Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 14MAT103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech II Year I Semester (R14) Supply End Semester Examinations – MAR 2021

DIFFERENTIAL EQUATIONS & LAPLACE TRANSFORMS

(Common to All)

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.	Solve $y' = x$.	1M
	ii.	Define a differential equation.	1M
	iii.	Write the equivalent system of first order D.Es. $x^2y''' - 3y'' + 2xy = 0$.	1M
	iv	Define power series solution at x=0.	1M
	v.	Write the form of Bessel's equation.	1M
	vi	Define Gamma function.	1M
	vii.	State Convolution theorem.	1M
	viii.	Find $L\left(e^{-3x}\cos 2x\right)$.	1M
	ix.	Define even and odd functions.	1M
	x.	State Strum-Liouville theorem.	1M

Q.2(A)	Solve the differential equation $x\frac{dy}{dx} - 3y = x^4$.	10M
	OR	
Q.2(B)	Find a solution of $y'' + 4y = \tan 2x$ using the method of variation of parameters.	10M
Q.3(A)	Find the solutions of the homogeneous system $\frac{dx}{dt} = 4x - 2y,\ \frac{dy}{dt} = 5x + 2y$	10M
	OR	
Q.3(B)	Determine $y'' + y = 0$ by Power series method.	10M
Q.4(A)	Using Rodrigues formula, Calculate $P_0(x), P_1(x), P_2(x), P_3(x)$	10M
	OR	
Q.4(B)	Show that a) $\left(n+\frac{1}{2}\right)! = \frac{(2n+1)!}{2^{2n+1}\,n!}\sqrt{\pi}$ b) $\left(n-\frac{1}{2}\right)! = \frac{(2n)!}{2^{2n}\,n!}\sqrt{\pi}$	10M
Q.5(A)	Evaluate the integrals a) $\int_0^\infty \frac{e^{-ax}\sin bx}{x}dx$ b) $\int_0^\infty \frac{e^{-ax} - e^{-bx}}{x}dx$	10M
	OR	
Q.5(B)	Solve $y'' + y' - 6y = 0, y(0) = 0;\ y'(0) = 0$ using Laplace Transforms.	10M
Q.6(A)	Find the Fourier series of the function $f(x) = x, -\pi \le x \le \pi$.	10M
	OR	
Q.6(B)	Solve the vibration of string problem given by the function $f(x) = \frac{1}{\pi}x(\pi - x); 0 \le x \le \pi$	10M

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 14HUM101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – MAR 2021

PRINCIPLES OF ECONOMICS

(Common to ALL)

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 Scarcity?	1M
	ii.	What is Comparative advantage?	1M
	iii.	State Micro economics.	1M
	iv.	Define the Law of Demand.	1M
	v.	What is meant by GDP?	1M
	vi.	Define Money	1M
	vii.	What is Oligopoly?	1M
	viii.	Define Factor Pricing.	1M
	ix.	What is a Private Good	1M
	x.	What is Bank?	1M
Q.2(A)	Define Business Economics. State its nature and scope		10M
	OR		
Q.2(B)	Explain problems of scarcity and choice.		10M
Q.3(A)	What is law of demand? Explain demand schedule and demand curve.		10M
	OR		
Q.3(B)	Explain different types of elasticity of demand.		10M
Q.4(A)	Explain different types of costs.		10M
	OR		
Q.4(B)	Explain features and price output determination of monopolistic competition		10M
Q.5(A)	Explain public goods.		10M
	OR		
Q.5(B)	Explain Poverty and income distribution..		10M
Q.6(A)	Explain elements of macro economics.		10M
	OR		
Q.6(B)	Explain functions of Banks.		10M

END

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 14CE104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – March 2021

BUILDING MATERIALS & CONSTRUCTION

(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 Part-A or B only

Q.1	i.	What is the importance of providing 'Damp Proof Course'?	1M
	ii.	Write down the examples of Group 'A' type of buildings?	1M
	iii.	Define 'Star shakes' and 'Rind galls' in wood?	1M
	iv.	What is the function of 'Frog' in bricks?	1M
	v.	Differentiate between High carbon steel and high tensile strength steel?	1M
	vi.	What is meant by Quick Setting cement and Rapid hardening cement?	1M
	vii.	What is meant by polymerization?	1M
	viii.	State the difference between English bond and Flemish bond?	1M
	ix.	What do you mean by Geo-membrane and Geo-composites?	1M
	x.	What is scaffolding? Mention the types of scaffoldings.	1M
Q.2(A)		Draw a neat sketch of a building showing its various components and explain their importance.	10M
		OR	
Q.2(B)		Write down the main classification of rocks. Briefly explain each of them.	10M
Q.3(A)		Write down the steps involved in brick manufacturing?	10M
		OR	
Q.3(B)		What are the constituents of good Brick earth?	10M
Q.4(A)		i) Enumerate the sources of lime and ii) State the properties and uses of lime.	10M
		OR	
Q.4(B)		Briefly describe different types of Iron, and their properties?	10M
Q.5(A)		What is the function of foundation? Draw neat sketch of different types of foundation and mention their use.	10M
		OR	
Q.5(B)		Mention the merits and demerits of stone masonry and brick masonry with neat sketch.	10M
Q.6(A)		Discuss the construction of cavity wall and partition wall in buildings? Explain why and where they are adopted?	10M
		OR	
Q.6(B)		What are the importance of underpinning and its application in building construction?	10M

*** END***

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 14CE101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – MAR'2021

STRENGTH OF MATERIALS

(Civil Engineering)

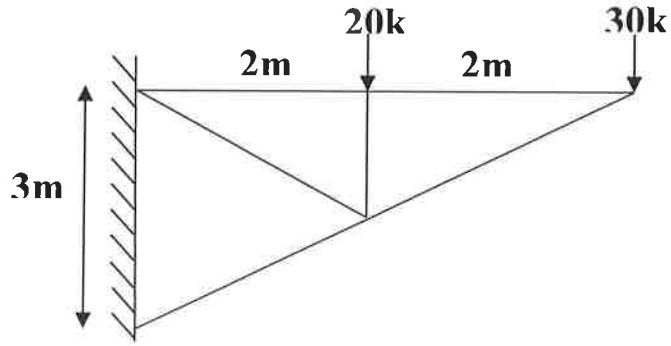
Time: 3Hrs **Max Marks: 60**

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 Part A or Part B only

Q.1	(i)	Give example for ductile, brittle and malleable materials	1M
	(ii)	Define strain energy density.	1M
	(iii)	What is section modulus?	1M
	(iv)	Define neutral axis of a cross section	1M
	(v)	Write the bending equation?	1M
	(vi)	Give two methods to compute principal stresses?	1M
	(vii)	What is mean by perfect frame?	1M
	(viii)	What is the angle between principal planes and the planes of maximum shear stress	1M
	(xi)	What is meant by compressive and tensile force?	1M
	(x)	Draw the shear stress distribution for symmetric I-section	1M
Q.2(A)		A uniform ladder of weight 200 N of length 4.5m rests on a horizontal ground and leans against a rough vertical wall. The coefficient of friction between the ladder and floor is 0.4 and between ladder and vertical wall is 0.2. When a weight of W2 N is placed on the ladder at a distance of 1.2m from top of the ladder, the ladder is at the point of sliding. Find (i) The angle made by the ladder with horizontal, (ii) Reaction at the floor of the ladder, and (iii) Reaction at the top of the ladder.	10M

OR

Q.2(B)	(a)	Derive the relation between Young's modulus & Rigidity modulus	10M
	(b)	Assuming the relation between Young's modulus and Bulk modulus, derive relationship among all three elastic moduli.	
Q.3(A)		Determine the forces in all the members of a truss shown in figure by method of joints	10M



OR

Hall Ticket No: | | | | | | | | | | |

Course Code: 14CE102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary Examinations – March 2021

FLUID MECHANICS - I

(Civil Engineering)

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

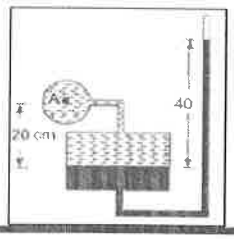
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only.

Q.1	i.	Define density or mass density	1M
	ii.	What is the name of unit for viscosity at CGS system?	1M
	iii.	Define centre of buoyancy.	1M
	iv.	Write the condition for unstable equilibrium floating body.	1M
	v.	Write the various forces acting in the flowing fluid.	1M
	vi.	Define co-efficient of contraction (Cc).	1M
	vii.	Write the relation between Cc, Cd and Cv.	1M
	viii.	What is Mouthpiece?	1M
	ix.	Write the formula to find the discharge over rectangular notch.	1M
	x.	Describe Pascal's law.	1M

Q.2(A) What is Hydrostatic law? Prove that $p = \rho g Z$ where p is pressure at the point, ρ is density of fluid and Z is the depth of the point from free surface. 10M

OR

Q.2(B) A single column manometer is connected to a pipe containing a liquid of sp. gr. 0.9 as shown fig. Find the pressure in the pipe if the area of the reservoir is 100 times the area of the tube for the manometer reading as shown in the figure. The sp.gr. of mercury is 13.6. 10M



Q.3(A) Describe the Meta- Centre and Meta-Centric height. Find the expression for meta-centric height by analytical method. 10M

OR

Q.3(B) A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s. 10M

Q.4(A) Derive the Bernoulli's equation from Euler's equation. Also mention the assumption made to derive it. 10M

OR

Q.4(B) A horizontal venturimeter with inlet and throat diameter 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometers connected to the inlet and the throat is 20 cm of mercury. Determine the rate of flow. Take Cd=0.98. 10M

Q.5(A)	i. What is mouthpiece? Write the classifications of mouthpiece. ii. Prove that the Cd value for the mouthpiece is more than the Cd value of orifices (>0.62).	5M 5M
	OR	
Q.5(B)	The head of water over an orifice of diameter of diameter 100 mm is 10m. The water coming out from orifice is collected in a circular tank of diameter 1.5m. The rise of water level in this tank is 1.0 m in 25 seconds. Also the co-ordinate of a point on jet, measured from vena-contracta are 4.3m horizontal and 0.5 m vertical. Find the coefficients Cd, Cv and Cc.	10M
Q.6(A)	Find the expression for Darcy- Weisbach equation.	10M
	OR	
Q.6(B)	The resisting force R of a supersonic plane during flight can be considered as dependent upon the length of aircraft l, velocity V, air viscosity μ, air density ρ and bulk modulus of air K. Express the functional relationship between these variables and resisting force.	10M

*** END***

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 14CE103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – MARCH 2021

SURVEYING - I

(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 Part-A or B only

Q.1	i.	List the different types of chain.	1M
	ii.	Define base line.	1M
	iii.	Define shrinkage factor.	1M
	iv	Define the term magnetic bearing.	1M
	v.	Define fore bearing.	1M
	vi	Define precisions.	1M
	vii.	Define offset.	1M
	viii.	Define profile levelling.	1M
	ix.	What are the sources of error in levelling?	1M
	x.	What is contour line?	1M

Q.2(A) Define surveying. What are primary divisions of surveying? 10M

OR

Q.2(B) A steel tape 30m long standardized at 65^0F with pull of 15kg used for measuring a baseline. Find the correction per tape length. If the temperature at the time of measurement was 85^0F and pull exerted was 21kg. Weight of 1 cubic cm of steel 7.86g, weight of tape 0.8 kg and E = 2.109 X 10^6 kg/cm^2. Co-efficient expansion of tape per 1^0F = 6.2 X 10^{-6} 10M

Q.3(A) Give the possible solutions for surveying area having obstacles to both chaining and ranging. 10M

OR

Q.3(B) Differentiate between i) Base line and check line ii) Plain surveying and geodetic surveying iii) Cumulative errors and compensating errors. 10M

Q.4(A) The following bearings were observed with a compass. Calculate interior angles. 10M

line	AB	BC	CD	DE	EA
Fore bearing	$60^\circ30''$	$122^\circ0''$	$46^\circ0''$	$205^\circ30''$	$300^\circ0''$

OR

Q.4(B) The following whole circle bearings were observed. Determine which station suffer from local attraction and determine the correct bearings if the declination was 2°-15" west. 10M

Line	Fore bearing	Back bearing
AB	$74^\circ15'$	$256^\circ0'$
BC	$107^\circ15'$	$286^\circ15'$
CD	$224^\circ45'$	$44^\circ45'$
DA	$307^\circ45'$	$127^\circ0'$

Q.5(A)	Define plain table. List the advantages and disadvantages of plain table surveying.	10M
	OR	
Q.5(B)	Explain radiation method of plane table surveying with neat sketch.	10M
Q.6(A)	The following consecutive readings were taken with the help of dumpy level: 1.904, 2.653, 3.906, 4.026, 1.964, 1.702, 1.592, 1.261, 2.542, 2.006, and 3.145. The instrument was shifted after 4^{th} and 7^{th} readings. The first reading taken on the staff held on BM of RL 100.00 m. rule out the page of level field book, enter the above readings there on. Calculate the R.Ls of the point and apply necessary check.	10M
	OR	
Q.6(B)	Define contour. List the uses of contour map.	10M

*****END*****

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 14EEE102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – MAR'2021

NETWORK ANALYSIS

(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 Part-A or B only

Q.1	i.	State Thevenin's theorem.	1M
	ii.	Write down the internal impedance of an ideal voltage source.	1M
	iii.	What is the phase angle of a series RLC circuit when $X_L=X_C$	1M
	iv	Write the relation between phase current and line current in a three-phase delta-connected system.	1M
	v.	Define time constant? Write its formula for series R-L circuit with DC excitation	1M
	vi	Capacitance opposes the instant change in .....?	1M
	vii.	Why admittance parameters are called as short circuit parameters?	1M
	viii.	Write the expression for Z-parameters.	1M
	ix.	What is the Laplace transform of a unit step function?	1M
	x.	What is the inverse Laplace transform of X(s) = 1/(s+a).	1M

Q.2(A) Find the current through 5Ω in the circuit shown in Fig.1 by using Thevenins theorem. 10M

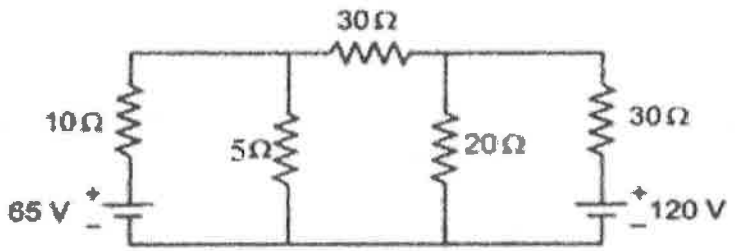


Fig. 1

OR

Q.2(B) A circuit has a resistance 5 Ω and inductance 120 mH in series with a 100μF capacitor, is connected to a 300 V, 50 Hz supply. Calculate (a) the current flowing, (b) the phase difference between the supply voltage and current, (c) the voltage across the coil and (d) the voltage across the capacitor 10M

Q.3(A) Explain the two-wattmeter method of power measurement in a three-phase balanced system with star-connected load. 10M

OR

Q.3(B) The unbalanced Y-load of Fig.2 has balanced voltages of 200V and *acb* sequence. Calculate the line currents and the neutral current. 10M

Take Z_A =10Ω, Z_B = 3+4j Ω, Z_C=6-8jΩ

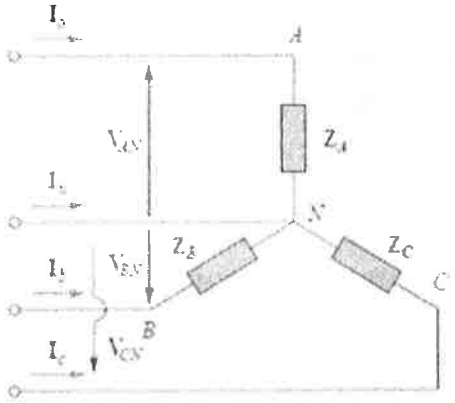


Fig. 2

Q.4(A) Derive the capacitor voltage $V_c(t)$ and current i(t) expressions for R-C series circuit with DC excitation. 10M

OR

Q.4(B) Derive the expression for transient current for a RLC circuit with DC voltage source. 10M

Q.5(A) Derive transmission parameters in terms of open circuit impedance Parameters and h-parameters. 10M

OR

Q.5(B) Find the open and short parameters of the circuit shown in below Fig. 3. 10M

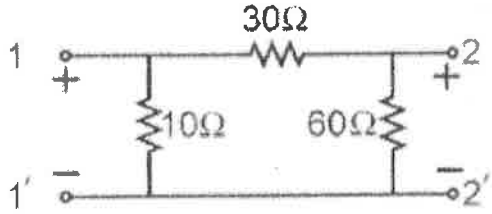


Fig. 3

Q.6(A) Write the Laplace transform of some common forcing functions with neat sketch. 10M

OR

Q.6(B) Obtain the exponential Fourier series of the following waveform shown in Fig. 4 10M

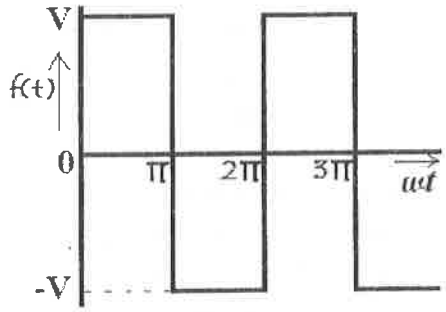


Fig. 4

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Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 14EEE103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – March 2021

ELECTRICAL 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 Part-A or B only

Q.1	i.	What is dynamic braking in DC Motors ?	1M
	ii.	What is the significance of E_b in a DC Motor ?	1M
	iii.	Mention the advantage of Auto-Transformer over ordinary transformers.	1M
	iv.	How circulating currents and operation at different p.f. can be avoided while operating the single-phase transformers in parallel.	1M
	v.	Define Slip of an induction motor.	1M
	vi.	If a 6 – pole induction motor supplied from a three phase, 50Hz supply has a rotor frequency of 2.3Hz, what is the operating slip of the motor ?	1M
	vii.	What is crawling?	1M
	viii.	Define Distribution factor.	1M
	ix.	Define voltage regulation of an alternator.	1M
	x.	A 4pole 3 phase alternator with 48 armature slots is using an armature winding which is short pitched by one slot. Calculate its pitch factor.	1M
Q.2(A)		Briefly explain the characteristics of DC Motors.	10M
		OR	
Q.2(B)	i.	What is the necessity of starter in DC Machines?	5M
	ii.	Explain the operation of a 4-point starter for DC Motors with a neat sketch.	5M
Q.3(A)		Obtain the equivalent circuit of a single-phase transformer referred to primary.	10M
		OR	
Q.3(B)		A 5-kVA, 220/400-V, 50 Hz distribution transformer is testes for efficiency and regulation as follows: **O.C. Test :** 220V 2A, 100 W **(LV side)** ; **S.C. Test :** 40V 12.5A, 240 W **(HV side)**. Determine **(i)** core loss, **(ii)** draw the equivalent circuit referred to primary, **(iii)** efficiency on F.L. and **(iv)** regulation of transformer at 0.8 p.f. lagging.	10M
Q.4(A)	i.	Briefly explain the power flow diagram of a three phase induction motor.	5M
	ii.	The power input to the rotor of a 440V, 50Hz, 6 pole, 3 phase induction motor is 20 KW while running at 960 r.p.m. Calculate the rotor copper loss and Mechanical power developed in the machine.	5M
		OR	
Q.4(B)	i.	Draw and explain the Torque Slip characteristics of three phase induction motor.	4M
	ii.	Explain how the rotor of a three phase induction motor rotates using the fundamental principle of operation.	6M

Q.5(A)	Explain the speed control methods of a three phase induction motor with relevant diagrams.	10M
	OR	
Q.5(B)	A 12 pole, 50 Hz, 3-phase induction motor has rotor resistance of 0.15 Ω and standstill reactance of 0.25Ω per phase. On full load it is running at a speed of 480 r.p.m. The rotor induced e.m.f per phase at standstill is observed to be 32V. Calculate **(i)** starting torque, **(ii)** full load torque, **(iii)** maximum torque and **(iv)** speed at which maximum torque occurs.	10M
Q.6(A)	With a neat diagram explain the constructional details of a Brushless DC Motor. Also explain the principle operation.	10M
	OR	
Q.6(B)	i. Derive the EMF equation of a alternator.	5M
	ii. A 3-Phase 16-pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 wb and is sinusoidally distributed. If the operating speed is 375 rpm, Find the phase and line values of emf.	5M

*** END***

Hall Ticket No: | | | | | | | | | | | Course Code: 14EEE105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary Examinations – March 2021

ELECTRONIC DEVICES

(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 Part-A or B only.

Q.1	(i)	What are the types of solid crystals?	1M
	(ii)	Define lattice crystal.	1M
	(iii)	Define mobility of charge carrier.	1M
	(iv)	What are direct band gap semiconductors? Give one example.	1M
	(v)	Give an example of diamond lattice crystal structure.	1M
	(vi)	Define drift velocity.	1M
	(vii)	Draw the symbol of Varactor diode.	1M
	(viii)	List out the difference between the JFET and MOSFET.	1M
	(xi)	List out different biasing methods of BJT.	1M
	(x)	Define light emitting diode.	1M
Q.2(A)		Find Atomic packing factor (APF) for Face Centered and simple cubic with a neat sketch.	10M
		OR	
Q.2(B)		Draw the energy band structures at 0 K temperatures for Insulator, semiconductor and conductors and draw comparison between them.	10M
Q.3(A)		Write the expression for Fermi Dirac Distribution function and discuss it for T=0 K and T > 0 K case.	10M
		OR	
Q.3(B)		Derive the expression for total current density due to electric field in terms of mobilities of charge carriers in a semiconductor.	10M
Q.4(A)		Describe a typical experimental setup for carrying out the Haynes-Shockley experiment.	10M
		OR	
Q.4(B)		Explain the process of generation and recombination process mechanism with suitable diagrams.	10M
Q.5(A)		Explain the operation of PN junction under zero voltage applied bias condition and derive the expression for built-in potential barrier.	10M
		OR	
Q.5(B)		Draw and explain Zener diode and its characteristics. What is the difference between Zener and avalanche breakdown.	10M
Q.6(A)		Discuss the drain and transfer characteristics of JFETs.	10M
		OR	
Q.6(B)		i. What is Tunnel diode? Explain its characteristics with the help of energy band diagrams.	5M
		ii. Define light emitting diode with its applications.	5M

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Hall Ticket No: | | | | | | | | | | |

Course Code: 14EEE104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech III Year I Semester (R14) Supplementary Examinations – March 2021

DIGITAL DESIGN

(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 Part-A or B only.

Q.1	i.	What is the necessity of binary codes in computers?	1M
	ii.	Convert $(1101)_2$ to decimal.	1M
	iii.	Write the truth table for half substractor	1M
	iv.	What is the toggle mode of JK flip flop?	1M
	v.	What is Multiplexer?	1M
	vi.	Write the expansion of EPROM	1M
	vii.	What is the difference between latches and flip flops?	1M
	viii.	Write what is 2's complement of $(10111010)_2$	1M
	ix.	State what is difference between ROM and RAM	1M
	x.	Add $(101001)_2$ and $(111)_2$.	1M
Q.2(A)		What are universal gates? Realize AND, OR, NOT, XOR gates using universal gates.	10M
		OR	
Q.2(B)		Convert the following numbers 1. $(53.6875)_{10}=()_2$ 2. $(37.48)_8=()_2$ 3. $(BAD)_{16}=()_{10}$ 4. $(57.4)_8=()_{10}$	10M
Q.3(A)		Draw the logic diagram corresponding to the following Boolean expressions (i) $F = x'y'z + x'yz + xy'$ (ii) A + CD + (A + D')(C' + D) (iii) $F = [(yz' + x'w)(xy' + zw')]'$	10M
		OR	
Q.3(B)		a. Design a full adder and draw its logic diagram b. Compare Synchronous and Asynchronous sequential circuits	10M
Q.4(A)		Construct a JK flip-flop using a D flip-flop and T flip-flop	10M
		OR	
Q.4(B)		Explain about shift Registers. Design a four-bit Universal Shift Register and explain its operation	10M
Q.5(A)		Write short notes on a. Johnson Counter b. BCD Ripple Counters	10M
		OR	
Q.5(B)		What is race around condition in J K Flipflop? Precisely explain how to solve race around condition in JK flip-flop?	10M

Q.6(A) What is the difference between static and dynamic memory? Discuss briefly about different types of memories. 10M

OR

Q.6(B) Implement the following Boolean function using PAL logic 10M

w (A, B, C, D) = ∑ (2, 12, 13)

x (A, B, C, D) = ∑ (7, 8, 9, 10, 11, 12, 13, 14, 15)

y (A, B, C, D) = ∑ (0, 2, 3, 4, 5, 6, 7, 8, 10, 11, 15)

z (A, B, C, D) = ∑ (1, 2, 8, 12, 13)

*** END***

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 14ME104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – MAR'2021

THERMODYNAMICS

(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 Part A or Part B only

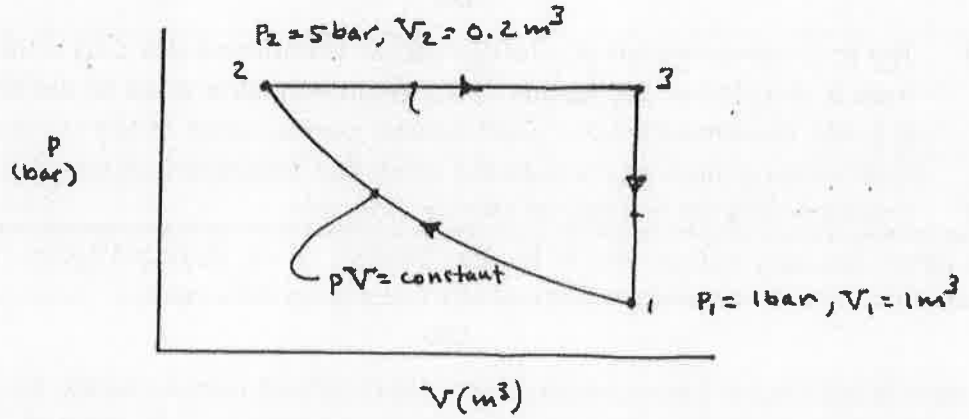
Q.1	i.	What is an open system?	1M
	ii.	State the units of specific volume.	1M
	iii.	What is the relationship between gauge and absolute pressure?	1M
	iv.	Define the efficiency of a heat engine.	1M
	v.	At same compression ratio, Otto cycle efficiency is more than Diesel cycle- True or False.	1M
	vi.	What is reduced pressure?	1M
	vii.	Specific enthalpy is an extensive property: True or False.	1M
	viii.	Define perpetual motion machine of the second kind.	1M
	ix.	What is a path function?	1M
	x.	What is flow work?	1M

Q.2(A) (i) What is a thermodynamic system? Explain the type of thermodynamic systems. 5M

(ii) Define isothermal, isobaric, adiabatic and isochoric processes. 5M

OR

Q.2(B) Determine the work for each process and the network for the cycle: 10M



Q.3(A) (i) What is saturation temperature and saturation pressure for a pure substance? 4M

(ii) A rigid tank contains 12 kg of water at 80°C. If 10 kg of the water is in the liquid form and the rest is in the vapor form, determine (*a*) the pressure in the tank and (*b*) the volume of the tank, (c) the enthalpy of the system. 6M

OR

Q.3(B) Determine the missing properties and the phase description in the following table for water: 10M

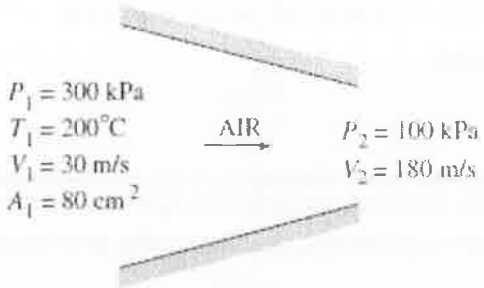
	T (°C)	P (kPa)	u (kJ/kg)	x	Phase description
(i)		200		0.7	
(ii)	125		1600		
(iii)		1000	2950		
(iv)	75	500			
(v)		850		1	

Q.4(A) (I) Derive an expression for the work done during expansion and compression of gasses undergoing a polytropic process. 5M

(II) Show that the enthalpy of a fluid before throttling is equal to that after throttling. 5M

OR

Q.4(B) Air enters an adiabatic nozzle steadily at 300 kPa, 200°C, and 30 m/s and leaves at 100 kPa and 180 m/s. The inlet area of the nozzle is 80 cm2. Determine (*a*) the mass flow rate through the nozzle, (*b*) the exit temperature of the air, and (*c*) the exit area of the nozzle. 10M



Q.5(A) What is a Carnot cycle? Describe the four processes which constitute the Carnot cycle on a P-V diagram and derive the thermal efficiency of the Carnot heat engine. 10M

OR

Q.5(B) (i) The food compartment of a refrigerator is maintained at 4°C by removing heat from it at a rate of 360 kJ/min. If the required power input to the refrigerator is 2 kW, determine (*a*) the coefficient of performance of the refrigerator and (*b*) the rate of heat rejection to the room that houses the refrigerator. 7M

(ii) Explain briefly the increase of entropy principle. 3M

Q.6(A) List down the assumptions made for the analysis of air standard cycles. Derive an expression for the air standard thermal efficiency of an Otto cycle. 10M

OR

Q.6(B) An ideal diesel engine has a compression ratio of 20 and uses air as the working fluid. The state of air at the beginning of the compression process is 95 kPa and 20°C. If the maximum temperature in the cycle is not to exceed 2200 K, determine (a) the thermal efficiency and (b) the mean effective pressure. Assume constant specific heats for air at room temperature. 10M

*** END***

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 14ME105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – MARCH 2021

MATERIAL SCIENCE & ENGINEERING

(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 Part-A or B only

Q.1	i.	What is metallic bond? Explain with an example.	1M
	ii.	Define Unit Cell.	1M
	iii.	What is a dislocation? Name different types of dislocations?	1M
	iv	State Fick's law of diffusion?	1M
	v.	Name different heat treatment processes used in an industry?	1M
	vi	What is the difference between Annealing and Normalizing processes?	1M
	vii.	What is work hardening?	1M
	viii.	Define FRP	1M
	ix.	List types of ceramics.	1M
	x.	Define PMC	1M

Q.2(A)	What is an Atomic Pacing Factor? Derive APF for a BCC Unit Cell.	10M
	OR	
Q.2(B)	Within a cubic unit cell represent crystallographic planes for (111), (100), (010), (001) and (201)	10M
Q.3(A)	Derive Bragg's law with neat sketch.	10M
	OR	
Q.3(B)	Explain Various Point defects with neat sketches.	10M
Q.4(A)	Plot the Fe-Fe_3C phase diagram and write all the important reactions. Explain the significance of it?	10M
	OR	
Q.4(B)	Draw TTT diagram of eutectoid steel. Explain its significance for the industry.	10M
Q.5(A)	Draw the stress vs strain curve for a mild steel material and explain (i) Engineering stress, (ii) Engineering strain, (iii) Young's Modulus and (iv) ultimate tensile strength	10M
	OR	
Q.5(B)	Explain the strengthening mechanism of materials by particulate dispersion Method	10M
Q.6(A)	Explain any one method of manufacturing Polymer Matrix Composites.	10M
	OR	
Q.6(B)	Mention the important characteristics of advanced ceramics. How are ceramics classified? Explain with examples.	10M

END

Hall Ticket No: | | | | | | | | | |

Question Paper Code: 14ME103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – MAR 2021

KINEMATICS OF 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

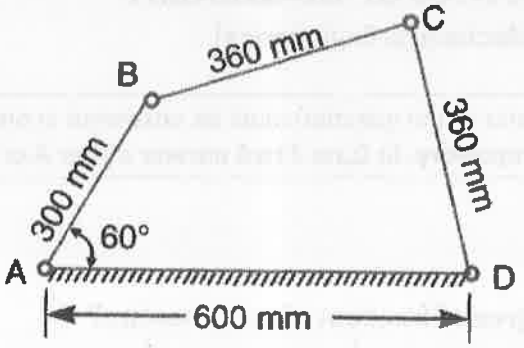
Q.1	i.	State Grashof's law	1M
	ii.	What do you mean by degree of freedom of a mechanism?	1M
	iii.	What is steering gear mechanism?	1M
	iv.	List out the materials used for the belt drives	1M
	v.	Define instantaneous center	1M
	vi.	State Kennedy's theorem.	1M
	vii.	Define pressure angle in gear	1M
	viii	Sketch two teeth of a gear and show the following: Circular pitch, Addendum.	1M
	ix.	What are the types of followers?	1M
	x.	State few applications of cam.	1M

Q.2 (A)	Sketch and explain any two inversions of a four-bar chain mechanism.	10M
	OR	
Q.2 (B)	Discuss various types of Kinematic pairs with examples	10M

Q.3(A)	Derive the expression of perfect steering correct condition with sketch and what are the differences between Davis and Ackernan steering mechanism.	10M
	OR	
Q.3(B)	A shaft rotating at 200 r.p.m. drives another shaft at 300 r.p.m. and transmits 6 kW through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4 m. The smaller pulley is 0.5 m in diameter. Calculate the stress in the belt, if it is 1. an open belt drive, and 2. cross belt drive. Take $\mu = 0.3$.	10M

Q.4(A)	Derive the method of locating instantaneous centres in a slider crank mechanism with neat sketch.	10M
	OR	

Q.4(B) In a pin jointed four bar mechanism, as shown in Fig. AB = 300 mm, BC = CD = 360 mm, and AD = 600 mm. The angle BAD = 60°. The crank AB rotates uniformly at 100 r.p.m. Locate all the instantaneous centres and find the angular velocity of the link BC. 10M



Q.5(A) 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

OR

Q.5(B) Classify the different types of gears and explain them in detail. 10M

Q.6(A) List out the different types of followers & cam and explain any two with neat sketch. 10M

OR

Q.6(B) A cam is to give the following motion to a knife-edged follower: 1. Outstroke during 60° of cam rotation; 2. Dwell for the next 30° of cam rotation; 3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when the axis of the follower passes through the axis of the cam shaft. 10M

*** END***

Hall Ticket No: | | | | | | | | | | |

Course Code: 14ME102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary Examinations – March 2021

MECHANICS OF SOLIDS

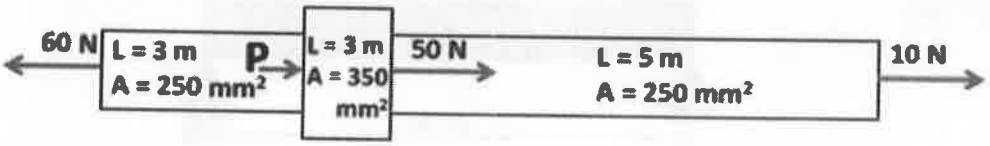
(Mechanical Engineering)

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 Part-A or B only.

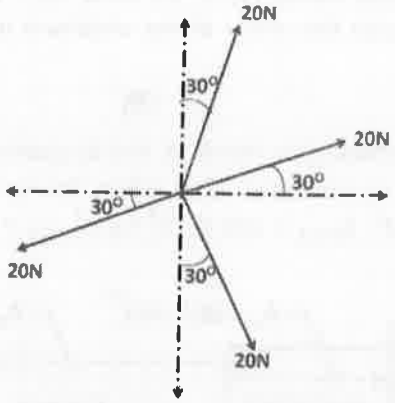
Q.1	i.	Define "moment of a force".	1M
	ii.	State Newton's second law of motion	1M
	iii.	What do you mean by "point of contraflexure"?	1M
	iv.	Write relation between shear force and load intensity.	1M
	v.	What is condition of pure shear?	1M
	vi.	What is the condition of plane stress?	1M
	vii.	What do you mean by torsion?	1M
	viii.	Define polar modulus	1M
	ix.	Define flexural rigidity.	1M
	x.	Define "moment of inertia".	1M

Q.2(A) Calculate force P required to maintain the equilibrium of the bar and also find the total elongation of the bar. Take E=2X10^{5}N/mm^2. The cross sectional area and length are given in Figure. 10M



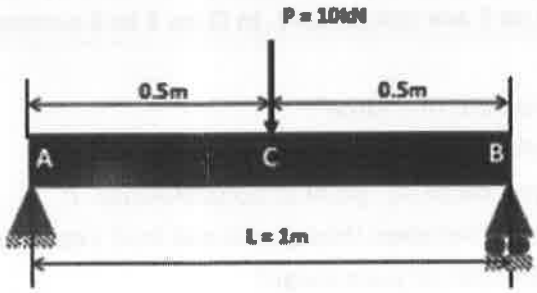
OR

Q.2(B) Find the magnitude and direction of the resultant force as shown in the figure. 10M



Q.3(A) For the cantilever beam (as shown in the figure): 10M

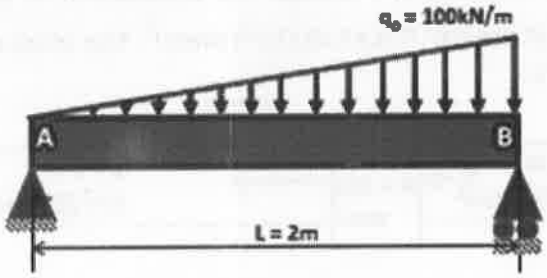
(a) Draw free body diagram
(b) Find the reactions forces
(c) Draw the Shear force diagram (SFD)
(d) Draw the bending moment diagram (BMD)



OR

Q.3(B) For the simply supported beam (as shown in the figure): 10M

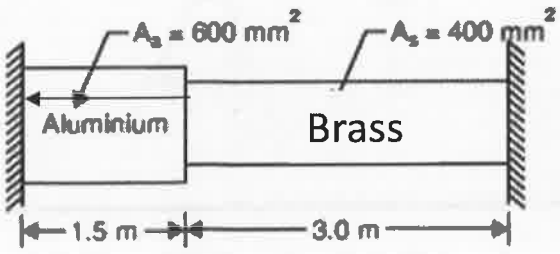
(a) Draw free body diagram
(b) Find the reactions forces
(c) Draw the Shear force diagram (SFD)
(d) Draw the bending moment diagram (BMD)



Q.4(A) A plane stress condition exists (σ_x = -50 MPa, σ_y = 20 MPa, $\tau_{xy} = \tau_{yx} = \tau$ = 10 MPa). Calculate the normal and the shear stress obtained by rotating clockwise at an angle of 45°. 10M

OR

Q.4(B) A composite bar (as shown) is fitted at the supports (as shown) between two rigid walls. Determine the compressive load when the temperature raises 50 °C (ΔT = 80 °C). $E_{Al} = 70 \times 10^9$ N/M^2, $E_{brass} = 100 \times 10^9$ N/M^2, $\alpha_{Al} = 11 \times 10^{-6}$ /°C, $\alpha_{brass} = 18.7 \times 10^{-6}$ /°C. 10M



Q.5(A) Derive the expression for strain energy and power for torsion of a solid circular shaft. 10M

OR

Q.5(B) i. What is torsional rigidity? 3M

ii. Show the torsional rigidity of a hollow circular shaft is more than a solid circular shaft if the cross-sectional areas of the shafts are same. 7M

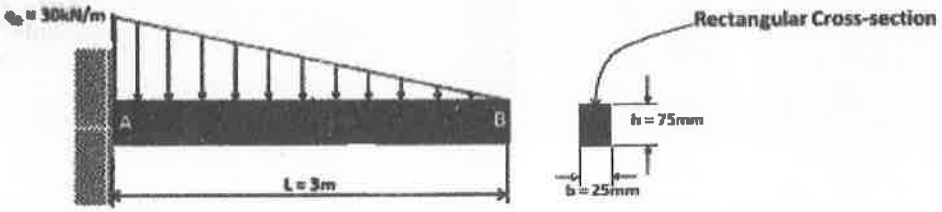
Q.6(A) Evaluate the following for the cantilever beam 10M

(a) Draw free body diagram

(b) Find the reactions forces

(c) Find the expression for bending moment (BM)

(d) Find the vertical deflection at point B.



OR

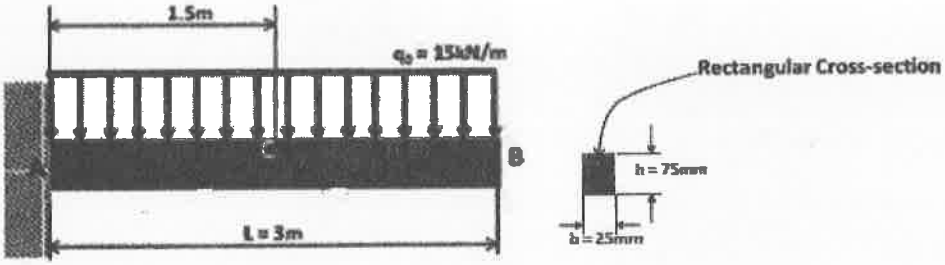
Q.6(B) Evaluate the following for the simply supported beam 10M

(a) Draw free body diagram

(b) Find the reactions forces

(c) Find the expression for bending moment (BM)

(d) Find the vertical deflection at point C.



*** END***

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 14ECE101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – March 2021

ELECTRICAL MACHINES

(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 is dynamic braking in DC Motors ?	1M
	ii.	What is the significance of E_b in a DC Motor ?	1M
	iii.	Mention the advantage of Auto-Transformer over ordinary transformers.	1M
	iv.	How circulating currents and operation at different p.f. can be avoided while operating the single-phase transformers in parallel.	1M
	v.	Define Slip of an induction motor.	1M
	vi.	If a 6 – pole induction motor supplied from a three phase, 50Hz supply has a rotor frequency of 2.3Hz, what is the operating slip of the motor ?	1M
	vii.	What is crawling?	1M
	viii.	Define Distribution factor.	1M
	ix.	Define voltage regulation of an alternator.	1M
	x.	A 4pole 3 phase alternator with 48 armature slots is using an armature winding which is short pitched by one slot. Calculate its pitch factor.	1M
Q.2(A)		Briefly explain the characteristics of DC Motors.	10M
		OR	
Q.2(B)	i.	What is the necessity of starter in DC Machines?	5M
	ii.	Explain the operation of a 4-point starter for DC Motors with a neat sketch.	5M
Q.3(A)		Obtain the equivalent circuit of a single-phase transformer referred to primary.	10M
		OR	
Q.3(B)		A 5-kVA, 220/400-V, 50 Hz distribution transformer is testes for efficiency and regulation as follows: **O.C. Test :** 220V 2A, 100 W **(LV side)** ; **S.C. Test :** 40V 12.5A, 240 W **(HV side)**. Determine **(i)** core loss, **(ii)** draw the equivalent circuit referred to primary, **(iii)** efficiency on F.L. and **(iv)** regulation of transformer at 0.8 p.f. lagging.	10M
Q.4(A)	i.	Briefly explain the power flow diagram of a three phase induction motor.	5M
	ii.	The power input to the rotor of a 440V, 50Hz, 6 pole, 3 phase induction motor is 20 KW while running at 960 r.p.m. Calculate the rotor copper loss and Mechanical power developed in the machine.	5M
		OR	
Q.4(B)	I.	Draw and explain the Torque Slip characteristics of three phase induction motor.	4M
	ii.	Explain how the rotor of a three phase induction motor rotates using the fundamental principle of operation.	6M

Q.5(A) Explain the speed control methods of a three phase induction motor with relevant diagrams. 10M

OR

Q.5(B) A 12 pole, 50 Hz, 3-phase induction motor has rotor resistance of 0.15 Ω and standstill reactance of 0.25Ω per phase. On full load it is running at a speed of 480 r.p.m. The rotor induced e.m.f per phase at standstill is observed to be 32V. Calculate **(i)** starting torque, **(ii)** full load torque, **(iii)** maximum torque and **(iv)** speed at which maximum torque occurs. 10M

Q.6(A) With a neat diagram explain the constructional details of a Brushless DC Motor. Also explain the principle operation. 10M

OR

Q.6(B) i. Derive the EMF equation of a alternator. 5M

ii. A 3-Phase 16-pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 wb and is sinusoidally distributed. If the operating speed is 375 rpm, Find the phase and line values of emf. 5M

*** END***

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 14ECE102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – March 2021

(Regulations: R14)

NETWORK ANALYSIS

(ECE)

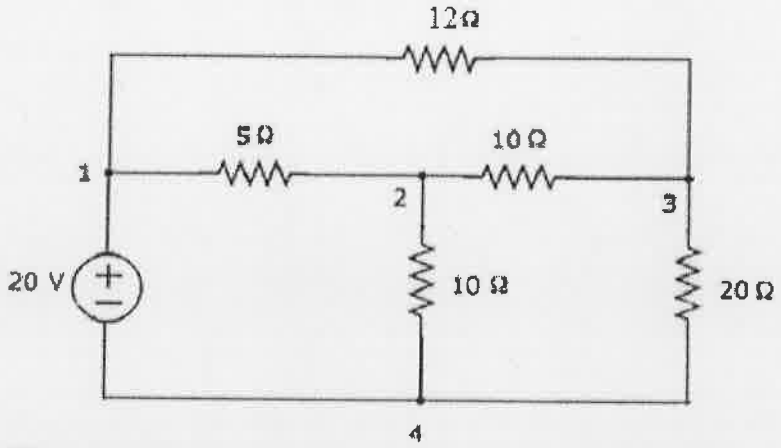
Time: 3Hrs **Max Marks: 60**

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.	State superposition theorem	1M
	ii.	Define tree and co tree	1M
	iii.	Define quality factor	1M
	iv	Determine resonance frequency for series RLC circuit where R=20 ohm,L =0.5m H and C = 3uF.	1M
	v.	Define two port network.	1M
	vi	Write the expressions of hybrid parameters.	1M
	vii.	Write the expression for k-constant filter	1M
	viii.	Define filter	1M
	ix.	Define LPF	1M
	x.	What is gain margin?	1M
Q.2(A)		State and Prove Thevinin's Theorem when the network is excited by DC source	10M

OR

Q.2(B) For the network shown below draw the graph and write down the incidence matrix, tie set matrix and cut set matrix. 10M



Q.3(A)	(i) Derive the expression for resonanace frequency for series RLC circuit.	5M
	(ii) Explain the universal reactance curves of series resonant circuit	5M

OR

Q.3(B) Derive the relationship between band width and Quality factor for series RLC resonance circuit. 10M

Q.4(A) Explain the series and parallel connection of two port networks. 10M

OR

Q.4(B) Find the values of two port network for h and ABCD parameters. Where Z_{11}=50Ω, 10M

$Z_{12}= Z_{21}= 30\ \Omega$, $Z_{22}=76\ \Omega$

Q.5(A)	Discuss about constant –K low pass filter and also derive its cut off frequency.	10M
	OR	
Q.5(B)	Design an m-derived T section and π section low pass filter having cut-off frequency (fc)= 7 kHz, design impedance R_0=600 Ω and m=0.35.	10M
Q.6(A)	Explain about the classification of magnitude responses of filter functions.	10M
	OR	
Q.6(B)	Draw the magnitude and phase plot for the transfer function.	10M

$$T(s) = \frac{10}{S(1+0.5S)(1+0.1S)}$$

***** END*****

Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 14ECE103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – March 2021

(Regulations: R14)

ELECTRONIC DEVICES

(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 materials are classified based on energy band diagrams?	1M
	ii.	What is electron volt? What is the relation between electron volt and joule?	1M
	iii.	Mention any three n-type impurities.	1M
	iv	Where will be the Fermi level for intrinsic semiconductor?	1M
	v.	Define carrier mean life time	1M
	vi	What is continuity equation?	1M
	vii.	Mention the applications of pn diode and zener diode.	1M
	viii.	What is the need for biasing?	1M
	ix.	Compare BJT and JFET.	1M
	x.	Write the basic principle of LED.	1M
Q.2(A)	(i) What is crystal lattice? Explain crystalline structure of semiconductor		5M
	(ii) The intrinsic concentration of a semiconductor is $5 \times 10^{19}/m^3$ When acceptor atoms are introduced, the majority carrier concentration becomes $1.5 \times 10^{21}/m^3$. Calculate the minority carrier concentration.		5M
	OR		
Q.2(B)	Derive the expression for Schrodinger wave equation.		10M
Q.3(A)	Explain the following		
	(i)	charge carriers in semiconductors	5M
	(ii)	Drift concept due to electric field	5M
	OR		
Q.3(B)	Explain temperature dependence of intrinsic carrier concentration and p-type silicon		10M
Q.4(A)	Explain generation and recombination mechanisms in semiconductors.		10M
	OR		
Q.4(B)	Explain the following		
	i)	Photo conductivity and	5M
	ii)	Diffusion of carriers in semiconductors	5M
Q.5(A)	(i) Explain forward and reverse bias conditions of p-n junction diode.		5M
	(ii) Explain breakdown mechanisms occur in semiconductor diodes.		5M
	OR		
Q.5(B)	Discuss about input-output characteristics of CE configuration		10M
Q.6(A)	(i) Explain JFET drain characteristics.		5M
	(ii) Discuss about V-I characteristics of UJT.		5M
	OR		
Q.6(B)	Explain the principle and working of photodiode and tunnel diode.		10M

***** END*****

Hall Ticket No: | | | | | | | | | | | Question Paper Code: 14ECE104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech. II Year I Semester (R14) Supplementary End Semester Examinations – March 2021

(Regulations: R14)

DIGITAL DESIGN

(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.	Convert $(313)_{16}$to decimal number.	1M
	ii.	Write the signed binary representations of +59 and -59.	1M
	iii.	Determine the 9's complement of 777_8.	1M
	iv	Note the truth table of NOR gate.	1M
	v.	Distinguish between latch and flip-flop.	1M
	vi	Mention the differences between synchronous and asynchronous counters.	1M
	vii.	Determine the excitation table for SR flip-flop.	1M
	viii.	Note the truth table of T flip-flop.	1M
	ix.	List out various HDL operators.	1M
	x.	What is HDL and Expand it.	1M
Q.2(A)	Write the given function in standard SOP and POS forms. F(A,B,C,D)= B'D+A'D+BD.		10M
	OR		
Q.2(B)	i) Implement the F=xy+x'y'+y'z Boolean function using NAND gates. ii) Implement the F=ab+a'bc'+b'c Boolean function using NOR gates.		10M
Q.3(A)	i) Implement 32×1 multiplexer with 8X1 Multiplexers. ii) Implement Full 8X1 multiplexer with 2×1 multiplexers.		10M
	OR		
Q.3(B)	Design 4-bit Ripple carry adder using full adders.		10M
Q.4(A)	Draw the logic diagrams of SR and T flip flops with the help of state table and state equations.		10M
	OR		
Q.4(B)	Design synchronous mod 10 counter using D-flip flops.		10M
Q.5(A)	What is Hamming code? Generate the even parity Hamming code for the given data. 111000100.		10M
	OR		
Q.5(B)	Implement the following Boolean functions using PAL. i) F1(A, B, C) = ∑ (0, 1, 2, 4). ii) F2(A, B, C) = ∑ (0, 5, 6, 7).		10M
Q.6(A)	Write a HDL code for full adder using two half adders.		10M
	OR		
Q.6(B)	Write a HDL code for 8×1 multiplexer.		10M

***** END*****

Hall Ticket No: | | | | | | | | | | | QP Code: 14CSU102/14CSIT102/14IT102

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B. Tech. II Year I Semester (R14) Supplementary End Semester Examinations – March 2021

(Regulations: R14)

DATA STRUCTURES AND ALGORITHMS

(Common to CSE, CSIT, IT)

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 time complexity.	1M
	ii.	What is the worst case time complexity of the Linear Search?	1M
	iii.	PUSH(A), PUSH(B), POP(), PUSH(C), PUSH(D), POP(), POP() if these operations are performed on a empty stack, show the final contents of the stack.	1M
	iv	What is the node structure of singly linked list?	1M
	v.	FIFO stands for.	1M
	vi	Define Max Heap property.	1M
	vii.	Define hashing.	1M
	viii.	If pre order is {d,b,a,c,f,e,g} and post order is {a,c,b,e,g,g,d} then what is its in order?	1M
	ix.	Red – Black tree root always colured with.	1M
	x.	Splay node always position at which location?	1M
Q.2(A)	i. Define Algorithm. Explain its Characteristics.		5 M
	ii. write and explain binary search algorithm with an example.		5 M
	OR		
Q.2(B)	Write and explain Merge sort algorithm with example.		10M
Q.3(A)	i.	Write a C++ program to implement Stack Operations.	5 M
	ii.	Convert the following infix expression to postfix using stack. A+B*(C^D-E)^(F+G*H)-I	5 M
	OR		
Q.3(B)	Explain doubly linked list operations with example.		10M
Q.4(A)	Explain Dequeue operations with example.		10M
	OR		
Q.4(B)	Explain Min Heap implementation.		10M
Q.5(A)	Explain in brief collision resolution methods.		10M
	OR		
Q.5(B)	Explain binary search tree properties and implement for following values {13,3,4,12,14,10,5,1,8,2,7,9,11,6,18}		10M
Q.6(A)	What is a balance factor in AVL Tree? Explain AVL tree rotations in brief.		10M
	OR		
Q.6(B)	Define Graph. Explain Breadth First Traversal with an example.		10M

***** END*****

Hall Ticket No: | | | | | | | | | | |

QP Code: 14CSE103/14CSIT103/ 14IT103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – March 2021

(Regulations: R14)

OBJECT ORIENTED PROGRAMMING

(Common to CSE, CSIT, IT)

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.	State any three features of java.	1M
	ii.	Difference between default and public access modifier.	1M
	iii.	Write three major differences between interface & class?	1M
	iv	Name the root interface for collection classes.	1M
	v.	What is exception?	1M
	vi	Define multithreaded programming.	1M
	vii.	Define an event. Give examples.	1M
	viii.	State the difference between paint() and repaint() method	1M
	ix.	List 5 Swing Components.	1M
	x.	Difference between JLabel to Label	1M
Q.2(A)	Explain working of java virtual machine (JVM) also explain how java is architectural neutral.		10M
	OR		
Q.2(B)	Explain data types in java.		10M
Q.3(A)	Explain classification of stream classes. Explain various types of byte stream classes & character stream classes in detail.		10M
	OR		
Q.3(B)	Give brief description about TreeSet class?		10M
Q.4(A)	What is an exception? How can we create our own exceptions? Illustrate with suitable example.		10M
	OR		
Q.4(B)	Explain the life cycle of a thread and briefly explain its states.		10M
Q.5(A)	What is an applet? Explain in detail about applet life cycle with suitable diagram. Write a program to draw circle & rectangle filled with red color.		10M
	OR		
Q.5(B)	Explain the following terms in detail with examples: (i) Component. (ii) Container. (iii) Layout managers.		10M
Q.6(A)	Differentiate between any three AWT controls and Swing controls.		10M
	OR		
Q.6(B)	Write briefly about JDBC ODBC Connectivity steps.		10M

***** END*****

Hall Ticket No: | | | | | | | | | | | QP Code: 14CSU104/14CSIT104/14IT104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – March 2021

(Regulations: R14)

DIGITAL DESIGN

(CSE/CSIT/IT)

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 $A6_{16}$ to ( )$_8$	1M
	ii.	Convert the following 53_{10} to ( )$_2$	1M
	iii.	What is the advantages of Gray code?	1M
	iv	State De-Morgan's Theorem.	1M
	v.	Define Half Adder and Full Adder	1M
	vi	Write the HDL model for Half Adder	1M
	vii.	Write the truth table for 3 to 8 decoder.	1M
	viii.	What are the sequential circuits?	1M
	ix.	Define Static RAM.	1M
	x.	List different types of memories.	1M
Q.2(A)	a) Express the following numbers into decimal i) $(10110.0101)_2$ ii) $(16.5)_{16}$ iii)$(26.24)_8$ b) Find the complement of F= x+yz. Then show FF'=0 and F+F' =1.		10M
	OR		
Q.2(B)	Express the following function into sum of min terms and product of max terms. F(A,B,C,D)=B'D+A'D+BD		10M
Q.3(A)	For the following function F(W,X,Y,Z) = ∑m (1,2,3,5,13) + d(6,7,8,9,11,15) using K-map (i) Minimal SOP (ii) Minimal POS.		10M
	OR		
Q.3(B)	Minimize the Boolean function F(A,B,C,D,E)=∑(2,3,8,10,11,12,14,15,19,20,24,25,30) using the K-map. Construct the logic circuit using NAND and NOT gates only.		10M
Q.4(A)	Design a logic circuit for Counter using D Flip Flop.		10M
	OR		
Q.4(B)	Implement 8x1 MUX by using 4x1 MUX.		10M
Q.5(A)	i) Design a four-nit binary ripple countdown counter. ii) Discuss Shift Registers.		10M
	OR		
Q.5(B)	Explain the design procedure of synchronous sequential circuits with simple example.		10M
Q.6(A)	I) Explain different types of Read Only Memory. ii) With suitable diagram, explain Programmable Logic Array.		10M
	OR		
Q.6(B)	Design a 4 bit square generator using RAM.		10M

*** **END*****

Hall Ticket No: | | | | | | | | | | |

QP Code: 14CSU105/14CSIT105/14IT105

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

B.Tech II Year I Semester (R14) Supplementary End Semester Examinations – March 2021

(Regulations: R14)

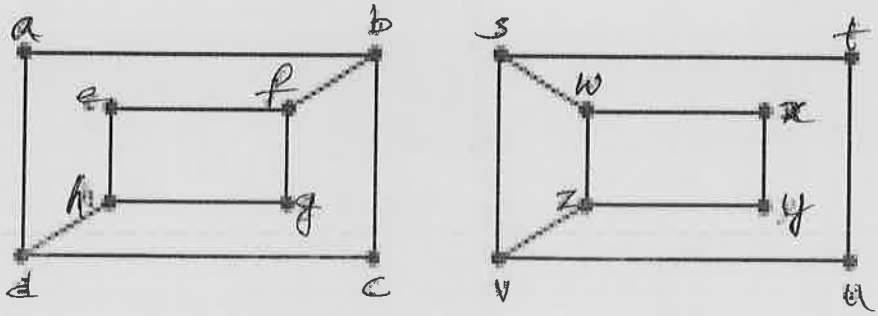
MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

(Common to CSE/ CSIT/ IT)

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

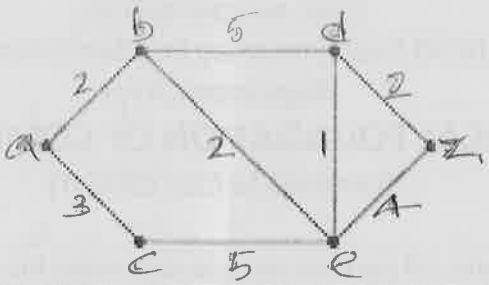
Attempt all the questions. All parts of the question must be answered in one place only.
All parts of Q.no 1 are compulsory. In Q.no 2 to 6 answer either Part-A or B only

Q.1	i.	Write the inverse form of "If it is raining, then the home team wins."	1M
	ii.	Define equivalence relation with an example.	1M
	iii.	Define bijective and surjective functions	1M
	iv	What is Lattice? Give an example.	1M
	v.	Define Euler path.	1M
	vi	Define a spanning tree	1M
	vii.	Define is modular congruence.	1M
	viii.	Write Pigeonhole principle?	1M
	ix.	What is encryption?	1M
	x.	Find the binary expansion of $(241)_{10}$.	1M
Q.2(A)		Obtain Principal Disjunctive and Principal Conjunctive Normal Forms of $(p \wedge q) \vee (\neg p \wedge r) \vee (q \wedge r)$.	10M
		OR	
Q.2(B)		(i) Find principal conjunctive normal form for $[(p \vee q) \wedge \neg p \rightarrow \neg q]$.	10M
		(ii)Show that t is valid conclusion from the premises $\neg p \wedge q, r \rightarrow p, \neg r \rightarrow s, and\ s \rightarrow t.$	
Q.3(A)		(i) Let f, g, h be the functions from Z to Z defined by $f(x) = x - 1$, $g(x) = 3x$ and $h(x) = 0$ if x is even, $h(x) = 1$ if x is odd. Determine $(fo(goh))(x)$ and $((fog)oh)(x)$. Verify that $(fo(goh))(x) = ((fog)oh)(x)$.	10M
		(ii) $f : A \rightarrow B, g : B \rightarrow C$ are bijective, prove that gof and f^{-1} are also bijective.	
		OR	
Q.3(B)		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 $\{2,12,24\}$.	10M
Q.4(A)		Define isomorphism of graphs. Determine whether the following graphs are isomorphic.	10M



OR

Q.4(B) Use Dijkstra's algorithm to find the shortest path from vertex a to vertex z in the graph 10M



Q.5(A) (i) Solve the recurrence relation $a_n - 6a_{n-1} + 9a_{n-2} = 0$, where $n \geq 2$ and $a_0 = 5, a_1 = 12$ using characteristic roots method. 10M

(ii) Show that the set {1,2,3,4,5}is not a group under addition and multiplication modulo 6.

OR

Q.5(B) (i) Prove that $(Q^+, *)$ where * is a binary operation defined by $a * b = ab/5$ is a group. 10M

(ii) Solve the recurrence relation $a_{n+2} - 8a_{n+1} + 16a_n = 8.5n$ where $n \geq 0$ and $a_0 = 12, a_1 = 5$.

Q.6(A) Explain RSA algorithm for Encryption and Decryption with an example. 10M

OR

Q.6(B) Explain RSA algorithm and find the cipher text where e = 17 and n = 3053 and plain text is 0986 3029 1134 1105 1232 2281 2967. 10M

***** END*****