

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

B.Tech II Year II Semester (R18) Regular End Semester Examinations – NOV 2020

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

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|--------|--|-----|
| Q.1 | i. Define Corporate Social Responsibility. | 1M |
| | ii. How do you explain the concept of Management? | 1M |
| | iii. Define planning. | 1M |
| | iv. What is Strategic Management? | 1M |
| | v. What is Change management. | 1M |
| | vi. Explain the term Decentralization. | 1M |
| | vii. Discuss about Leadership styles. | 1M |
| | viii. Explain Verbal communication. | 1M |
| | ix. What is Feed-Forward control? | 1M |
| | x. Define Concurrent control. | 1M |
| <hr/> | | |
| Q.2(A) | Explain managerial functions and skills? | 10M |
| OR | | |
| Q.2(B) | Do you agree with the statement that "Managing Global Business environment is the new success mantra for Global organisations"? Comment. | 10M |
| <hr/> | | |
| Q.3(A) | Define decision making? Classify decision making conditions and styles. | 10M |
| OR | | |
| Q.3(B) | Write about various decision-making biases and errors. | 10M |
| <hr/> | | |
| 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 human resource management? Classify the various functions of HRM? | 10M |
| <hr/> | | |
| Q.5(A) | Define leader? Elaborate various theories of leadership. | 10M |
| OR | | |
| Q.5(B) | Can you make use of the facts to explain communication process? | 10M |
| <hr/> | | |
| Q.6(A) | Explain in detail about the Process of control. | 10M |
| OR | | |
| Q.6(B) | Write a note on Value chain management? | 10M |

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations –DEC 2020**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 intake. 1M
 - ii. Describe the term water treatment. 1M
 - iii. If a circular sedimentation tank of diameter 3.5 m treats 20 million litres of sewage daily, Calculate the applicable surface loading rate? 1M
 - iv. Compare coagulation and Flocculation. 1M
 - v. What is meant by septic tank? Show the different methods of dispersion trenches in septic tank. 1M
 - vi. What is meant by grey water? 1M
 - vii. Evaluate particulate matter with their sources and effects 1M
 - viii. What is the unit used to express the noise? 1M
 - ix. What is the role of an individual in pollution prevention? 1M
 - x. What is a hazardous waste? 1M
-
- Q.2(A) A rapid sand filter is to be provided in a water treatment plant, to process the water to a town with a population of 3,00,000. The water demand is 200 LPCD. The rate of filtration is $15\text{m}^3/\text{m}^2/\text{hr}$. Allow 5% of filtered water for storage to meet the backwash requirements. Each backwashing time is 30 minutes. Determine the number of filters required allowing one as standby unit. The available surface area configuration of filter unit is $10\text{ m} * 4\text{ m}$. Also compute the up-flow velocity and headloss to expand the bed to 0.66m from its original undisturbed depth of 0.6 m. the porosity of the bed is 0.50, specific gravity 2.5. the average particle size is 0.66 mm. the drag co-efficient is 5.02. The flow is assumed to be transition flow. 10M
- OR**
- Q.2(B) What is the significance of aeration? Explain the methods of aeration commonly used in the treatment of water. 10M
-
- Q.3(A) State the various types of water carriage system and briefly describe their relative advantages and disadvantages. 10M
- OR**
- Q.3(B) How does biogas production occur? List the factors affecting on the sludge digestion? 10M
-
- Q.4(A) i) List the factors affecting biogas. 3M
ii) Differentiate dewatering and disposal. 7M
- OR**
- Q.4(B) Show the design a septic tank with dispersion pit for a hostel with a population of 150 and peak discharge of 205 Lit Per Min. Take desludging period as one year. Assume suitable design criteria and draw a neat sketch of the designed tank. 10M

- Q.5(A) i) Analyze the ill effects of air pollution with the help of case study for each. 7M
ii) How can you, as an individual, prevent environmental pollution? Why such an effort at individual level is important? 3M

OR

- Q.5(B) i) Evaluate the role of an individual in pollution prevention in detail. 2M
ii) Elaborate a recent case study about noise pollution. 8M

-
- Q.6(A) i) List the various disposal methods of solid waste management. 3M
ii) Explain the control and prevention measure of municipal solid wastes. 7M

OR

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- Q.6(B) Find the ways by which the radioactive wastes can be managed by listing its effects. 10M

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations –DEC 2020**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

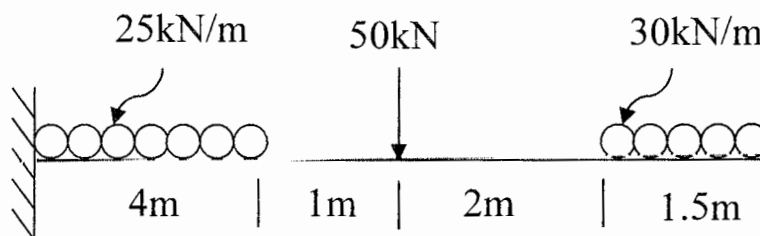
Q.1	i. State Hooks law	1M
	ii. Define Poisons ratio	1M
	iii. Mention different Types of Supports	1M
	iv. Differentiate between long column and short column	1M
	v. Write the bending equation and explain the terms	1M
	vi. What is section modulus	1M
	vii. Define torsional rigidity	1M
	viii. Define principal stress and principal strain.	1M
	ix. Define slope and deflection	1M
	x. Mention different methods for finding slope and deflections of beams	1M

Q.2(A) A bar of 30mm diameter is subjected to a pull of 60kN. The measured extension on gauge length of 200mm is 0.1 mm and change in diameter is 0.004 mm. Calculate Young's modulus, Poisson's ratio and Bulk modulus. 10M

OR

Q.2(B) A metallic bar 250mmx100mmx40mm is subjected to a force of 50kN (Tensile, along 200mmx40mm face), 60kN (tensile, along 250mmx 40mm face) and 40kN (tensile, along 250mmx100mm face) along x, y and z directions respectively. Determine the change in volume of the block. Take $E=2 \times 10^5$ N/mm² and Poisson's ratio = 0.20 10M

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

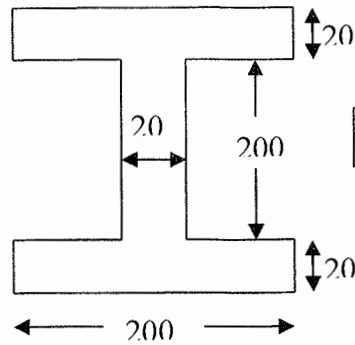
**OR**

Q.3(B) i. Draw SFD and BMD for a cantilever beam subjected to UDL over the entire span. 5M
ii. Draw SFD and BMD for a Simply supported beam subjected to Point load at center. 5M

Q.4(A) State the assumptions and derive the equation of pure bending equation. 10M

OR

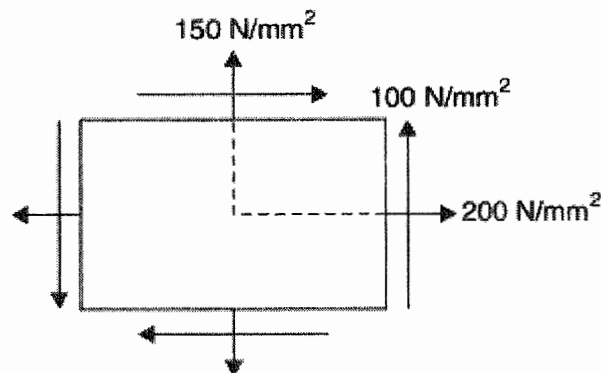
Q.4(B) The unsymmetrical I-section shown in the Figure has a cross section of the beam, which is subjected to a shear force of 100kN. Draw the shear stress variation across the depth 10M



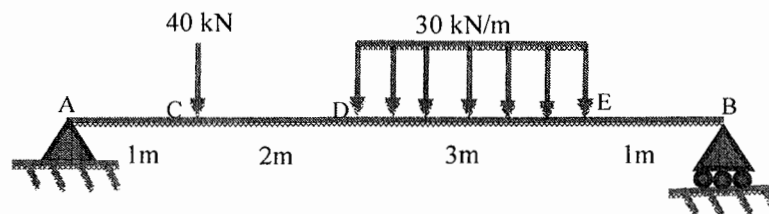
Q.5(A) A hollow shaft, having an internal diameter 40% of its external diameter, transmits 10M power at 200rpm. Determine the external diameter of the shaft if shear stress is not 60N/mm^2 and the angle of twist in a length of 2.5m should not exceed 1.3 degree: maximum torque = 1.25 mean torque and modulus of rigidity = $9 \times 10^4 \text{N/mm}^2$.

OR

Q.5(B) The state of stress at a point in a strained material is shown in Figure. Determine (a) the direction of principal planes (b) the magnitude of principal stresses and (c) the magnitude of maximum shear stress 10M



Q.6(A) Find the slope and deflection at C and D and find maximum deflection and its location of the SSB shown in the figure shown below. 10M



OR

Q.6(B) Using Double integration method find (a) slope and deflection of a cantilever beam subjected to UDL over the entire span and (b) slope and deflection of SSB subjected to point load at center. 10M

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

B.Tech II Year II Semester (R18) Regular End Semester Examinations –DEC 2020
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. Define Isohyet	1M
	ii. What is convective precipitation?	1M
	iii. What is the main advantage of double ring infiltrometer with respect to single ring	1M
	iv. What is W-index?	1M
	v. What is the main advantage of bubble gauge in measuring stream flow?	1M
	vi. What do you mean by base flow separation?	1M
	vii. What is Pan Coefficient?	1M
	viii. What is attenuation?	1M
	ix. What is transmissibility of aquifer?	1M
	x. What is specific Capacity of a well?	1M
Q.2(A)	i) Define the following: Mass curve of rainfall, Hyetograph and Rainfall Excess.	5M
	ii) Explain Thiessen Polygon method of finding average rainfall over an area.	5M
OR		
Q.2(B)	Explain various methods of finding mean rainfall over a catchment area.	10M
Q.3(A)	i) What is infiltration?	2M
	ii) What are the main factors that affect infiltration?	3M
	iii) How is the infiltration measured in the field?	5M
OR		
Q.3(B)	i) The infiltration capacity in a basin is represented by Horton's equation as $f_p = 2.5 + e^{-2t}$ Where f_p is in cm/h and t is in hours. Assuming the infiltration to take place at capacity rates in a storm of 60 minutes duration, estimate the depth of infiltration in first 30 min duration and the second 30min duration.	8M
	ii) Distinguish between potential and actual evapotranspiration	2M
Q.4(A)	Using suitable example explain various methods of direct measurement of stream flow	10M
OR		
Q.4(B)	i) Draw and describe various components of a hydrograph	4M
	ii) What are the major factors affecting shape of a hydrograph? Discuss along with suitable example.	6M

- Q.5(A) i) What do you mean by Design flood, and what is its importance? 2M
ii) What are the various methods of estimating flood of a catchment. Discuss any one method in detail. 8M

OR

- Q.5(B) i) What do you mean by flood routing through reservoir? 3M
ii) Explain Hydrologic Channel Routing 7M

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- Q.6(A) i) Draw and describe different zones of ground water. 3M
ii) During recuperation test of a 5m dia open well, recuperation of the depression head from 2.5m to 1.25m was found to take place in 90min. Determine the specific capacity per unit area and yield of the well for a safe drawdown of 2.5m. 7M

OR

- Q.6(B) i) What do you understand by well recuperation test? 5M
ii) Draw and describe the Artesian Well. 3M
iii) What is parched water table? 2M

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations –NOV 2020

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. Define axiomatic definition of probability? 1M
 - ii. Let A and B be events such that $p(A) = 0.5$, $p(B) = 0.7$ what must be $p(A \cap B)$ equal for A and B to be independent? 1M
 - iii. Define cumulative distribution function of a random variable? 1M
 - iv. Let X is number of heads when a coin is tossed 3 times. Find its mean? 1M
 - v. Define statistical independence of two random variables? 1M
 - vi. Define coefficient of correlation? 1M
 - vii. Mean of Poisson distribution is 3. Find $P(X=1)$ 1M
 - viii. Evaluate $\int_0^{\infty} z^2 e^{-z} dz$ 1M
 - ix. Define Null hypothesis? 1M
 - x. Define Level of significance? 1M

- Q.2(A) When a computer goes down, there is a 75% chance that it is due to an overload and a 15% chance that it is due to software problem. There is an 85% chance that it is due to an overload or a software problem. What is the probability that (i) both the problems are at fault (ii) there is software problem but not overload (iii) there is an overload problem but not software problem (iv) neither software problem nor overload problem? 10M

OR

- Q.2(B) State and Prove Baye's theorem? Also mention the use of the Baye's theorem? 10M

- Q.3(A) A drug is used to maintain a steady heart rate in patients who have suffered a mild heart attack. Let X denotes the number of heart beats per minute obtained per patient 10M

x	40	60	68	70	72	80	100
f(x)	0.01	0.04	0.05	0.80	0.05	0.04	0.01

Find the (a) $p(68 \leq X \leq 72)$ (b) Distribution function (c) average heart beat of the patients (d) variance of heart beats.

OR

- Q.3(B) (i) State and Prove Chebychev's inequality. 10M
(ii) From past experience, a professor knows that the test score of a student taking her final examination is a random variable with mean 75. What can be said about the probability that a student will score between 65 and 85?

- Q.4(A) For the following bivariate probability distribution find (a) $V(X)$ and $V(Y)$ (b) $Cov(X, Y)$ (c) correlation coefficient? 10M

$X \backslash Y$	0	1	2	3
0	0.800	0.040	0.030	0.020
1	0.070	0.010	0.008	0.002
2	0.010	0.005	0.004	0.001

OR

- Q.4(B) The joint density for (X, Y) is given by $f(x, y) = \frac{x^3 y^3}{16}$ $0 \leq x \leq 2, 0 \leq y \leq 2$ 10M

- Find the marginal densities for X and Y .
- Are X and Y independent?
- Find $p(X \leq 1)$
- Find $p(X \leq 1, Y \leq 1)$

- Q.5(A) (i) Find mean and variance of binomial distribution? 10M
(ii) Suppose that the average number of accidents occurring weekly on a particular stretch of a highway equal 3. Calculate the probability that there is (a) at least one and (b) at most one accident this week.

OR

- Q.5(B) (i) Find mean and variance of Uniform distribution? 10M
(ii) The Scholastic Aptitude Test mathematics test scores across the population of high school seniors follow a normal distribution with mean 500 and standard deviation 100. If five seniors are randomly chosen, find the probability that (a) all scored below 600 and (b) exactly three of them scored above 640.

- Q.6(A) (i) A sample of 900 members is found to have a mean of 3.4 cm. Can it be reasonably regard as a truly random sample from a large population with mean 3.25 cm and standard deviation 1.61 cm? 10M
(ii) A sample of height of 6400 soldiers have a mean of 67.85 inches and a standard deviation of 2.56 inches while a sample of heights of 1600 sailors has a mean of 68.55 inches and a standard deviation of 2.52 inches. Do the data indicate that the sailors are on the average taller than soldiers?

OR

- Q.6(B) Two independent samples of sizes 7 and 6 have the values: 10M

Sample A: 28 30 32 33 33 29 34
Sample B: 29 30 30 24 27 29

Examine whether the samples have been drawn from normal populations having the same variance?

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations –DEC 2020

CONCRETE TECHNOLOGY

(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

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|-----------|---|-----|
| Q.1 | i. What is GGBS? List its advantages. | 1M |
| | ii. Classify aggregates. | 1M |
| | iii. Define Gel space ratio. | 1M |
| | iv. Differentiate Segregation & bleeding. | 1M |
| | v. Give the relation between compressive and tensile strength | 1M |
| | vi. Define workability. | 1M |
| | vii. List the objectives of mix design. | 1M |
| | viii. Give the formula for calculating the target mean strength for mix design. | 1M |
| | ix. What is pumice? | 1M |
| | x. Classify light weight concrete on the purpose for which it is used | 1M |
| <hr/> | | |
| Q.2(A) | i) Examine the test for aggregate to determine the flakiness index. | 8M |
| | ii) List out the salient features of Rapid hardening cement and Sulphate resisting cement. | 2M |
| OR | | |
| Q.2(B) | Describe the different field tests conducted in cement. | 10M |
| <hr/> | | |
| Q.3(A) | i) Define workability. What are the factors effecting workability? | 5M |
| | ii) Explain the influence of various constituents of concrete on workability. | 5M |
| OR | | |
| Q.3(B) | i) What is the purpose of mixing water in concrete? | 2M |
| | ii) Explain the steps involved in manufacture of concrete. | 8M |
| <hr/> | | |
| Q.4(A) | Explain the slump cone test procedure with neat sketches. | 10M |
| OR | | |
| Q.4(B) | i) Explain the procedure to conduct compaction factor test. | 8M |
| | ii) List the effects on bleeding of concrete. | 2M |
| <hr/> | | |
| Q.5(A) | Design of M20 concrete mix as per IS:10262-2009, Concrete mix proportioning-guidelines i. Grade designation : M20 ii. Type of cement : OPC 43 grade confirming to IS 8112 iii. Maximum nominal size of aggregates : 20 mm iv. Minimum cement content : 320 kg/m ³ v. Maximum water cement ratio : 0.55 vi. Workability : 75 mm (slump) vii. Exposure condition : Mild viii. Degree of supervision : Good ix. Type of aggregate : Crushed angular aggregate x. Maximum cement content : 450 kg/m ³ xi. Chemical admixture : Not recommended xii. Specific gravity of cement : 3.15 Coarse aggregate : 2.68 Fine aggregate : 2.65 xiii. Water absorption Coarse aggregate : 0.6 percent Fine aggregate : 1.0 percent xiv. Free (surface) moisture Coarse aggregate : Nil (absorbed moisture full) Fine aggregate : Nil xv. Sieve analysis Coarse aggregate : Conforming to Table 2 of IS: 383 Fine aggregate : Conforming to Zone I of IS: 383. | 10M |

OR

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|--------|--|----|
| Q.5(B) | i) Describe the BIS method of concrete design with the necessary data's stipulated | 5M |
| | ii) How will you calculate the cement content and aggregate contents for mix design? | 5M |
| Q.6(A) | i) Discuss about Fibre Reinforced Concrete, What are the fibres used in concrete. | 5M |
| | ii) Explain Self compacting concrete with suitable example. | 5M |
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OR

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|--------|---|-----|
| Q.6(B) | When to use High Performance Concrete? Explain with any case study. | 10M |
|--------|---|-----|

***** END*****

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

B. Tech II Year II Semester (R18) Regular End Semester Examinations – DEC 2020
INDUCTION AND SYNCHRONOUS MACHINES
(Electrical and Electronics 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

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|-----------|-------|--|-----|
| Q.1 | i. | Why Fractional pitch winding is preferred over full-pitch winding. | 1M |
| | ii. | Define Distribution factor | 1M |
| | iii. | Give the emf equation of an alternator | 1M |
| | iv. | Define the voltage regulation of alternator | 1M |
| | v. | List the starting methods of synchronous motor | 1M |
| | vi. | Does the change in excitation will affect the synchronous motor speed and power factor | 1M |
| | vii. | Find out the full load speed of a 3-phase, 6-pole, 50Hz Induction motor rotating at a slip speed of 60 rpm. | 1M |
| | viii. | What is meant by Crawling | 1M |
| | ix. | List the two types of stepper motors | 1M |
| | x. | Give any two advantages of BLDC Motors | 1M |
| | | | |
| Q.2(A) | (i) | An alternator has 9 slots per pole. The coil span is 8 slots. Find the pitch factor for fundamental frequency | 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) | | Show that when two identical coils displaced in space by 90° are connected across 2-ph ac supply, a uniformly rotating field of constant amplitude rotating at synchronous speed is produced. | 10M |
| | | | |
| Q.3(A) | | Find the no-load phase and line voltage of a star connected 3-phase, 6-pole alternator which runs at 1200 rpm. Having flux per pole of 0.1 Wb sinusoidally distributed, its stator has 54 slots having double layer winding. Each coil has 8 turns and each coil is short pitched by 1 slot. | 10M |
| OR | | | |
| Q.3(B) | | A 3-phase star-connected alternator is rated at 1600 kVA at 13.5 kV. The per phase armature effective resistance and synchronous reactance are 1.5 ohm and 30 ohms respectively. Calculate Voltage regulation for a load of 1.280 MW at a power factor of (i) 0.8 pf lag and (ii) unity power factor | 10M |

- Q.4(A) (i) Draw and explain V and inverted V characteristics of synchronous motor. 5M
(ii) Why synchronous motor isn't self-starting? 5M

OR

- Q.4(B) (i) A 3-phase star connected 400V synchronous motor takes a power input of 5472W at rated voltage. Its synchronous reactance is 10 Ω per phase and resistance is negligible. If its excitation voltage is adjusted equal to the rated voltage of 400 V, compute the load angle. 5M
(ii) What are the causes for hunting? How to eliminate hunting? 5M

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- Q.5(A) (i) Discuss the theory of operation of 3-phase induction motor. What is meant by slip of an induction motor? Explain the importance of the slip in operation and performance of an induction motor 5M

- (ii) A 3-phase 4-pole induction motor is supplied from a 3-phase, 50 Hz supply. Calculate (a) Synchronous Speed (b) Rotor speed when slip is 4% and (c) rotor frequency when rotor runs at 600 rpm 5M

OR

- Q.5(B) (i) Explain the speed control methods of 3-phase induction motor? 5M
(ii) Explain the construction of circle diagram for 3-phase induction motor. 5M

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- Q.6(A) (i) Explain double revolving field theory. Draw the equivalent circuit of 1-phase induction motor. 6M
(ii) Why single phase induction motor is not self-starting? 4M

OR

- Q.6(B) (i) Explain construction and working principle of reluctance motor. 5M
(ii) Explain construction and working principle of BLDC motor. 5M

*****END*****

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations –Nov-2020

CONTROL SYSTEMS

(EEE)

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.

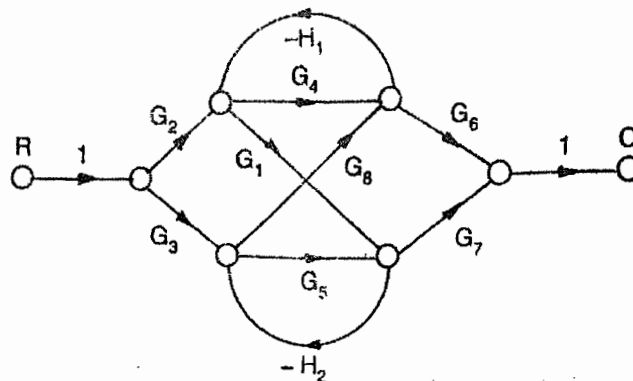
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

- | | | |
|-----|---|----|
| Q.1 | i. Write the significance of feedback system. | 1M |
| | ii. Define transfer function. | 1M |
| | iii. What is delay time. | 1M |
| | iv. Write the formula for velocity error constant. | 1M |
| | v. Check the stability of the equation given using Routh Hurwitz Criteria.
$5S^4 - 15S^3 + 25S^2 + 10S + 20$. | 1M |
| | vi. What is root locus? | 1M |
| | vii. Define Gain margin. | 1M |
| | viii. What is compensator? | 1M |
| | ix. Define state model. | 1M |
| | x. What are the properties of state transition matrix? | 1M |

- Q.2(A) Explain about open loop and closed loop systems with suitable examples. 10M

OR

- Q.2(B) Apply Mason's gain formula to obtain transfer function $C(s)/R(s)$ for the system whose signal flow graph is shown below. 10M



- Q.3(A) Derive the expressions for rise time, peak time, peak overshoot and settling time for underdamped second order system. 10M

OR

- Q.3(B) A unity feedback system is characterized by an open loop transfer function $G(s) = \frac{K}{s(s+6)}$, determine (a) the gain K so that the system will have a damping ratio of 0.82. (b) For this value of K, determine settling time, peak time, peak overshoot for a unit step input. 10M

Q.4(A) Determine the range of K for the stability of unity feedback system whose open loop transfer function is $G(s) = \frac{K}{s(s+1)(s+2)}$ 10M

OR

Q.4(B) A unity feedback control system has an open loop transfer function $G(s) = \frac{K}{s(s+4)}$. 10M
Draw the Root Locus and determine the value of K, if the damping ratio ξ is to be 0.707?

Q.5(A) For the given open loop system draw bode plot and find gain margin and phase margin also comment on the stability of the system. 10M

$$G(s) = \frac{75(1+0.2s)}{s(s^2+16s+100)}$$

OR

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

Q.6(A) The transfer function of a system is given by $\frac{Y(s)}{U(s)} = \frac{s^2+3s+2}{s^3+9s^2+26s+24}$. Determine State model. 10M

OR

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

*** END***

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

B.Tech II Year II Semester (R18) Regular End Semester Examinations – DEC 2020
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. Define Scalar & vector multiplication.	1M
	ii. Show that the vector $H = 3y^4z\mathbf{a}_x + 4x^3z^2\mathbf{a}_y + 2x^3y^2\mathbf{a}_z$ is solenoidal.	1M
	iii. Define dipole and dipole moment	1M
	iv. Find the electric potential at a point (4 , 3) m due to a charge of 10^{-9} C located at the origin in free space.	1M
	v. Define magnetic vector potential.	1M
	vi. A solenoid with a radius of 2cm is wound with 20 turns per cm length and carries 10mA. Find H at the centre if the total length is 10cm?	1M
	vii. What is the significance of displacement current?	1M
	viii. A conductor of 1m length is moved with a velocity of 100m/sec. Perpendicular to a field of 1 tesla. What is the value of emf induced?	1M
	ix. Define circular polarization.	1M
	x. What are the properties uniform plane wave?	1M
OR		
Q.2(A)	i) Derive the Spherical coordinates in-terms of Cartesian coordinates	6M
	ii) Discuss Position and Distance vector	4M
OR		
Q.2(B)	For a vector field A, show explicitly that $\nabla \cdot \nabla \times \mathbf{A} = 0$; that is, the divergence of the curl of any vector field is zero.	10M
OR		
Q.3(A)	Obtain the energy and energy density in an electrostatic field.	10M
OR		
Q.3(B)	i) Define the electric dipole & Explain Electric field intensity due to an electric dipole?	6M
	ii) Derive the capacitance of a coaxial cable.	4M
OR		
Q.4(A)	Derive the expression for Force between two current carrying conductor placed in a magnetic field.	10M
OR		
Q.4(B)	Derive the expression for Magnetic Field Intensity due to straight current carrying conductor.	10M
OR		
Q.5(A)	State Faraday's Law of Electromagnetic Induction and derive the point form of equation.	10M
OR		
Q.5(B)	i) Discuss on motional emf.	4M
	ii) compare actual and modified Maxwell's equations.	6M
OR		
Q.6(A)	State and prove pointing theorem.	10M
OR		
Q.6(B)	Construct wave equations from Maxwell's equations.	10M

END

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations – DEC 2020**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.	What are the applications of Boolean algebra?	1M
	ii.	Find the 2's complement of $(1010111)_2$	1M
	iii.	What is race around condition?	1M
	iv.	What are the advantages of K-map?	1M
	v.	What is the difference between a latch and a flip-flop?	1M
	vi.	What is state diagram?	1M
	vii.	Mention the unique feature of CMOS logic family.	1M
	viii.	What is meant by logic family?	1M
	ix.	What are the advantages of PLDs?	1M
	x.	Write the characteristic equation of D latch?	1M

Q.2(A)	i.	Construct NAND gate using NOR gates	3M
	ii.	Discuss the characteristics of digital ICs.	4M
	iii.	Given that $16_{10} = 100_b$, find the value of b.	3M

OR

Q.2(B)	(I) Find the 16's complement of BABA	10M
	(II) Convert BABA to its equivalent binary	
	(III) Find the 2's complement of the results in (II)	
	(IV) Convert answer in (III) to hexadecimal and compare with the answer in (I)	

Q.3(A)	$F = \overline{X}YZ + X\overline{Y}Z + \overline{W}XY + W\overline{X}Y + WXY$	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	

OR

Q.3(B)	i. Simplify the Boolean function using a 4 variable KMAP	4M
	$F(w, x, y, z) = \sum(1, 3, 7, 11, 15) + d(0, 2, 5)$	
	ii. Design a 4 bit magnitude comparator with logic diagram	6M

Q.4(A)	i.	Obtain the characteristics of JK, SR, D and T type flip flops. Also explain excitation tables of all the flip flops	6M
	ii.	Construct a JK flip-flop using a D flip-flop	4M

OR

Q.4(B)	i.	Design a four-bit Universal Shift Register and explain its operation precisely with neat sketch	6M
	ii.	Give the comparison between Mealy and Moore models	4M

- Q.5(A) i. With a neat sketch explain the operation of DTL NAND gate. 5M
ii. Discuss the characteristics of digital logic family. 5M

OR

- Q.5(B) Write Short notes on 10M
a) Binary ripple counter
b) Ring Counter

-
- Q.6(A) Implement the following Boolean function using PLA logic 10M

- a) $(x,y,z) = \sum(1,2,4,6)$
b) $(x,y,z) = \sum(0,1,6,7)$
c) $(x,y,z) = \sum(2,6)$
d) $(x,y,z) = \sum(1,2,3,5,7)$
-

OR

- Q.6(B) i. Discuss Difference between ROM and RAM. Explain different types of ROM? 8M
ii. Explain difference between static memory and dynamic memory? . 2M

*****END*****

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

B. Tech II Year II Semester Regular & Supplementary End Semester Examinations – NOV 2020
ECONOMICS AND 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 do you mean by Scarcity in Economics?	1M
	ii.	Determine the Law of Supply.	1M
	iii.	Outline Fixed cost and Variable cost.	1M
	iv.	Discuss break even analysis.	1M
	v.	What is perfect competition?	1M
	vi.	How can you classify different markets?	1M
	vii.	What is meant by Book-Keeping?	1M
	viii.	Explain Nominal Account with example.	1M
	ix.	Outline of Solvency ratio.	1M
	x.	How do you interpret Financial statements?	1M

Q.2(A) Explain the scope and significance of Economics. 10M

OR

Q.2(B) What do you understand Law of Demand? Elaborate the various types of Elasticity of Demand. 10M

Q.3(A) What is meant by Cost? Explain different types of Costs. 10M

OR

Q.3(B) **From the following data, you are required to calculate:** 10M

(a) P/V ratio

(b) Break-even sales with the help of P/V ratio.

(c) Sales required to earn a profit of Rs. 4,50,000

Fixed Expenses = Rs. 90,000

Variable Cost per unit:

Direct Material = Rs. 5

Direct Labour = Rs. 2

Direct Overheads = 100% of Direct Labour

Selling Price per unit = Rs. 12.

Q.4(A) Distinguish between Monopoly and Perfect market competition. 10M

OR

Q.4(B) What is Monopolistic competition? Explain the features and price output determination under Monopolistic competition. 10M

Q.5(A) Elucidate the classification of Accounts with debit and credit rules. 10M

OR

Q.5(B) Prepare trial balance from the following. 10M

Bills receivable Rs. 52,500

Capital Rs. 250,000

Furniture Rs. 33,000

Drawings Rs. 74,800

Purchases Rs. 295,700

Stock (1.04.2011) Rs. 30,000

Discount allowed Rs. 950

Sales Rs. 335,350

Rent Rs. 72,500

Freight Rs. 3,500

Printing charges Rs. 1,500

Sundry creditors 75,000

Insurance Rs. 2,700

Sundry expenses Rs. 21,000

Discount received Rs. 1,000

Bank loan Rs. 120,000

Stock (31.03.2012) Rs. 17,000

Income tax Rs. 9,500

Machinery Rs. 215,400

Bills payable Rs. 31,700

Q.6(A) What is Ratio Analysis? Explain the categories of Ratio Analysis. 10M

OR

Q.6(B) What is Capital Budgeting? Discuss the techniques of Capital Budgeting. 10M

END

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular & Supplementary End Semester Examinations – NOV 2020

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. What is an organelle which is also known as “post office of the cell”. | 1M |
| | ii. Name the carbon and energy source of chemolithotroph? | 1M |
| | iii. Name the metal ion present in Haemoglobin? | 1M |
| | iv. Give an example for a protein molecule that also acts as a hormone. | 1M |
| | v. Mention the products in glycolysis of glucose. | 1M |
| | vi. Draw the neat diagram of Neurons and label it. | 1M |
| | vii. Mother has Gg genotype and father has Gg genotype. What is the probability that the offspring will have gg genotype? | 1M |
| | viii. Name any one application of recombinant DNA technology. | 1M |
| | ix. Differentiate metabolism and anabolism. | 1M |
| | x. Define endothermic reactions. | 1M |
| <hr/> | | |
| Q.2(A) | Discuss the structure and functions of a cell using five cell organelles as cell components. | 10M |
| OR | | |
| Q.2(B) | (i) Differentiate between a prokaryotic cell and eukaryotic cell with suitable examples. | 4M |
| | (ii) Demonstrate with comparisons how an aeroplane is bio-inspired from a bird. | 6M |
| <hr/> | | |
| 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 |
| | (a) Monosaccharides (b) Nucleotides | |
| <hr/> | | |
| Q.4(A) | Explain the Krebs cycle in detail with a neat diagram. | 10M |
| OR | | |
| Q.4(B) | Explain neuromuscular junction in detail with a neat illustration. | 10M |
| <hr/> | | |
| Q.5(A) | What do you mean by biosensors and biochips? Explain both in detail. | 10M |
| OR | | |
| Q.5(B) | Explain the cell reproduction with mitotic division with neat diagrams. | 10M |
| <hr/> | | |
| Q.6(A) | Discuss the mechanism of photosynthesis with neat diagram. | 10M |
| OR | | |
| Q.6(B) | (i) Evaluate the concept that ATP is an energy currency. | 5M |
| | (ii) State and explain the 1 st and 2 nd law of thermodynamics with biological examples. | 5M |

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular & Supplementary End Semester Examinations – DEC 2020

MECHANICS OF SOLIDS

(Mechanical Engineering)

Time: 3Hrs

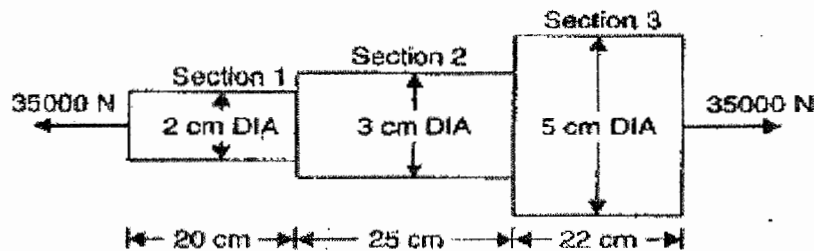
Max Marks: 60

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. | Explain the term factor of safety. | 1M |
| | ii. | Define Resilience. | 1M |
| | iii. | What do you mean by the point of contra flexure? | 1M |
| | iv. | What are the different types of beams? | 1M |
| | v. | Write the relation between slope deflection and radius of curvature of a beam. | 1M |
| | vi. | Define the term polar modulus. | 1M |
| | vii. | Write the assumptions in the theory of pure torsion. | 1M |
| | viii. | Define torsional rigidity? | 1M |
| | ix. | Define slenderness ratio? | 1M |
| | x. | Define the terms column and strut. | 1M |

- Q.2(A) An axial pull of 35000N is acting on a bar consisting of three lengths as shown in figure. 10M
If the young's modulus = 2.1×10^5 N/mm², determine
(i) Stresses in each section and
(ii) Total extension of the bar.



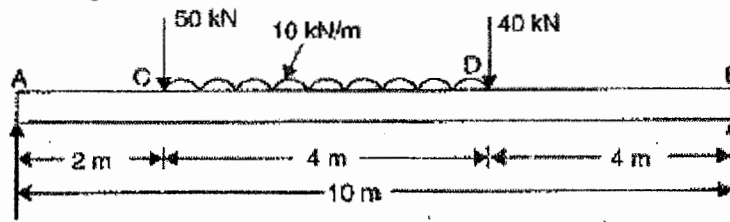
OR

- 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 10⁰ C there is no longitudinal stress, calculate the stresses in the rod and tube when the temperature is raised to 200⁰ C. Take E for steel and copper as 2.1×10^5 N/mm² and 1×10^5 N/mm² 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 ⁰C 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) A simply supported beam of length 10m carries a UDL and two point loads as shown in figure. Draw the shear force and bending moment diagram for the beam. Also, find maximum bending moment. 10M



-
- Q.4(A) A rectangular beam 300 mm deep is simply supported over a span of 4 metres. Determine the uniformly distributed load per metre which the beam may carry, if the bending stress should not exceed 120 N/mm^2 . Take $I = 8 \times 10^6 \text{ mm}^4$. 10M

OR

- Q.4(B) A beam of uniform rectangular section 200 mm wide and 300 mm deep is simply 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 $1 \times 10^4 \text{ N/mm}^2$, find:
(i) The slope at the supports and (ii) Maximum deflection. 10M

-
- Q.5(A) Two shafts of the same material and of same lengths are subjected to the same torque, if the first shaft is of a solid circular section and the second shaft is of hollow circular section, whose internal diameter is $2/3$ of the outside diameter and the maximum shear stress developed in each shaft is the same, compare the weights of the shafts. 10M

OR

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

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

OR

- Q.6(B) A hollow alloy tube 5 m long with external and internal diameters 40 mm and 25 mm respectively was found to extend 6.4 mm under a tensile load of 60 kN. Find the buckling load for the tube when used as a column with both ends pinned. Also find the safe load for the tube, taking a factor of safety = 4. 10M

END

Hall Ticket No:

Question Paper Code: 18ME106

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

B.Tech II Year II Semester (R18) Regular End Semester Examinations – DEC 2020

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. Name any two pattern materials. | 1M |
| | ii. Define core print in casting process. | 1M |
| | iii. What is edge preparation? | 1M |
| | iv. List the various types of flames in oxy-acetylene gas welding. | 1M |
| | v. List out the classifications of sheet metal operations. | 1M |
| | vi. Define the sketch progressive die process. | 1M |
| | vii. List out the types of forging. | 1M |
| | viii. Mention the defects in drawing operation. | 1M |
| | ix. What is screen mesh in powder metallurgy process? | 1M |
| | x. Define sintering. | 1M |
| Q.2(A) | Mention the applications of investment casting? Discuss the detailed steps involved in investment casting in details with suitable diagrams. | 10M |
| | OR | |
| Q.2(B) | Explain cold chamber and hot casting process with a neat sketch. | 10M |
| Q.3(A) | What is the basic difference between a TIG welding and MIG welding? Explain the working principle of both welding with neat diagrams | 10M |
| | OR | |
| Q.3(B) | How defects can be detected by NDT methods? | 10M |
| Q.4(A) | Explain the difference between punching, blanking and piercing with neat sketches. | 10M |
| | OR | |
| Q.4(B) | Explain the working principle of mechanical press. How is it diverse from a hydraulic press? | 10M |
| Q.5(A) | What are the characteristics of any forging machine? Explain the process of closed die forging and the importance of flash. | 10M |
| | OR | |
| Q.5(B) | Explain the working principle of extrusion process and also explain the various defects in extrusion process. | 10M |
| Q.6(A) | Explain the process of atomization in powder metallurgy process. | 10M |
| | OR | |
| Q.6(B) | What is the scope of Powder Metallurgy? Compare Powder Metallurgy with other fabrication techniques | 10M |

***** END*****

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

B.Tech II Year II Semester (R18) Regular End Semester Examinations – DEC 2020

THEORY OF MACHINES

(Mechanical Engineering)

Time: 3Hrs

Max Marks: 60

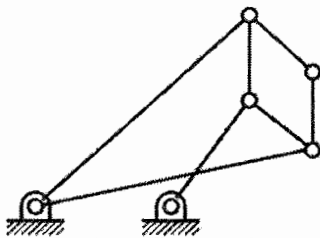
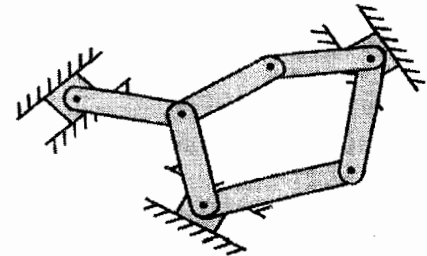
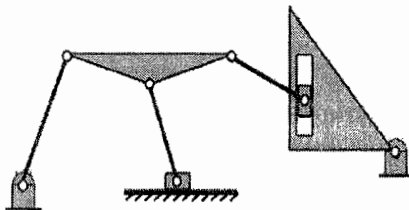
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

- | | | |
|-----|---|----|
| Q.1 | i. Define (i) Kinimatic link (ii) kinematic pair | 1M |
| | ii. State Grashoff's Law. | 1M |
| | iii. What is instantaneous centre of rotation? | 1M |
| | iv. State Kennedy's theorem. | 1M |
| | v. State the effect of rolling in naval ships. | 1M |
| | vi. State law of gearing. | 1M |
| | vii. Why rotating masses are to be dynamically balanced? | 1M |
| | viii. List the classifications of cam followers based on shape. | 1M |
| | ix. Define whirling speed of the shaft. | 1M |
| | x. What are the causes and effects of vibrations? | 1M |

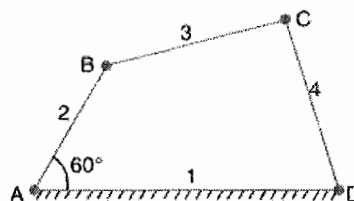
Q.2(A) Sketch and describe the working of any two inversions of Four-bar mechanism. 10M

OR

Q.2(B) Determine the number of degrees of freedom for the following mechanisms. 10M



Q.3(A) Locate all the instantaneous centres for a four-bar mechanism as shown in Figure. The lengths of various links are: AD = 125 mm; AB = 62.5 mm; BC = CD = 75 mm. If the link A B rotates at a uniform speed of 10 r.p.m. in the clockwise direction, find the angular velocity of the links BC and CD. 10M



OR

Q.3(B) The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine: 10M
1. linear velocity and acceleration of the midpoint of the connecting rod, and
2. angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position.

Q.4(A) In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the center of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B? 10M

OR

Q.4(B) A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio. 10M

Q.5(A) Four masses m_1 , m_2 , m_3 and m_4 are 200 kg, 300 kg, 240 kg and 260 kg respectively. The corresponding radii of rotation are 0.2 m, 0.15 m, 0.25 m and 0.3 m respectively and the angles between successive masses are 45° , 75° and 135° . Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2 m. 10M

OR

Q.5(B) A cam drives a knife edge follower in the following manner : During first 120° rotation of the cam, follower moves outwards through a distance of 20 mm with simple harmonic motion. The follower dwells during next 30° of cam rotation. During next 120° of cam rotation, the follower moves inwards with simple harmonic motion. The follower dwells for the next 90° of cam rotation. The minimum radius of the cam is 25 mm. Draw the profile of the cam. 10M

Q.6(A) A cantilever shaft 50 mm diameter and 300 mm long has a disc of mass 100 kg at its free end. The Young's modulus for the shaft material is 200 GN/m^2 . Determine the frequency of longitudinal and transverse vibrations of the shaft. 10M

OR

Q.6(B) A coil of spring stiffness 4 N/mm supports vertically a mass of 20 kg at the free end. The motion is resisted by the oil dashpot. It is found that the amplitude at the beginning of the fourth cycle is 0.8 times the amplitude of the previous vibration. Determine the damping force per unit velocity. Also find the ratio of the frequency of damped and undamped vibrations 10M

*** END***

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

B.Tech II Year II Semester (R18) Regular End Semester Examinations - Oct 2020

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 viscosity of a fluid.	1M
	ii. What is barometric pressure?	1M
	iii. Express Bernoulli's equation in terms of energy.	1M
	iv. Explain any one application of momentum equation	1M
	v. List out the examples of laminar flow.	1M
	vi. Discuss minor losses in pipes.	1M
	vii. Express the equation of force exerted by fluid jet on a stationary flat plate normal to the jet.	1M
	viii. Mention different type of turbines.	1M
	ix. Express the equation of work done by a impeller of a centrifugal pump.	1M
	x. What are various losses that occur during the operation of a centrifugal pump?	1M

Q.2(A) Calculate specific weight, density and specific gravity of two liters of a liquid which weigh 15N. 10M

OR

Q.2(B) Explain the terms: (i) Path line (ii) Streak line (iii) Stream line (iv) Stream tube. 10M

Q.3(A) State and derive Bernoulli's equation. Write the assumptions for such a derivation. 10M

OR

Q.3(B) A garden hose attached with a nozzle is used to fill a 40 Litre bucket. The inner diameter of the hose is 2 cm, and it reduces to 0.8 cm at the nozzle exit. If it takes 50 s to fill the bucket with water, determine (a) the volume and mass flow rates of water through the hose, and (b) the average velocity of water at the nozzle exit. 10M

Q.4(A) The flow rate of methanol at 20°C ($\rho = 788.4 \text{ kg/m}^3$ and $\mu = 5.857 \times 10^{-4} \text{ kg/m} \cdot \text{s}$) through a 4-cm-diameter pipe is to be measured with a 3-cm-diameter orifice meter equipped with a mercury manometer across the orifice place. If the differential height of the manometer is read to be 11 cm, determine the flow rate of methanol through the pipe and the average flow velocity. 10M

OR

Q.4(B) Mention the different characteristics of laminar and turbulent flows. 10M

Q.5(A) A jet of water 75 mm diameter having a velocity of 20m/s, strikes normally a flat smooth plate. Determine the thrust on the plate a) if the plate is at rest (b) if the plate is moving in the same direction as the jet with a velocity of 5m/s. Also find the work done per second on the plate in each case and the efficiency of the jet when the plate is moving. 10M

OR

Q.5(B) Explain the working of pelton wheel turbine and derive equations of efficiency and work done by a pelton wheel hydraulic turbine. 10M

Q.6(A) Explain the working of reciprocating pump and derive the equation of work done by a reciprocating pump. 10M

OR

Q.6(B) A centrifugal pump has an impeller 0.5m outer diameter and when running at 600 r.p.m discharges water at the rate of 8000 litres/minute against a head of 8.5m. The water enters the impeller without whirl and shock. The inner diameter is 0.25m, and the vanes are set back at outlet at an angle of 45° and the area of flow which is constant from inlet to outlet of the impeller is 0.06m^2 , Determine (a) the manometric efficiency (b) the vane angle at inlet (c) the last speed at which the pump commences to work. 10M

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations – Dec 2020**ENGINEERING MECHANICS**

(Mechanical Engineering - Readmitted)

Time: 3Hrs

Max Marks: 60

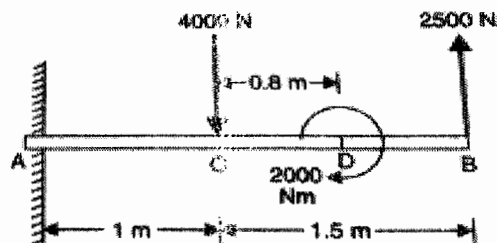
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either A or B only

- Q.1
- | | | |
|-------|---|----|
| i. | Define the free body diagram of a body in an equilibrium system and explain its importance. | 1M |
| ii. | State D'Alembert's principle. | 1M |
| iii. | State the procedure to find resultant of concurrent force system. | 1M |
| iv. | What are the conditions of equilibrium for concurrent force system? | 1M |
| v. | State the law of conservation of momentum. | 1M |
| vi. | State and explain Lami's theorem | 1M |
| vii. | Define relative velocity | 1M |
| viii. | What is the difference between kinematics and kinetics? | 1M |
| ix. | What is dry and wet friction? | 1M |
| x. | What is simply supported and cantilever trusses? | 1M |

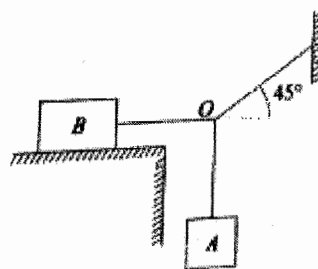
- Q.2(A) The resultant of two concurrent forces is 2500N and the angle between the forces is 90° . The resultant makes an angle of 46° with one of the forces. Find the magnitude of each force. 10M

OR

- Q.2(B) Figure shows two vertical forces and a couple of moment 2000 N-m acting on a horizontal rod which is fixed at end A. Determine the support reactions at A. 10M

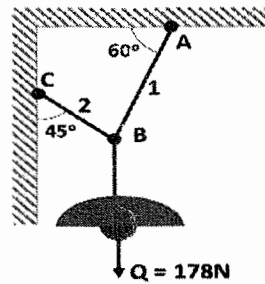


- Q.3(A) Block B in figure weighs 100 N. Determine the maximum weight of the block A for which the system will be in equilibrium. The coefficient of static friction between the block B and the table is 0.20. 10M

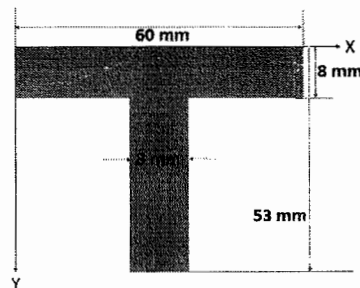


OR

- Q.3(B) An electric light fixture of weight $Q = 178 \text{ N}$ is supported as shown in the figure. Find the tensile forces "S1" and "S2" in the wire BA and BC. 10M

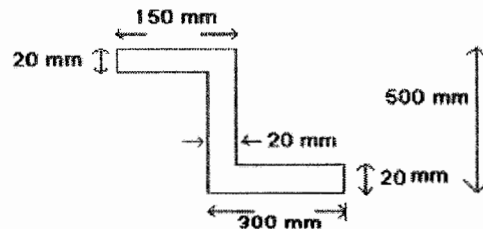


- Q.4(A) Determine the moment of inertia of the T-section as shown in figure 10M



OR

- Q.4(B) Find the centroid of the Z section shown in Figure 10M



- Q.5(A) A body of weight 2000 N moves on a level horizontal rough road for a distance of 200 m . The resistance of the road is 10 N per 1000 N weight of the body. Find the work done by the resistance on the body. 10M

OR

- Q.5(B) (i) A car has an initial speed of 25 m/s and a constant deceleration of 3 m/s^2 . Determine the velocity of the car when $t=4 \text{ s}$. What is the displacement of the car during the 4 s time interval? How much time is needed to stop the car? 5M
- (ii) A projectile is fired with an initial velocity of 250 m/s at a target located at a horizontal distance of 4 km and vertical distance of 700 m above the gun. Determine the value of firing angle to hit the target. Neglect air resistance. 5M

- Q.6(A) A car weighing 60 kN and moving at 72 kmph along the main road collides with a truck of weight 120 kN which emerges at 18 kmph from a cross road at right angles to the main road. If two vehicles lock after collision, what will be the magnitude and direction of the resulting velocity according to momentum impulse method? 10M

OR

- Q.6(B) The rotation of a flywheel is governed by the equation $\dot{\omega} = 3t^2 - 2t + 2$ where $\dot{\omega}$ is radian per second and time is in second. After one second from the rest, the angular displacement was 4 radians. Determine the angular displacement, angular velocity and acceleration of the flywheel after travelling 3 seconds. 10M

*** END***

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

B.Tech II Year II Semester (R18) Regular End Semester Examinations – NOV 2020
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. Write axioms of probability. 1M
 - ii. A single card is drawn from a 52 card deck. What is the probability that the card is spade? 1M
-
- iii. Define probability density of a random variable? 1M
 - iv. A continuous random variable X having density function $f(x) = kx(2-x)$; $0 \leq x \leq 2$. 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 monotonic transformation of a continuous random variable? 1M
 - viii. State the Central limit theorem? 1M
 - ix. Write the conditions for wide sense stationary (WSS) process? 1M
 - x. Write any one of the properties of power density spectrum? 1M

-
- Q.2(A) A missile can be accidentally launched if two relays A and B both have failed. The probabilities of A and B failing are known to be 0.01 and 0.03, respectively. It is also known that B is more likely to fail (probability 0.06) if A has failed. (a) What is the probability of an accidental missile launch? (b) What is the probability that A will fail if B has failed? (c) Are the events "A fails" and "B fails" statistically independent? 10M

OR

- Q.2(B) An airline in a small city has five departures each day. It is known that any given flight has a probability of 0.3 of departing late. For any given day find the probabilities that (a) no flights depart late (b) all flights depart late, and (c) three or more depart on time. (d) The local manager of the airline desires to make sure that the probability that all flights leave on time is 0.9. What is the largest probability of being late that the individual flights can have if the goal is to be achieved? Will the operation have to be improved significantly? 10M

-
- Q.3(A) A random variable X has the distribution function $F_X(x) = \sum_{n=1}^{12} \frac{n^2}{650} u(x-n)$ 10M
Find (a) $P(-\infty < X \leq 6.5)$ (b) $P(X > 4)$ and (c) $P(6 < X \leq 9)$.

OR

- Q.3(B) For the Poisson random variable show that $\bar{X} = E(X) = \lambda$ and $\sigma_X^2 = \lambda$. 10M
-

- Q.4(A) Given the function $f_{X,Y}(x,y) = b(x+y)^2$; $-1 < x < 1$ and $-3 < y < 3$. 10M
 (a) Find the 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) For two random variables X and Y have the joint density 10M
 $f_{X,Y}(x,y) = \frac{xy}{9}$; $0 < x < 2$ and $0 < y < 3$.
 Find (a) The first and second order moments, (b) The Covariance and (c) Are X and Y uncorrelated?

- Q.5(A) i. The P.d.f of a random variable X is given by $f_X(x) = \frac{x}{20}$; $2 \leq x \leq 5$. Find the P.d.f of 5M
 $Y = 3X - 5$.

- ii. A random variable X is uniformly distributed on the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$. X is 5M
 transformed to the new random variable $Y = T(X) = a \tan x$, where $a > 0$. Find the P.d.f of Y .

OR

- Q.5(B) Gaussian random variables X_1 and X_2 for which $\bar{X}_1 = 2$, $\sigma_{X_1}^2 = 9$, $\bar{X}_2 = -1$, $\sigma_{X_2}^2 = 4$ 10M
 and $C_{X_1X_2} = -3$ are transformed to new random variables Y_1 and Y_2 according to
 $Y_1 = -X_1 + X_2$, $Y_2 = -2X_1 - 3X_2$. Find (a) \bar{X}_1^2 (b) \bar{X}_2^2 (c) $\rho_{X_1X_2}$ (d) $\sigma_{Y_1}^2$ (e) $\sigma_{Y_2}^2$ and (f) $C_{Y_1Y_2}$

- Q.6(A) Show that the random process $X(t) = A \cos(\omega_0 t + \Theta)$ is wide-sense stationary if it 10M
 assume that A and ω_0 and Θ is uniformly distributed random variable on the interval
 $(0, 2\pi)$

OR

- Q.6(B) A Gaussian random process is known to be WSS with mean $\bar{X} = 4$ and autocorrelation 10M
 function $R_{XX}(\tau) = 25e^{-3|\tau|}$. Find the Covariance function necessary to specify the joint
 density of the random process and give the Covariance matrix for $X_i = X(t_i)$; $i = 1, 2, 3$

*** END***

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

B.Tech II Year II Semester (R18) Regular End Semester Examinations – November 2020
(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. Define Energy of a signal.	1M
	ii. Sketch the signal $u(-t+2)$	1M
	iii. What is LTI system?	1M
	iv. Find whether the system $y(n) = x(n+2)$ is linear or nonlinear.	1M
	v. Find Fourier transform of $\delta(n-k)$	1M
	vi. State linearity property of CTFT	1M
	vii. What is the Laplace transform of a function $x(t)$	1M
	viii. What is Z-transform of $a^n u(n)$	1M
	ix. Define sampling theorem?	1M
	x. Define critical sampling.	1M
Q.2(A)	(i) Find whether the following signal is Energy signal or Power signal $x(n) = n u(n)$	5M
	(ii) Determine whether the following signal is even or odd $x(t) = u(t+2)$	5M
OR		
Q.2(B)	Determine whether the following system is linear, stable, causal and time invariant or not using appropriate tests $y(n) = 2 x(n+1) + [x(n-1)]^2$	10M
Q.3(A)	Determine the unit step response of the following system whose impulse responses is given by	
	(i) $h(t) = e^{-5t} u(t)$	5M
	(ii) $h(t) = u(t+2)$	5M
OR		
Q.3(B)	Perform the convolution of the following two signals	10M
	$x_1(t) = t u(t) = t \quad ; t \geq 0$	
	$x_2(t) = e^{-5t} u(t) = e^{-5t} \quad ; t \geq 0$	
Q.4(A)	Find the relation between the trigonometric Fourier series and exponential Fourier series	10M
OR		
Q.4(B)	(i) What are Dirichlet's conditions?	10M
	(ii) Find the Fourier transform of the following signals	
	(a) $e^{3t} u(t)$	
	(b) $t e^{-at} u(t)$	

Q.5(A) State and prove any four properties of Laplace transform 10M

OR

Q.5(B) Determine the Z-transform and ROC of the following discrete time signals 10M

(a) $x(n) = \{3, 2, 5, 7\}$ (b) $x(n) = 0.5^n u(n)$

↑

Q.6(A) State and prove the sampling theorem for a band limited signals. 10M

OR

Q.6(B) (i) What is aliasing effect? How can it eliminate? 10M

(ii) Find the Nyquist rate and Nyquist interval for the following signal

$$x(t) = -10 \sin 40\pi t \cos 300\pi t$$

***** END*****

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations – November 2020

(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. | What are the conditions to be satisfied for an amplifier to function as an oscillator? | 1M |
| | ii. | Negative feedback reduces the amplifier gain. Why is it used? | 1M |
| | iii. | Write the ideal characteristics of op-amp | 1M |
| | iv. | What type of feedback topology is used in emitter follower? | 1M |
| | v. | Define CMRR in a differential amplifier | 1M |
| | vi. | Sketch cross over distortion. | 1M |
| | vii. | Define input offset voltage in an op-amp | 1M |
| | viii. | Draw the frequency response of high pass active filters. | 1M |
| | ix. | Which A/D converter is considered to be fastest? | 1M |
| | x. | What are the advantages of Colpitts oscillators? | 1M |
| <hr/> | | | |
| 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) | | Sketch the circuit of a Wein-bridge oscillator. Briefly explain how the circuit operates and how it fulfills the Barkhausen criteria. | 10M |
| <hr/> | | | |
| Q.3(A) | | Explain the working of complementary push-pull class-B power amplifier and obtain the power efficiency. | 10M |
| OR | | | |
| Q.3(B) | | Describe tuned amplifier. Draw and explain the working of single tuned amplifier. | 10M |
| <hr/> | | | |
| Q.4(A) | | Draw and explain the circuit diagram of inverting & non inverting amplifier using op-amp. Derive an expression for their gain. | 10M |
| OR | | | |
| Q.4(B) | | Explain the principle of differential amplifier. Derive the differential gain (A_D), common mode gain (A_C) and CMRR | 10M |
| <hr/> | | | |
| Q.5(A) | | Draw and explain the working of Schmitt trigger and list out the applications. | 10M |
| OR | | | |
| Q.5(B) | | Explain the working of logarithmic amplifier using op-amp | 10M |
| <hr/> | | | |
| Q.6(A) | | With a neat functional block diagram and waveforms, explain the working of astable multivibrators using 555 timer. | 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) Regular End Semester Examinations – November 2020

(Regulations: R18)

CONTROL SYSTEM ENGINEERING

(ECE)

Time: 3Hrs

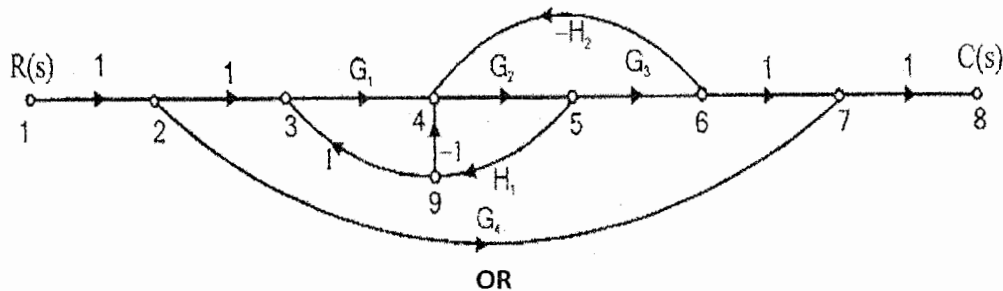
Max Marks: 60

Attempt all the questions. All parts of the question must be answer in one place only.

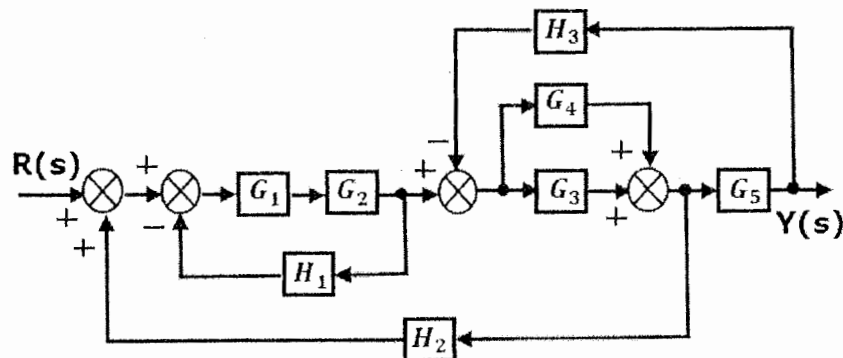
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only

Q.1	i.	What is feedback? What are its effects on a control system?	1M
	ii.	What is signal flow graph?	1M
	iii.	Give the physical significance of impulse signal used in control systems.	1M
	iv.	Sketch the response of second order underdamped system and define Rise Time (t_r)?	1M
	v.	How will you find the gain K at a point on the root locus?	1M
	vi.	Define Nyquist stability criteria.	1M
	vii.	Define gain and phase margin.	1M
	viii.	What do you mean by frequency response of a system? Give its advantages.	1M
	ix.	What is advantage of state space model of control systems?	1M
	x.	Write the properties of state transition matrix.	1M

Q.2(A) Obtain the overall gain of the system represented by signal flow graph shown in the below figure using Mason's gain formula. 10M



Q.2(B) Determine the transfer function of the system shown below using Block Diagram reduction technique. 10M



Q.3(A) (i) For a unity feedback system whose open loop transfer function is $G(s) = 50/(1+0.1s)(1+2s)$, 10M
find the position, velocity & acceleration error constants.
(ii) Derive the expression for rise time for a unit step response of a second order system.

OR

- Q.3(B) i) When second order system is subjected to unit step input, the value of $\xi = 0.5$ and $\omega_n = 6$ rad/sec. investigate the rise time, peak time, settling time and peak overshoot. 10M
ii) Explain briefly the effects of PI Controller and PID Controller on system performance with suitable block diagrams.

- Q.4(A) (i) Determine the stability of the system whose characteristic equation is given by $s^5 + s^4 + 2s^3 + 2s^2 + 3s + 5 = 0$. Also, determine the number of roots lying on right half of s-plane, left of s-plane and on imaginary axis. 10M
(ii) The characteristic equation of a system is given as $s^4 + 12s^3 + 64s^2 + 128s + K = 0$. Consider K as a parameter for the root locus plot. Find the point where the root locus crosses the imaginary axis.

OR

- Q.4(B) A unity negative feedback control system has an open loop transfer function as, 10M

$$G(s) = \frac{K}{s(s+2)(s+4)}$$

Sketch the root locus and find the value of K so that the damping ratio of the closed loop system is 0.5.

- Q.5(A) (i) A unit feedback control system has 10M

$$(ii) G(s) = \frac{10}{s(s+1)(4s+1)}$$

Draw the Nyquist plot and comment on closed loop stability.

OR

- Q.5(B) Plot the Bode diagram for the transfer function $G(s) = \frac{10}{s(1+0.1s)(1+0.4s)}$ 10M
and obtain the gain cross over frequency, phase cross over frequency, gain margin and phase margin.

- Q.6(A) (i) Obtain the transfer function of the system described by 10M

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ k \end{bmatrix} u;$$
$$y = \begin{bmatrix} 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}.$$

- (ii) What are the advantages and disadvantages of state space approach?

OR

- Q.6(B) (i) Obtain a state space representation of the system given as: 10M

$$\frac{C(s)}{R(s)} = \frac{10(s+2)}{(s^3 + 3s^2 + 5s + 15)}$$

- (ii) Explain briefly about the controllability and observability with suitable examples.

*** END***

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations – November 2020

(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. | How many numbers of flags available in 8086? | 1M |
| | ii. | Write the difference between microprocessor and microcontroller? | 1M |
| | iii. | What is the significance of I/O interfacing? | 1M |
| | iv | _____ instruction at the end of ISS causes the control transferred back to the main program. | 1M |
| | v. | 8255 is a _____ peripheral interface. | 1M |
| | vi | HOLD and HLDA signals are associated with _____ controller. | 1M |
| | vii. | 8051 microcontroller has _____ number of I/O ports | 1M |
| | viii. | What is the IP and CS value for the breakpoint interrupt? | 1M |
| | ix. | Write two important criteria for choosing a microcontroller. | 1M |
| | x. | What is the pipelining concept in 8086? | 1M |
| <hr/> | | | |
| Q.2(A) | | Draw and explain the architecture of 8086. | 10M |
| OR | | | |
| Q.2(B) | | Write an 8086 Assembly Language Program to search a number from the array. | 10M |
| <hr/> | | | |
| Q.3(A) | | Explain the maximum mode operation of 8086 with neat diagram. Also explain memory write cycle in the maximum mode. | 10 M |
| OR | | | |
| Q.3(B) | | What is the need of advanced processors, give suitable example with necessary diagram? | 10 M |
| <hr/> | | | |
| Q.4(A) | | What is DMA controller? How DMA operations are performed explain in detail? | 10M |
| OR | | | |
| Q.4(B) | | Explain the architecture of Programmable Interval Timer (8254) with a neat block diagrams. | 10M |
| <hr/> | | | |
| Q.5(A) | | Describe the architecture of 8051 microcontroller in detail. Also describe all the Special Function Registers (SFRs) available in 8051. | 10M |
| OR | | | |
| Q.5(B) | | Describe the different modes of operation of timers/counters in 8051 with its associated | 10M |
| <hr/> | | | |
| Q.6(A) | | Write a short notes on the following: | 10M |
| | i) | LCD Interfacing | |
| | ii) | Keyboard Interfacing | |
| OR | | | |
| Q.6(B) | | Neatly draw circuit diagram of interfacing a stepper motor with 8051. Also write assembly language program in support of connection with stepper motor. | 10M |

*** END***

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

B.Tech II Year II Semester (R18) Regular End Semester Examinations – Dec 2020

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 the modus ponens.	1M
	ii. What is an Existential generalization?	1M
	iii. State Pigeon hole principle.	1M
	iv. Define bijective function with an example.	1M
	v. Define normal subgroup	1M
	vi. Define phrase structure grammar.	1M
	vii. Draw the Hasse diagram representing the partial ordering $\{(a, b) \mid a \text{ divides } b\}$ on $\{1, 2, 3, 4, 6, 8, 12\}$.	1M
	viii. Write the rules of matrix representation of graphs	1M
	ix. Write two differences between spanning tree and minimum spanning tree.	1M
	x. Define the Turing machine.	1M
Q.2(A)	Construct truth table for $((p \rightarrow q) \rightarrow r) \rightarrow s$	10M
	OR	
Q.2(B)	(i) Show that $p \vee [p \wedge (p \vee q)] \Leftrightarrow p$.	5M
	(ii) Justify $\neg p$ is valid conclusion from the premises $p \rightarrow r, r \rightarrow s, t \vee \neg s, \neg t \vee u, \neg u$.	5M
Q.3(A)	(i) How many solutions does the equation $x_1 + x_2 + x_3 = 13$ have, where x_1, x_2 and x_3 are nonnegative integers?	5M
	(ii) How many ways are there to order the letters of the word <i>INDISCREETNESS</i> ?	5M
	OR	
Q.3(B)	(i) Every student in a discrete mathematics class is either a computer science or a mathematics major or is a joint major in these two subjects. How many students are in the class if there are 38 computer science majors (including joint majors), 23 mathematics majors (including joint majors), and 7 joint majors?	5M
	(ii) Let n be a nonnegative integer. Then prove that	5M
	(a) $\sum_{k=0}^n \binom{n}{k} = 2^n$, (b) $\sum_{k=0}^n (-1)^k \binom{n}{k} = 0$.	
Q.4(A)	Show that $G = \{1, 2, 3, 4, 5, 6\}$ is an Abelian with respect to multiplication modulo 7.	10M
	OR	
Q.4(B)	(i) How does a formal language differ from a natural language? Define phrase structure grammar with an appropriate example.	5M
	(ii) Write a derivation for the string $a^2b^2c^2$ by using the grammar $G_3 = (\{S, B, C\}, \{a, b, c\}, S, \emptyset)$ where \emptyset consists of the productions $S \rightarrow aSBC, S \rightarrow aBC, CB \rightarrow BC, aB \rightarrow ab, bB \rightarrow bb, bC \rightarrow bc, cC \rightarrow cc$.	5M

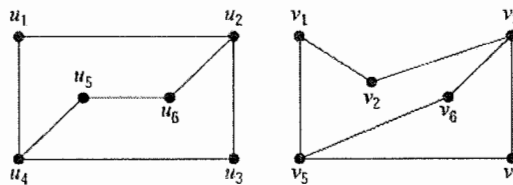
Q.5(A) Draw the Hasse diagram for inclusion on the set $P(S)$, where $S = \{a, b, c, d\}$. 10M

OR

Q.5(B) Using the following truth table find out the corresponding Boolean expression as product of maxterms. 10M

Input			Output
X	Y	Z	F
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

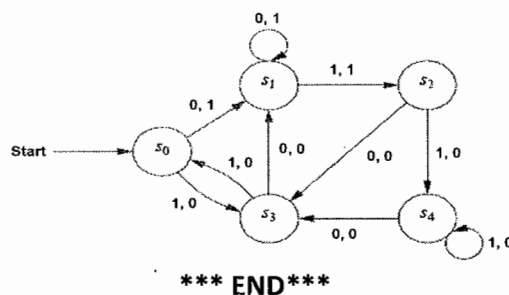
Q.6(A) i) Define isomorphism of graphs. Prove that the following graphs are isomorphic. 5M



ii) What is a planar graph? Is K_5 a planar graph? 5M

OR

Q.6(B) Construct the state table for the finite-state machine with the state diagram given below and find the output string generated by the finite-state machine, if the input string is 101011. 10M



MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations – November 2020

(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. | What do you mean by dynamic programming? | 1M |
| | ii. | If $f(n)=n!$ and $g(n)=2n$, indicate whether $f=O(g)$, or $f=\Omega(g)$, or both ($f=\theta(g)$) | 1M |
| | iii. | State the time complexity of Bubble sort. | 1M |
| | iv. | What do you mean by randomization? | 1M |
| | v. | Describe asymptotic notation. | 1M |
| | vi. | Explain the classes of P and NP. | 1M |
| | vii. | Define state space tree, solution state, answer state and E-node. | 1M |
| | viii. | Describe the characteristics of algorithm with an example. | 1M |
| | ix. | List various applications of DFS and BFS | 1M |
| | x. | What is the time complexity of the matrix multiplication and Strassen's algorithm? | 1M |

- | | | |
|--------|---|-----|
| Q.2(A) | $T(n)=aT(n/b)+f(n)$. Simplify this recurrence relation in terms $h(n)$ and $u(n)$ functions to find out the time complexities. | 10M |
|--------|---|-----|

OR

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| Q.2(B) | Write the algorithm for finding pivot element in quick sort algorithm and analyze its time complexity. | 10M |
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| Q.3(A) | Sort the list 415,213,700,515,712,715 using Merge sort algorithm. Also explain the time complexity of merge sort algorithm. | 10M |
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OR

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| Q.3(B) | Write a short note for the following:
i. Divide and conquer technique ii. Greedy algorithm | 10M |
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| Q.4(A) | How to insert more number of jobs in feasible solution set $J=\{\}$ to maximize the profit using greedy method? Explain algorithm. | 10M |
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OR

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| Q.4(B) | Apply dynamic programming to obtain optimal binary search tree for the identifier set $(a_1, a_2, a_3, a_4)=(cin, for, int, while)$ with $(p_1, p_2, p_3, p_4)=(1, 4, 2, 1)$, $(q_0, q_1, q_2, q_3, q_4)=(4, 2, 4, 1, 1)$ and also write algorithm for its construction. | 10M |
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| Q.5(A) | Extend the Dijkstra's algorithm to find All-pairs-shortest-path (APSP) problem | 10M |
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OR

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| Q.5(B) | Compare the various programming paradigms such as divide-and-conquer, dynamic programming and greedy approach | 10M |
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| Q.6(A) | Write the algorithm for general iterative backtracking method and explain various factors that define the efficiency of backtracking. | 10M |
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OR

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|--------|---|-----|
| Q.6(B) | What is the role of 'min' cost edge in the graph to find minimum cost spanning tree using Kruskal's algorithm? Give the implementation. | 10M |
|--------|---|-----|

*** END***

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MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations – November 2020

(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.	Define weighted number system? Give an example.	1M
	ii.	Convert the following number with the indicated bases to decimal : (198) ₁₂ .	1M
	iii.	List out the few limitations of Karnaugh Map.	1M
	iv.	How can you use an XOR gate to detect when two bits are different?	1M
	v.	Why multiplexer is called as a data selector?	1M
	vi.	Differences between the Decoders and Encoders.	1M
	vii.	Write the Boolean equation for 2×1 Mux	1M
	viii.	Differentiate between Ripple counters and synchronous counters	1M
	ix.	List different types of memories.	1M
	x.	Name the various VHDL modeling.	1M
<hr/>			
Q.2(A)		Convert the hexadecimal number 68BE to binary and then convert it from binary to octal.	10M
OR			
Q.2(B)		Obtain the complement of the following Boolean Expression $AB'C+A'BC+ABC$.	10M
<hr/>			
Q.3(A)		Simplify the given Boolean expression using K-Maps. (i) $F = \sum m(0, 1, 2, 4, 5, 7, 6, 9, 11)$ (ii) $F = \sum m(3, 5, 7, 10, 12, 13, 14, 15)$	10M
OR			
Q.3(B)		What is the functional difference between a NAND gate and a negative-OR gate? Do they both have the same truth table?	10M
<hr/>			
Q.4(A)	i)	Design Full adder circuit using suitable logic gates.	5M
	ii)	Realize a 3X8 decoder using suitable gates and explain its working.	5M
OR			
Q.4(B)		What is a multiplexer? Draw the diagram of a 4-to-1 line multiplexer and explain its operation with the aid of a function table.	10M
<hr/>			
Q.5(A)		With the help of neat diagram, explain the four bit binary ripple counter.	10M
OR			
Q.5(B)		Design a counter which will count 1, 4, 3, 5, 2, 6 by using state machine.	10M
<hr/>			
Q.6(A)		Implement the following output function using suitable PLA $F_1(A, B, C, D) = \sum m(3, 7, 8, 9, 11, 15)$ $F_1(A, B, C, D) = \sum m(3, 4, 5, 7, 10, 14, 15)$ $F_1(A, B, C, D) = \sum m(1, 5, 7, 11, 15)$	10M
OR			
Q.6(B)		Design a 4 bit square generator using ROM.	10M

*** END***

Hall Ticket No:

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QP Code: 18CSE108/18CSIT107/18CST106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations – November 2020

(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.	Give one difference between Multilevel queue and Multilevel feedback queue	1M															
	ii.	In which situation Round robin scheduling algorithm is similar to FCFS algorithm?	1M															
	iii.	Name File access methods.	1M															
	iv.	List some I/O Devices.	1M															
	v.	Recall any two classical problems of synchronization.	1M															
	vi.	A system with a 32-bit logical address space, if the page size is 4KB, then the page table may consists of how many entries?	1M															
	vii.	Write the advantages and Disadvantages of bitmap free space management scheme.	1M															
	viii.	What is logical address	1M															
	ix.	Formulate effective Memory access time of demand paging.	1M															
	x.	Recall Any two Disk scheduling Algorithms.	1M															
Q.2(A)		What are system calls? Illustrate them with an example?	10M															
		OR																
Q.2(B)		Explain the Layered structure of operating system?	10M															
Q.3(A)		What are various operations performed on a process? Explain each one in detail considering operating systems examples?	10M															
		OR																
Q.3(B)		Consider the following set of process, with the length of the CPU burst given in Milliseconds.	10M															
		<table border="1"> <thead> <tr> <th>Process</th> <th>Burst time</th> <th>Arrival Time</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>2</td> <td>0</td> </tr> <tr> <td>P2</td> <td>3</td> <td>10</td> </tr> <tr> <td>P3</td> <td>1</td> <td>15</td> </tr> <tr> <td>P4</td> <td>5</td> <td>18</td> </tr> </tbody> </table>	Process	Burst time	Arrival Time	P1	2	0	P2	3	10	P3	1	15	P4	5	18	
Process	Burst time	Arrival Time																
P1	2	0																
P2	3	10																
P3	1	15																
P4	5	18																
		Draw the Gantt chart that illustrates the execution of these processes using the FCFS and SJF. Analyze the waiting time for each of the scheduling algorithms.																
Q.4(A)		How resource allocation graph is useful in Deadlock detection? Explain?	10M															
		OR																
Q.4(B)		What are the necessary conditions for Deadlock? Explain with examples.	10M															
Q.5(A)		Illustrate the following Page Replacement algorithms with clear examples. FIFO (b)Optimal	10M															
		OR																
Q.5(B)		Analyze the concept of paging and its use in OS Memory Management	10M															
Q.6(A)		Classify different types of files and list their extensions.	10M															
		OR																
Q.6(B)		Discuss in detail about Free space Management.	10M															

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations – November 2020

(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.	What is a Database?	1M
	ii.	How can you create View?	1M
	iii.	What is TRC, give an example?	1M
	iv.	Formulate the syntax for SET operations in SQL	1M
	v.	Classify different types of function dependencies.	1M
	vi.	Define Redundancy.	1M
	vii.	Draw the States of transactions	1M
	viii.	Recall Cascading rollback.	1M
	ix.	What are importance of log file?	1M
	x.	Analyse the Authorization in application layer vs. database layer.	1M
Q.2(A)		Differentiate File system and Database.	10M
		OR	
Q.2(B)		List and Explain the steps involved in designing the database.	10M
Q.3(A)		Write SQL Queries for following set of tables: EMPLOYEE (EmpNo, Name, DoB, Address, Gender, Salary, DNumber) DEPARTMENT(DNumber, Dname, ManagerEmpNo, MnagerStartDate). i) Display the Age of 'male' employees. ii) Display all employees in Department named 'Marketing'. iii) Display the name of highest salary paid 'female' employee. iv) Which employee is oldest manger in company? v) Display the name of department of the employee 'SMITH'	10M
		OR	
Q.3(B)		Describe about different SQL operators and aggregate functions.	10M
Q.4(A)		How to compute closure of set of functional dependency? Explain with a suitable example schema.	10M
		OR	
Q.4(B)		Discuss in detail about 1NF, 2NF and BCNF with suitable examples.	10M
Q.5(A)		State the ACID properties and its use in databases in detail.	10M
		OR	
Q.5(B)		Define view serializability with example and state the comparison between conflict and view serializability.	10M
Q.6(A)		Classify different types of types of Access control models.	10M
		OR	
Q.6(B)		Explain in detail about various types of SQL injection prevention techniques.	10M

*** END***

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year II Semester (R18) Regular End Semester Examinations – November 2020

(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. | What is the role of each idea in the design of computer architecture? | 1M |
| ii. | State the formula for CPU execution time. | 1M |
| iii. | What is floating point representation? | 1M |
| iv. | Write down the significance of "lw" instruction with an suitable example | 1M |
| v. | Define MIPS Computer Architecture. | 1M |
| vi. | Mention any four elements used in building a datapath of a computer. | 1M |
| vii. | How compilers are used in instruction level parallelism? | 1M |
| viii. | List the difficulties in creating parallel processing programs. | 1M |
| ix. | Differentiate SRAM and DRAM. | 1M |
| x. | Compare interrupt driven data transfer scheme with DMA. | 1M |

- Q.2(A) List and explain the components of a computer system. 10M

OR

- Q.2(B) Assume that we have two implementations of the same instruction set architecture. Computer A has a clock cycle time of 300ps and a CPI of 2.0 for some program, and computer B has a clock cycle time of 600ps and a CPI of 1.2 for the same program. Determine which computer is faster for this program and by how much. 10M

- Q.3(A) Perform the multiplication of $1.110_{10} \times 10^{10}$ and $9.200_{10} \times 10^{-5}$ in binary floating point form showing the algorithmic steps. 10M

OR

- Q.3(B) Explain with examples how the floating-point numbers are represented and used in digital arithmetic operations. Give an example. 10M

- Q.4(A) Data hazards are obstacles to pipelined execution. Considering the following sequence with much dependence shown underlined, explain with relevant diagram the 'forwarding' strategy used for elimination of data hazards. 10M
- sub \$2, \$1, \$3
and \$12, \$2, \$5
or \$13, \$6, \$2
add \$14, \$2, \$2
sw \$15, 100(\$2)
-
.....

OR

- Q.4(B) What are pipeline hazards? List and define various conflicts that might arise in a pipeline. 10M

Q.5(A) Explain the parallel processing architecture and its uses 10M

OR

Q.5(B) Discuss about the various Flynn's classification of processor architectures in computers. 10M

Q.6(A) Why are the read and write control lines in a DMA controller bidirectional? Under what condition and for what purpose are they used as inputs? Under what condition and for what purpose are they used as outputs? 10M

OR

Q.6(B) Distinguish between the virtual memory and cache memory. Write the merits and demerits of virtual memory. 10M

***** END*****
