)   The water available for a Pelton wheel is 4 m^3/s and the total head from reservoir to   10M
the nozzle is 250 m. The turbine has two runners with two jets per runner. All the four
jets have the same diameters. The pipeline is 3000 m long. The efficiency if power
transmission through the pipeline and the nozzle is 91% and efficiency of each runner
is 90%. The velocity coefficient of each nozzle is 0.975 and coefficient of friction 4f for
the pipe is 0.0045. Determine:
   i.   the power developed by the turbine
   ii.   the diameter of the jet and
   iii.   the diameter of the pipeline.

OR

Q.5(B)   Explain the working of Francis turbine and also derive the work done and efficiency   10M
equations of a Francis turbine.

Q.6(A)   The cylinder bore diameter of a single-acting reciprocating pump is 150 mm and its   10M
stroke is 300 mm. The pump runs at 50 rpm and lifts water through a height of 25 m.
The delivery pipe is 22 m long and 100 mm in diameter. Find the theoretical discharge
and the theoretical power required to run the pump. If the actual discharge is
4.2 liters/s, find the percentage slip.

OR

Q.6(B)   Explain the working of centrifugal pumps with neat sketch and write the advantages   10M
of centrifugal pumps over reciprocating pumps.
*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – March 2021
PROBABILITY THEORY & STOCHASTIC PROCESSES
(ECE)

Time: 3Hrs　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only**

Q.1	i.	What is probability that a card drawn at random from a pack of playing cards may be either a queen or a king	1M
	ii.	State multiplication theorem of probability	1M
	iii.	Define probability density of a random variable?	1M
	iv.	A continuous random variable X having density function $f(x) = k(1 - x^2)$; $0 \le x \le 1$. Find the value of the constant k ?	1M
	v.	Define conditional density function of x given y ?	1M
	vi.	Write a condition for statistical independence of random variable?	1M
	vii.	Define convergence in probability?	1M
	viii.	State the Strong Law Large Numbers (SLLN)?	1M
	ix.	Define the power spectral density?	1M
	x.	Write any one of the properties of power density spectrum?	1M

Q.2(A) A manufacturing plant makes radios that each contain an integrated circuit (IC) supplied by three sources A, B and C. The probability that the IC in a radio came from one of the sources is $1/3$, the same for all sources. ICs are known to be defective with probabilities 0.001, 0.003, and 0.002 for sources A, B and C respectively.　　　**10M**
 (a) What is the probability any given radio will contain a defective IC?
 (b) If a radio contains a defective IC, find the probability it came from source A. Repeat for sources B and C.

OR

Q.2(B) i. A man wins in a gambling game if he gets two heads in five flips of a biased coin. The probability of getting a head with the coin is 0.7.　　　**5M**
　　　　a. Find the probability the man will win. Should he play this game?
　　　　b. What is his probability of winning if he wins by getting at least four heads in five flips? Should he paly this new game?
 ii. A rifleman can achieve a "marksman" award if he passes a test. He is allowed to fire six shots at a target's bull's eye. If he hits the bull's eye with at least five of his six shots he wins a set. He becomes a marksman only if he can repeat the feat three times straight. i.e. if he can win three straight sets. If his probability is 0.8 of hitting a bull's eye on any one shot,　　　**5M**
 Find the probabilities of his
　　　(a) winning a set and
　　　(b) becoming a marksman.

Q.3(A) A random variable X has the density function $f_X(x) = \frac{1}{2}u(x)e^{-\frac{x}{2}}$. Define events   **10M**

$A = \{1 < X \le 3\}$, $B = \{X \le 2.5\}$ and $C = A \cap B$. Find the probabilities of the events (a) A (b) B and (c) C

OR

Q.3(B) Find moment generating function for Gaussian distribution?   **10M**

Q.4(A) Given the function $f_{X,Y}(x,y) = b(x+y)^2$; $-1 < x < 1$ and $-3 < y < 3$. (a) Find the   **10M** constant b such that this is a valid joint density function. (b) Determine the marginal density functions $f_X(x)$ and $f_Y(y)$.

OR

Q.4(B) Random variables X and Y have the joint density   **10M** $f_{X,Y}(x,y) = \frac{(x+y)^2}{40}$; $-1 < x < 1$ and $-3 < y < 3$. (a) Find all the second-order moments of X and Y (b) What are the variances of X and Y? (c) What is the correlation coefficient?

Q.5(A) State and prove central limit theorem.   **10M**

OR

Q.5(B) Gaussian random variables X and Y have first and second order moments   **10M** $\bar{X} = -1.0, \overline{X^2} = 1.16, \bar{Y} = 1.5, \overline{Y^2} = 2.89$. Find (a) C_{XY} (b) ρ. Also find the angle θ of a coordinate rotation that will generate new random variables that are statistically independent.

Q.6(A) The auto correlation function of a stationary random process $X(t)$ is given by   **10M**

$R_{XX}(\tau) = 25 + \frac{4}{1+6\tau^2}$. Find the mean, mean square and variance of the process.

OR

Q.6(B) Two random processes $X(t)$ and $Y(t)$ be defined by $X(t) = A\cos(w_0 t) + B\sin(w_0 t)$;   **10M** $Y(t) = B\cos(w_0 t) - A\sin(w_0 t)$ Where A and B are random variables and w_0 is a constant. A and B are uncorrelated zero mean random variables having different density functions with the same variance σ^2. Show that $X(t)$ and $Y(t)$ are jointly wide sense stationary.

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – Mar' 2021
(Regulations: R18)
PRINCIPLES OF SIGNALS AND SYSTEMS
(ECE)

Time: 3Hrs   **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only

Q.1	i.	Sketch the signal u(-t+2)	1M
	ii.	Examine whether $\sin 12\pi t$ is periodic or not?	1M
	iii.	What is stable system?	1M
	iv	Find the name of the system whose output depends on future inputs.	1M
	v.	Write linearity property of DTFT	1M
	vi	Find Fourier transform of $\delta(n-5)$	1M
	vii.	Write inverse Laplace transform formula of X(s)	1M
	viii.	What is Z-transform of u(n)	1M
	ix.	What is interpolation?	1M
	x.	Write about aliasing effect.	1M

Q.2(A) (i) Find even and odd components of the following signal   5M
$$x(t) = (1+t^2 +t^3)\cos^2 10t$$
(ii) Determine whether the following signal is causal or noncausal.   5M
$$x(t) = e^{-3t}\ u(-t+2)$$

OR

Q.2(B) Find the linearity, invariance and causality of the following system   10M
$$y(n) = -a\ x(n-1) + x(n)$$

Q.3(A) Explain the following   10M
(i)   Causality of a system
(ii)   Condition for stability of a LTI sytem

OR

Q.3(B) Find the convolution of the following signals   10M
$$x_1(t) = e^{-3t}\ u(t)\ ;\ x_2(t) = u(t +3)$$

Q.4(A) State Fourier series and find the relation between the trigonometric Fourier series and exponential Fourier series.

OR

Q.4(B) State and prove the following properties of CTFT   10M
(i)   Linearity
(ii)   Time shifting
(iii)   Differentiation In time domain

Q.5(A) Find the poles and zeros of the following rational function and plot the pole-zero plot.   10M
$$X(s)= \frac{(s+2)(s+5)}{s(s^2 +6s+13)}$$

OR

Q.5(B)   Find the Z-transform and ROC of the following discrete time signals   10M
         (a) x(n) = u(n)   (b) x(n) = 0.2^n u(-n-1)

Q.6(A)   What is sampling theorem? Explain with neat sketches.   10M

OR

Q.6(B)   Determine the Nyquist rate and Nyquist interval to each of the following signals   10M
         (i)   x(t) = 1+cos 2000πt + sin 4000πt
         (ii)   x(t) = $\dfrac{\sin 4000\pi t}{\pi t}$

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – Mar' 2021
(Regulations: R18)

ANALOG CIRCUITS
(ECE)

Time: 3Hrs   **Max Marks: 60**

> Attempt all the questions. All parts of the question must be answered in one place only.
> All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only

Q.1	i.	Explain the effect of negative feedback on stability.	1M
	ii.	Define Barkhausen criteria for oscillations.	1M
	iii.	Why the efficiency of class-B amplifier is higher than that of a class-A power amplifier?	1M
	iv	What type of feedback topology is used in emitter follower?	1M
	v.	Write the gain equation of non-inverting amplifier.	1M
	vi	Sketch cross over distortion.	1M
	vii.	Draw the circuit diagram of a precision rectifier using op-amp.	1M
	viii.	Draw the frequency response of low-pass filter.	1M
	ix.	List the applications of 555 timer.	1M
	x.	What are the advantages of R/2R ladder DAC compared to binary weighted resistor DAC?	1M
Q.2(A)		Draw the block diagram of series-shunt feedback amplifier and derive expression for gain, input resistance and output resistance.	10M
		OR	
Q.2(B)		Explain Wein- bridge oscillator and derive frequency of oscillation.	10M
Q.3(A)		Derive the efficiency of class-A and complementary class-B push-pull power amplifier.	10M
		OR	
Q.3(B)		Draw the circuit diagram of a double tuned voltage amplifier. Explain how its frequency response is better than that of a single-tuned voltage amplifier.	10M
Q.4(A)		Explain the working of differential amplifier with the help of circuit diagram. Derive the expression of CMRR.	10M
		OR	
Q.4(B)		Explain with neat circuit diagrams, how an operational amplifier is used as summer, subtractor, integrator and differentiator.	10M
Q.5(A)		Draw and explain the working of Comparator and Schmitt trigger.	10M
		OR	
Q.5(B)		Draw and explain the low-pass and high-pass active filters based on op-amp.	10M
Q.6(A)		Describe functional block diagram of 555 timer and derive time period for monostable multivibrator.	10M
		OR	
Q.6(B)		Draw the circuit diagram of a flash type ADC converter and explain its operation.	10M

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – Mar' 2021
(Regulations: R18)
CONTROL SYSTEM ENGINEERING
(ECE)

Time: 3Hrs   Max Marks: 60

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only**

Q.1			
	i.	Write the Mason's gain formula.	1M
	ii.	Writ the force balance equation of damper.	1M
	iii.	Define velocity error constant.	1M
	iv	Define PID controller and explain its effect on system's response.	1M
	v.	What is the requirement for BIBO stability?	1M
	vi	What is necessary and sufficient condition for stability?	1M
	vii.	Draw the polar plot of $G(s) = \dfrac{1}{(1+sT)}$.	1M
	viii.	What are the frequency domain specifications?	1M
	ix.	Define controllability of a system.	1M
	x.	Define state and state variable for a space model of control systems?	1M

Q.2(A) Write the differential equation governing the mechanical system shown in Fig. Draw the torque-voltage and torque-current electrical analogous circuits and verify writing mesh and node equations.   **10M**
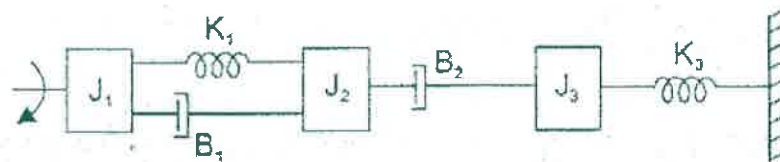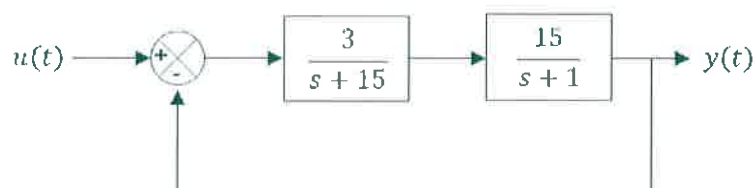

OR

Q.2(B) Evaluate the overall transfer function of the system shown in below figure.   **10M**
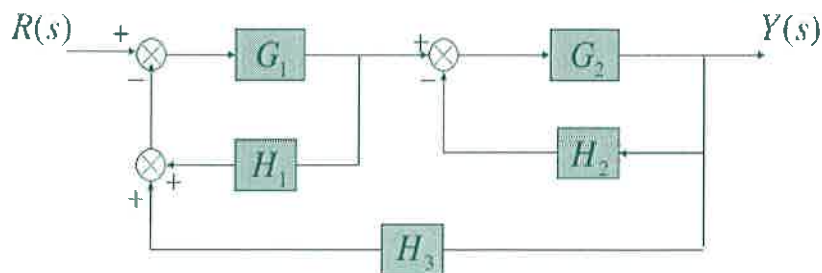
Q.3(A) (i) Determine the steady-state error of the given system and find the roots of the closed loop characteristic equation.   **10M**

(ii) Explain briefly the effects of PI controller and PID controller on system performance with suitable block diagram?

Q.3(B) (iii) Find the static error constants and corresponding steady-state error of the system 10M
described by $G(s) = \dfrac{5}{s\,(4+s)(2+s)}$ and $H(s) = 1$.

(iv) Explain the effect of adding a zero in closed loop transfer function of a second order system also show on the plot of response of the system in time domain.

Q.4(A) Sketch the root locus of 10M
$$G(s) = \frac{K(s + 0.5)}{s(s^2 + 2s + 2)}.$$
Also, determine the value of K for damping ratio of 0.5 from the root locus.

OR

Q.4(B) (i) Construct the Routh array and determine the stability of the system whose characteristic 10M
equation is given by $s^5 + s^4 + 2s^3 + 2s^2 + 3s + 5 = 0$. Also comment on location of roots in s-plane.

(ii) Explain lag and lag compensator.

Q.5(A) Sketch the Nyquist plot of the system whose open loop transfer function is 10M
$G(s)H(s) = \dfrac{K(1+s)^2}{s^3}$ and find the range of K for stability of the closed loop system.

OR

Q.5(B) (i) Sketch the Bode plot of the following transfer function and determine phase margin and 10M
gain margin.
$$G(s) = \frac{75(1 + 0.2s)}{s(s^2 + 16s + 100)}$$

(ii) Explain the lag compensator and derive the expression for maximum phase and corresponding frequency.

Q.6(A) (i) Compute the STM by infinite series method if 10M
$$A = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix}$$
(ii) Determine transfer matrix for the given system below
$$\begin{bmatrix} \dot{x_1} \\ \dot{x_2} \end{bmatrix} = \begin{bmatrix} 0 & 3 \\ -2 & -5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} u(t) \quad \text{and} \quad y = \begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

OR

Q.6(B) What are the advantages of state space model of a system? Obtain the state space model of a 10M
system whose closed loop transfer function is
$$T(s) = \frac{10(s + 4)}{s\,(1 + s)(3 + s)}$$
*** END ***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – Mar' 2021

(Regulations: R18)

MICROPROCESSOR & MICROCONTROLLER

(ECE)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only

Q.1	i.	The BIU prefetches instruction from memory and stores them in _____	1M
	ii.	After PUSH instruction the content of SP is decremented by _____	1M
	iii.	In the maximum mode operation of 8086, most of the control signals are generated from _____	1M
	iv	Define closed coupled configuration of 8086?	1M
	v.	Define I/O Interfacing?	1M
	vi	Intel 8257 is _____ channel DMA controller designed to be interfaced with their family of microprocessor.	1M
	vii.	8051 series has how many 16 bit registers?	1M
	viii.	How are the bits of the register PSW affected if we select Bank2 of 8051?	1M
	ix.	How many clock cycles are required to complete a read operation by 8086?	1M
	x.	What is the significance of I/O interfacing?	1M

| Q.2(A) | Write assembly language program to find out whether the given number is even or odd. If the given number is odd load 00H to DL and if it is even load 01 to DL. | 10M |

OR

| Q.2(B) | Explain the following assembler directives with example <br> i)DW   ii)DB   iii)Assume   iv)Ends | 10M |

| Q.3(A) | What is Interrupt? Describe type of interrupts in 8086 and explain the function of interrupt service routine in detail. | 10M |

OR

| Q.3(B) | What is multiprogramming? Draw and explain the timing diagram of IO write machine cycle in maximum mode operation of 8086. | 10M |

| Q.4(A) | Describe the various modes of operation of 8255 (Programmable Peripheral Interface) and also describe the control word formation in different modes. | 10M |

OR

| Q.4(B) | Explain the pins and detailed architecture of Programmable Interval Timer (8254) with a neat block diagrams. | 10M |

| Q.5(A) | Describe the architecture of 8051with a neat diagram. | 10M |

OR

| Q.5(B) | Explain briefly addressing modes for 8051. | 10M |

| Q.6(A) | Consider an LCD display is interfaced with the 8051 microcontroller as shown in Figure | 10M |

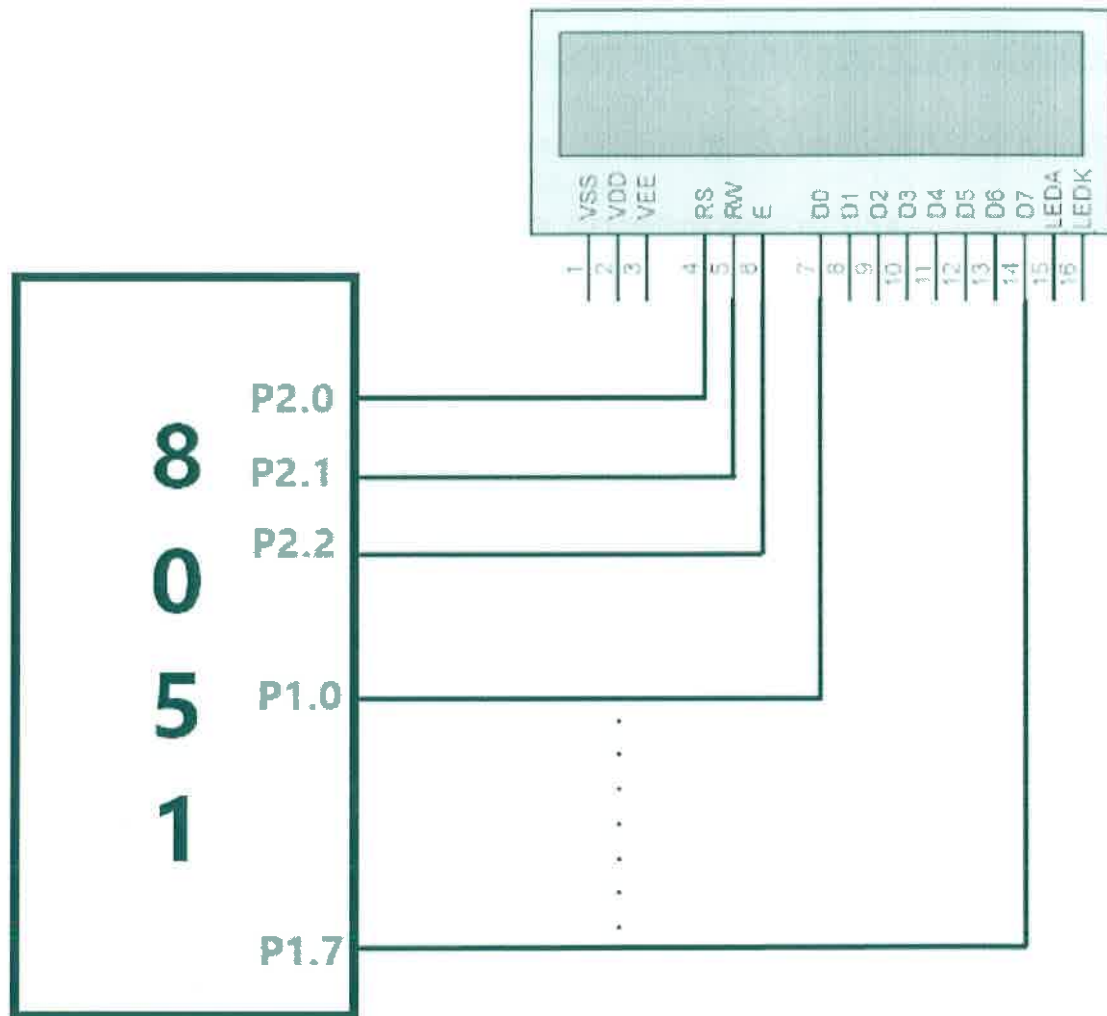Q6(A). **Develop** a complete program to display the strings 'MITS' at the LCD.

Figure Q6(A)

OR

Q.6(B) Explain how microcontrollers can be used for the Data Transfer using Serial Port   10M
Programming. Use sketches.

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – Mar' 2021

(Regulations: R18)

COMPUTER ORGANIZATION AND ARCHITECTURE

(CSIT)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only

Q.1	i.	Make differences between the Logical operations and control operations.	1M
	ii.	What are the great ideas in computer architecture?	1M
	iii.	Translate the following C statements into MIPS assembly program f = (g + h) − (i + j);	1M
	iv	Difference between real and whole numbers.	1M
	v.	Define data hazard. List the three situations under which a data hazard can occur.	1M
	vi	Name any five datapath control signals.	1M
	vii.	What is meant by Multithreading?	1M
	viii.	List the parallel processing challenges.	1M
	ix.	Define virtual memory.	1M
	x.	What is the use of DMA controller?	1M

Q.2(A) Consider three different processors P1, P2, and P3 executing the same instruction set.   **10M**
P1 has a 3GHz clock rate and a CPI of 1.5, P2 has a 2.5GHz clock rate and a CPI of 3.0, and P3 has a 4.0 GHz clock rate and a CPI of 2.2.
i) By analyzing the information, identify the processor that has the highest performance expressed in instructions per second.
ii) If the processors each execute a program in 10 seconds, determine the number of cycles and the number of instructions.
iii) Assume that we want to reduce the execution time by 30% but this leads to an increase of 20% in the CPI. Determine the clock rate required for thus time reduction.

OR

Q.2(B) What is an Addressing mode? List and explain the various addressing modes with an   **10M**
example.

Q.3(A) Represent the two numbers 99.9 and 0.016 in their corresponding normalized   **10M**
scientific notation. Furthermore, add these two 32-bit floating point numbers using proper steps. Also, mention the overflow range of a 32-bit number, and check whether the above addition is within the range or not? In this regard, draw the flow chart of a floating point addition neatly.

OR

Q.3(B) Convert the following numerical arithmetic expression into reverse polish notation to   **10M**
infix notation.
    i) A B C D E + * - /
    ii) A B C D E * / - +

| Q.4(A) | List and explain the different types of pipeline hazards. | 10M |

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

| Q.4(B) | Discuss the important properties of vector architecture over conventional instruction set architectures. | 10M |

| Q.5(A) | Compare and contrast the instruction level parallelism and machine parallelism. | 10M |

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

| Q.5(B) | Explain the two main approaches of hardware multithreading for increasing the processor utilization. | 10M |

| Q.6(A) | Give a neat sketch that illustrates the components in a typical memory hierarchy. | 10M |

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

| Q.6(B) | Compare and contrast the various memory technologies in hierarchy for speed, size, and cost. | 10M |

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

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – March 2021
DISCRETE MATHEMATICAL STRUCTURES
(Common to CSE, CSIT & CST)

Time: 3Hrs   **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

Q.1			
	i.	Define truth table for Biconditions.	1M
	ii.	Explain De Morgan's Laws for Quantifiers	1M
	iii.	State Pigeon hole principle.	1M
	iv.	How many functions are there from a set with m elements to one with n elements?	1M
	v.	Define the left coset and right coset.	1M
	vi.	Define the Abelian group with an example.	1M
	vii.	Define Boolean Algebra.	1M
	viii.	Define POSETS.	1M
	ix.	Define isomorphism of graphs with its necessary and sufficient conditions.	1M
	x.	What is a Turing machine?	1M

Q.2(A) Construct a truth table for each of these compound propositions.   **10M**
a) $(p \wedge q) \rightarrow (p \vee q)$ b) $(q \rightarrow \neg p) \leftrightarrow (p \leftrightarrow q)$
OR

Q.2(B) For each of these collections of premises, what relevant conclusion or conclusions   **10M**
can be drawn? Explain the rules of inference used to obtain each conclusion from
the premises.
i) "Every computer science major has a personal computer." "Ralph does not have a
personal computer." "Ann has a personal computer."
ii) "What is good for corporations is good for the United States." "What is good for
the United States is good for you." "What is good for corporations is for you to buy
lots of stuff."

Q.3(A) Define pigeonhole principle.   **5M**
    (i)   What is the minimum number of students required in a discrete
         mathematics class to be sure that at least six will receive the same grade,
         if there are five possible grades, A, B, C, D, and F?
    (ii)   During a month with 30 days, a baseball team plays at least one game a   **5M**
         day, but no more than 45 games. Show that there must be a period of
         some number of consecutive days during which the team must play
         exactly 14 games.
OR

Q.3(B) (i) A book publisher has 3000 copies of a discrete mathematics book. How many   **5M**
ways are there to store these books in their three warehouses if the copies of the
book are indistinguishable?
(ii) How many solutions are there to the equation $x_1 + x_2 + x_3 + x_4 = 17$, where   **5M**
x_1, x_2, x_3 and x_4 are nonnegative integers?

Q.4(A) Show that $G=\{1, 2, 3\}$ with respect to multiplication modulo 4 is not a group but that $G=\{1, 2, 3, 4\}$ is an Abelian with respect to multiplication modulo 5.   **10M**

OR

Q.4(B) (i) Define phrase structure grammar and method of derivation of an expression with an example.   **5M**

(ii) Write a derivation for the string a^2ba^2 by using the grammar $G_4 = (\{S, C\}, \{a, b\}, S, \emptyset)$ where $\emptyset$ is the set of productions $S\rightarrow aCa$, $C\rightarrow aCa$, $C\rightarrow b$ **5M**

Q.5(A) Let $A = \{2,3,6,12,24,36\}$, $R = \{(x,y)/x,y \in A,\ x\ divides\ y\}$. Write the partial order and draw the hasse diagram for R and compute lower bounds, upper bounds, greatest lower bound, least upper bound for $\{2,12,24\}$.   **5M**
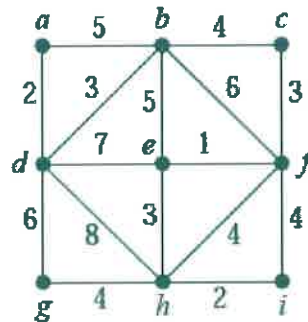
OR

Q.5(B) Show that in a Boolean algebra, the modular properties hold. i.e. show that $x \wedge (y \vee (x \wedge z)) = (x \wedge y) \vee (x \wedge z)$ and $x \vee (y \wedge (x \vee z)) = (x \vee y) \wedge (x \vee z)$.   **10M**

Q.6(A) (i) Use Dijkstra's algorithm to find the shortest path from vertex a to vertex z in the graph   **5M**
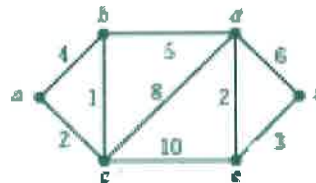
5M

(ii) Use Kruskal's algorithm to find a minimum spanning tree for the graph

OR

Q.6(B) Define a finite state machine with outputs. Construct the state diagram for the finite state machine with the following state table.   **10M**

State	f		g	
	Input		Output	
	0	1	0	1
S_0	S_1	S_0	0	0
S_1	S_2	S_0	1	1
S_2	S_0	S_2	0	1
S_3	S_1	S_2	1	0

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – Mar' 2021

(Regulations: R18)

DIGITAL LOGIC DESIGN

(Common to CSE and CST)

Time: 3Hrs   **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only

Q.1	i.	Convert the following number with the indicted bases to decimal: $(435)_8$	1M
	ii.	Represent decimal number 6027 in BCD.	1M
	iii.	Simplify $Y (A, B, C) = \sum m (1, 3, 5, 7)$.	1M
	iv	Implement Inverter using Ex-OR Function	1M
	v.	What are the Universal logic gates?	1M
	vi	Define Demultiplexers.	1M
	vii.	Difference between latch and flip-flop	1M
	viii.	How are shift right and shift left registers implemented using flip-flops?	1M
	ix.	Draw the internal logic of a 32×8 ROM	1M
	x.	Give the syntax module in VHDL.	1M

Q.2(A) Simplify the following Boolean function to a minimum number of literals.   **10M**
i) XY+X'Z+YZ   ii) X+X'Y   iii) X+Y(XZ+(Y+Z'W))

OR

Q.2(B) Express the following function as a sum of minterms and as a product of maxterms: **10M**
F(A,B,C,D)= B'D= A'D+BD.

Q.3(A) Implement the following Boolean function F no more than two NOR gates   **10M**
F=(A,B.C,D)=$\sum$(0,1,2,9,11)+d(8,10,14,15)

OR

Q.3(B) What is the functional difference between a NOR gate and a negative-AND gate? Do   **10M**
they both have the same truth table?

Q.4(A) Multiplexer circuits can be combined with common selection inputs to provide   **10M**
multiple bit selection logic." Justify the statement with an example.

OR

Q.4(B) Explain the design procedure of synchronous sequential circuits with simple example.   **10M**

Q.5(A) Draw the circuit diagram of clocked D-flip-flop with NAND gates and explain operation   **10M**
principle by using truth table. Also find Characteristic and Excitation table.

OR

Q.5(B) Design a 3-bit counter using JK flip flop which will start at 2 and end at 6.   **10M**

Q.6(A) Design a 3 bit binary to gray code converter using a suitable PLA.   **10M**

OR

Q.6(B) With a neat diagram explain about the constriction of 4x4 RAM.   **10M**

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – Mar' 2021
(Regulations: R18)
DESIGN ANALYSIS & ALGORITHMS
(Common to CSE/CSIT/CST)

Time: 3Hrs   **Max Marks: 60**

> Attempt all the questions. All parts of the question must be answered in one place only.
> **All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only**

Q.1	i.	Give the problem formulation of Knapsack problem using greedy method.	1M
	ii.	Prove that dynamic programming constructs solution in bottom up approach.	1M
	iii.	Using step count find the time complexity of sum of 'n' natural numbers	1M
	iv	Write about the constraints and criterion function used in backtracking.	1M
	v.	Define 8 queens problem.	1M
	vi	Write the two difference between greedy method and dynamic programming.	1M
	vii.	What are the factors that influence the efficiency of the backtracking algorithm?	1M
	viii.	What is meant by all pairs shortest path problem?	1M
	ix.	Define Prim's algorithm.	1M
	x.	What are the characteristics of an algorithm?	1M

Q.2(A) In what way amortized analysis is used for performance analysis of algorithms? Explain.   **10M**

OR

Q.2(B) Explain the role of instance characteristics in finding the time and space complexities with an example.   **10M**

Q.3(A) Explain 0/1 Knapsack problem with respect to branch and bound method.   **10M**

OR

Q.3(B) Given 2 sorted lists of numbers. Write the algorithm to merge them and analyze its time complexity.   **10M**

Q.4(A) Describe the Merge sort. And sort the following set of elements using merge sort 12,24,8,71,4,23,6,89,56   **10M**

OR

Q.4(B) What is Minimum cost spanning tree? Explain an algorithm for generating minimum cost spanning tree and list some applications of it.   **10M**

Q.5(A) What is the solution generated by function Job Sequencing algorithm when n=6 (P1...p6) = (3, 5, 20, 18, 1, 6), and (d1..d6) = (1, 3, 4, 3, 2, 1).   **10M**

OR

Q.5(B) A motorist wishing to ride from city A to B. Formulate greedy based algorithms to generate shortest path and explain with an example graph.   **10M**

Q.6(A) Relate Hamiltonian cycle with travelling salesperson problem and also give the backtracking solution vector that finds all Hamiltonian cycles for any directed or undirected graph.   **10M**

OR

Q.6(B) Distinguish P, NP, NP-Hard and NP-Complete   **10M**

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – Mar' 2021
(Regulations: R18)

OPERATING SYSTEMS
(Common to CSE, CSIT and CST)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only

Q.1	i.	Define an Operating system.	1M
	ii.	Distinguish between short-term scheduler and long-term scheduler.	1M
	iii.	Differentiate Micro and Macro Kernel.	1M
	iv	What is a dispatcher process?	1M
	v.	If there are 6 processes and each process require 4 resources of same type then what is the total no of resources required to say that system is deadlock free?	1M
	vi	Write the Deadlock Detection algorithms.	1M
	vii.	List the operations of a Directory.	1M
	viii.	Differentiate Constant Linear Velocity and Constant Angular Velocity in disks.	1M
	ix.	Name any two page replacement algorithms.	1M
	x.	What is boot block?	1M

Q.2(A) In a multiprogramming and time sharing environment several users share the system simultaneously. This situation can result in various security problems. Discuss these problems?   10M

OR

Q.2(B) Explain various operating System Generations?   10M

Q.3(A) Consider the following set of processes, with the length of the CPU burst given in milliseconds: 10M

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	4
P4	1	5
P5	5	2

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0. Draw Gantt chart that illustrate the execution of these processes using the non-preemptive priority (a smaller priority number implies a higher priority) scheduling algorithm. What is the turnaround time and waiting time of each process?

OR

Q.3(B) What are various issues to be considered in Multiple-Processor scheduling?   10M

Q.4(A) Consider the following snapshot of a system: 10M
        Allocation   Max Available

        ------------   ------------   -----------
                 ABC D   A B C D   A B C D
        Po   0 0 1 2 0 0 1 2   1 5 2 0
        P1   1 0 0 0   1 7 5 0
        p2   1 3 5 4 2 3 5 6
        p3   0 6 3 2   0 6 5 2
        p4   0 0 1 4   0 6 5 6
        Apply Banker's Algorithm and determine whether the system is in safe state or not?

                                        OR

Q.4(B) Analyze any two Classical Synchronization Problems with clear examples.   10M

Q.5(A) Sketch the structure of page table. What is the purpose of paging the page tables? 10M
                                        OR

Q.5(B) Illustrate the following Page Replacement algorithms with clear examples.   10M
        (i)Second Chance(SC)   (ii)Not Recently used(NRU)

Q.6(A) Describe various file allocation methods with their relative advantages and   10M
        disadvantages.
                                        OR

Q.6(B) Discuss the Following Disk scheduling Algorithms with suitable examples: 10M
        i)FCFS   ii)SSTF

                                   *** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
B.Tech II Year II Semester (R18) Supplementary End Semester Examinations – Mar' 2021
(Regulations: R18)
DATABASE MANAGEMENT SYSTEMS
(CSIT)

Time: 3Hrs   Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q. no 1 are compulsory. In Q. no 2 to 6 answer either Part-A or B only

Q.1	i.	Define instance.	1M
	ii.	State different levels of abstraction.	1M
	iii.	What is DRC, give an example?	1M
	iv	Formulate the syntax for UPDATE command in SQL.	1M
	v.	What is trivial Functional Dependency?	1M
	vi	List types of Decomposition.	1M
	vii.	What is multilevel indexing?	1M
	viii.	List the disadvantages of Dynamic hashing.	1M
	ix.	State the Limitation in SQL authorization.	1M
	x.	How database recovery is useful	1M

Q.2(A) Design the E-R diagram which models an online bookstore with following entity set (author, publisher, customer, book, shopping_card, ware house) and relationship (written-by, published by, etc.)   **10M**

OR

Q.2(B) Classify the terms generalization and specialization in details with an suitable example.   **10M**

Q.3(A) Write SQL statements for following:
Student(Enrno, name, courseId, emailId, cellno)
Course(courseId, course_nm, duration)
i) Add a column city in student table.
ii) Find out list of students who have enrolled in "computer" course.   **10M**
iii) List name of all courses with their duration.
iv) List name of all students start with „a".
v) List email Id and cell no of all mechanical engineering students

OR

Q.3(B) How stored procedures will be useful in JDBC.   **10M**

Q.4(A) State the Procedure to find minimal set of FD's and solve the following
A→B, C→B, D→AB C, A C→C   using the same.   **10M**

OR

Q.4(B) Discuss the similarities and differences between 3NF & 4 NF.   **10M**

Q.5(A) Compare ordered indexing and hashing.   **10M**

OR

Q.5(B) Classify various Concurrency control mechanisms.   **10M**

Q.6(A) Explain the different types of recovery facilities in detail.   **10M**

OR

Q.6(B) Describe any two access control models in detail.   **10M**

*** END***