



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

L.B. Reddy Nagar :: Mylavaram-521 230 :: Krishna Dist. :: A.P
Approved by AICTE, New Delhi. Affiliated to JNTUK, Kakinada

B.Tech.(VI-Semester) (R14) Supplementary Examinations, August 2021

&

B.Tech.(VI-Semester) (R14) Regular Examinations (Re-admitted Students), August 2021

TIME TABLE

TIME :10.00 AM to 01.00 PM

A.Y. 2020-21

DATE	ASE	CE	CSE	ECE	EEE	EIE	IT	ME
05-08-2021 (Thursday)	S360 - Propulsion- II	S185 - Design of Steel Structures	S415 - UML Design	S131 - Antennas and Wave Propagation	S213 - Electrical Distribution Systems	S333 - Opto Electronics and Laser Instrumentation	S268 - Image Processing	S259 - Heat Transfer
07-08-2021 (Saturday)	S120 - Aircraft Stability and Control	S420 - Waste Water Engineering	S163 - Compiler Design	S194 - Digital Systems Design using Verilog	S345 - Power System Analysis	S325 - Object Oriented Programming using Java	S163 - Compiler Design	S292 - Machine Design -II
09-08-2021 (Monday)	S250 - Finite Element Method	S421 - Water Resources Engineering	S425 - Web Technologies	S179 - Data Structures and Object Oriented Programming	S313 - Microprocessors and Microcontrollers	S129 - Analytical Instrumentation	S425 - Web Technologies	S317 - Modern Machining Processes
11-08-2021 (Wednesday)	S303 - Mechanics of Composites	S256 - Geo Technical Engineering-II	S272 - Information Security	S419 - VLSI Design	S429 - Optimization Techniques in Engineering	S334 - P. C. Based Instrumentation	S177 - Data Mining and Data Warehousing	S372 - Robotics
13-08-2021 (Friday)	S283 - Introduction to Space Technology	S413 - Transportation Engineering-II	S200 - Distributed Operating Systems	S190 - Digital Image Processing S307 - Medical Electronics S311 - Micro Electro Mechanical Systems	S105 - Advanced Electrical Machines S278 - Intelligent Control Systems	S416 - Virtual Instrumentation S274 - Instrumentation and Control in Petro chemicals Industries	S383 - Software Testing Methodologies	S302 - Mechanical Vibrations S414 - Tribology
16-08-2021 (Monday)	S260 - Helicopter Aerodynamics S114 - Aero Elasticity	S437 - Repair and Rehabilitation of Structures S435-Matrix Methods of Structural Analysis	S137 - Artificial Intelligence	S229 - Embedded Systems Design S176 - Data Communications S363 - Radio Frequency Integrated Circuits	S199 - Distributed Generation S261 - High Voltage Engineering	S139-Automation Industrial Process S279 - Intelligent Instrumentation	S152 - Business Intelligence and Big Data	S141 - Automobile Engineering

Note: Any omissions or clashes in the time table may please be informed to the Controller of Examinations immediately.

Date: 24-07-2021

CONTROLLER OF EXAMINATIONS

PRINCIPAL

Copy to: 1. Vice-Principal, Deans & HoDs 2. Transport in-charge & Librarian
3. Canteen, Security & Hostels 4. All Notice Boards

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S114-AERO ELASTICITY

(ASE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1 (a)	What is torsional rigidity?	1M	CO1	L2
(b)	Define strip theory.	1M	CO2	L2
(c)	Define the aileron efficiency.	1M	CO3	L1
(d)	Write the assumed mode of torsion of aeroelastic system.	1M	CO2	L1
(e)	List down atleast four aeroelastic problems in mechanical engineering.	1M	CO5	L1
(f)	What is response problem in aeroelastic system?	2M	CO1	L2
(g)	Name some approximate solution techniques.	2M	CO2	L4
(h)	Define critical-aileron reversal speed.	2M	CO2	L1
(i)	Distinguish between ternary flutter and binary flutter.	2M	CO4	L4
(j)	Give some typical examples of aeroelastic oscillations.	2M	CO1	L1

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	Write note on stability versus response problems.	7M	CO1	L1
(b)	Explain vortex induced vibration in detail.	8M	CO1	L2
3(a)	Write a short note on two dimensional idealizations.	7M	CO2	L2
(b)	Formulate an expression for the Fredholm integral equation of second kind.	8M	CO2	L6
4(a)	Identify the elastic efficiency for two-dimensional airfoil.	7M	CO2	L4
(b)	Derive total angle of rotation θ at x for a cantilever wing with aileron.	8M	CO2	L3
5(a)	Discuss about flutter control on a aeroelastic system.	7M	CO4	L3
(b)	Explain the methods of determining the critical speed of the aeroelastic system.	8M	CO4	L2
6(a)	Illustrate the experimental setup used in Dunn's tests.	7M	CO5	L3
(b)	Discuss the effect of windspeed on frequency and amplitude of oscillations.	8M	CO5	L2
7(a)	Identify q_{div} for the semirigid mode of the wing be defined by the function $f = \frac{y}{s}$.	7M	CO2	L4
(b)	Derive elementary beam theory.	8M	CO1	L3
8(a)	Discuss about the flutter prevention.	7M	CO2	L3
(b)	Identify the solution using successive approximation technique for a cantilever wing with aileron.	8M	CO2	L4

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B.Tech. (VI Semester) Regular/Supplementary Examinations

S260-HELICOPTER AERODYNAMICS

(AE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	What is Translational tendency in hovering?	1M	CO1	L1
(b)	Illustrate the term Autorotation.	1M	CO1	L2
(c)	Write a short note on Ideal twist rotors.	1M	CO1	L1
(d)	Define Compound aircraft.	1M	CO2	L2
(e)	List different types of hovercraft.	1M	CO2	L1
(f)	Explain rotor forces and power.	2M	CO1	L2
(g)	Summarize the three important functions provided by the rotor of a helicopter.	2M	CO1	L2
(h)	What are the limitations on the rotor speeds?	2M	CO1	L1
(i)	List different configurations of V/STOL.	2M	CO3	L1
(j)	Describe the propulsion system of a hovercraft.	2M	CO3	L2

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	Write a short note on (Draw neat sketches wherever relevant): (i) Explain Reverse flow region (ii) Autorotation.	7M	CO1	L5
(b)	Give examples of two helicopters and explain the technical differences between them.	8M	CO1	L5
3(a)	Derive momentum theory in hover along with all its assumptions and limitations. Draw neat sketches to support the theory.	8M	CO1	L4
(b)	Discuss the factors required for maximum efficiency of the helicopter.	7M	CO1	L6
4(a)	Explain in detail about autorotation in forward flight of helicopter.	7M	CO1	L5
(b)	Explain the induced and profile power in forward flight.	8M	CO1	L5
5(a)	Determine the thrust vectoring principle of an existing VTOL airplane.	7M	CO2	L2
(b)	Explain following term with respect to helicopter: (i) Lateral control (ii) Directional control.	8M	CO2	L5
6(a)	Explain the limitation of hover craft on land and water.	7M	CO3	L5
(b)	What are the principle details of a hovercraft. Discuss how does it obtain forward motion?	8M	CO3	L6
7(a)	What is rotor blade stall? Explain in what way it differs from the stall of a fixed wing aircraft?	8M	CO1	L5
(b)	Explain how the helicopter stability changes with variation in speed and angle of attack.	7M	CO1	L5
8(a)	Explain the features of the fully articulated rotor system, semi rigid rotor system and rigid rotor system.	8M	CO1	L5
(b)	Discuss the following parameters governing the static directional stability of the helicopter. (i) Directional stability (ii) Dihedral effect	7M	CO1	L6

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S283-INTRODUCTION TO SPACE TECHNOLOGY

(AE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) Define mass ratio of a rocket. [1M]
- (b) Define solar time. [1M]
- (c) Write expression for angular momentum of the particle. [1M]
- (d) Define atmospheric scale height. [1M]
- (e) Express synodic period. [1M]
- (f) Mention main components of solid propellant rockets. [2M]
- (g) Mention reference frames. [2M]
- (h) Define momentum of force in connection with space technology. [2M]
- (i) Relate acceleration and drag for a satellite of low orbit. [2M]
- (j) Write expression for wait time. [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2. Discuss briefly about performance parameters of SPRs. [15M]
3. Explain briefly about coordinate system with diagrams. [15M]
4. Derive an expression for gravity turn trajectory. [15M]
5. Discuss about re-entry phase and position of impact point. [15M]
6. Explain about orbit deviation due to injection errors. [15M]
7. Write properties, characteristics and performance for liquid propellants. [15M]
8. Derive the ideal velocity of rocket in free space in terms of payload fraction & structural efficiency. [15M]

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B.Tech.VI Semester ~~Regular~~/Supplementary Examinations

S250-FINITE ELEMENT METHOD

(AE)

Time : 3 hours

Max.Marks:75

PART-A

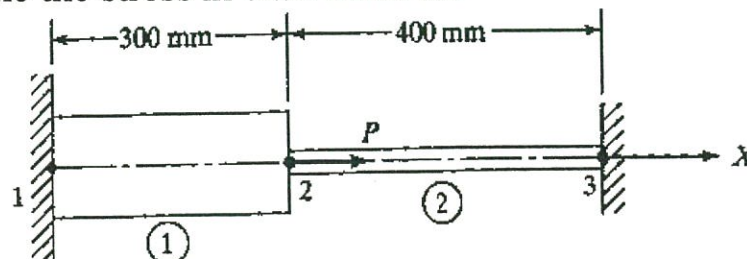
(Answer all questions)

- | | | |
|------|---|------|
| 1(a) | Write the material matrix (D) for Plane Strain problem. | [1M] |
| (b) | Write the Elemental Strain Energy Equation. | [1M] |
| (c) | How many number of degrees of freedom for a triangular element? | [1M] |
| (d) | Write $[B_T]$ matrix for 2-D heat transfer problems. | [1M] |
| (e) | Define lumped mass matrix. | [1M] |
| (f) | Potential Energy of an elastic body is a sum of _____ | [2M] |
| (g) | What is Neumann Boundary condition? | [2M] |
| (h) | Write the isoparametric representation of axisymmetric body. | [2M] |
| (i) | Write equation for h_T for heat transfer problems. | [2M] |
| (j) | Write the $[N]$ matrix for a Tetrahedral element. | [2M] |

PART-B

(Answer any FOUR questions)

- 2 Consider the bar shown in Figure. An axial load $P = 200 \times 10^3 \text{ N}$ is applied as shown. Using the penalty approach for handling boundary conditions, do the following: (a) Determine the nodal displacements. (b) Determine the stress in each material.



Aluminum

Steel

$$A_1 = 2400 \text{ mm}^2$$

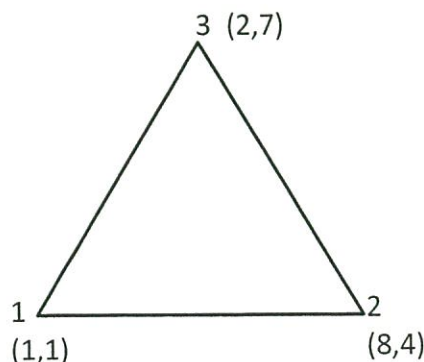
$$A_2 = 600 \text{ mm}^2$$

$$E_1 = 70 \times 10^9 \text{ N/m}^2$$

$$E_2 = 200 \times 10^9 \text{ N/m}^2$$

[15M]

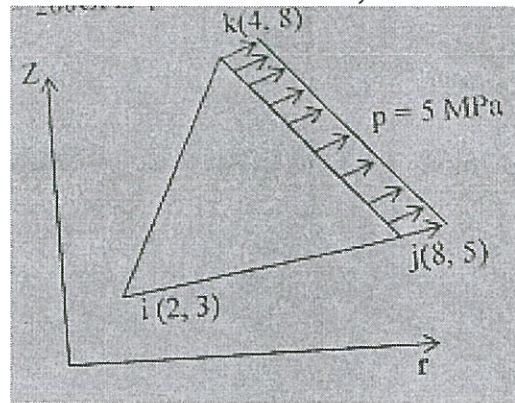
- 3 Find the strain-displacement matrix and strains for the triangular element shown in the figure by considering the model displacements (in cm), $q_1 = 0.001$, $q_2 = -0.004$, $q_3 = 0.003$, $q_4 = 0.002$, $q_5 = -0.002$ and $q_6 = 0.005$.



[15M]

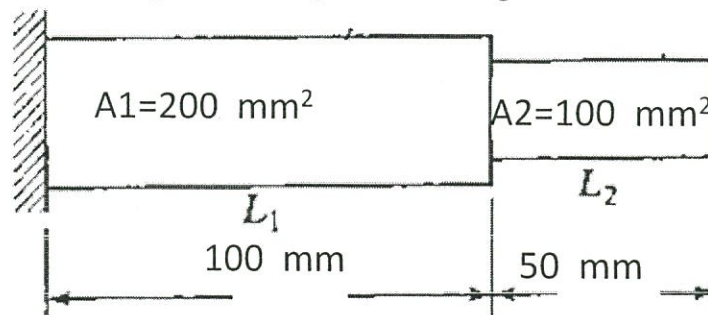
S250-FINITE ELEMENT METHOD

- 4, The axisymmetric element shown in figure is subjected to a uniformly distributed pressure as shown. Find strain-displacement matrix, material matrix and load vector. $E=80\text{GPa}$, $\nu=0.3$.



[15M]

- 5(a) Derive the conductivity matrix for 2-D triangular element; if one face is exposed to a heat transfer coefficient 'h' at ambient temperature of T_∞ and also derive the load vector. [7M]
- (b) Derive the one-dimensional heat conduction equation and write the proper boundary conditions. [8M]
- 6(a) Write the properties of Eigen Vectors. [7M]
- (b) Evaluate the Eigen values for the stepped bar as shown in the figure. Take $E=200\text{GPa}$ and specific weight $= 7850 \text{ kg/m}^3$.



[8M]

- 7(a) List and explain the types of boundary conditions can be used in FEM. [7M]
- (b) Derive the Material matrix [D] for a Plane stress problem. [8M]
- 8(a) Explain about Lumped mass matrix and Consistent mass matrix models. [7M]
- (b) Derive the stiffness matrix for a beam element. [8M]

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S120-AIRCRAFT STABILITY AND CONTROL

(AE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) Write the expression for stick fixed neutral point. [1M]
- (b) What are the advantages and disadvantages of frise aileron? [1M]
- (c) Define the term adverse yaw. [1M]
- (d) Define the term yaw damping. [1M]
- (e) Define the term spin of aircraft. [1M]
- (f) Draw the pressure distribution over horizontal stabilizer due to control deflection and show the variation of hinge moment with respect to it and explain. [2M]
- (g) What is meant by dihedral effect? [2M]
- (h) What is meant by 'Dorsal fin'? [2M]
- (i) Discuss the Stability derivatives in longitudinal dynamics. [2M]
- (j) Define spiral instability. [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

- 2(a) Derive an expression for static longitudinal stability of an airplane with conventional tail Contribution. [7M]
- (b) Explain about Hinge moments, coefficients
Restoring tendency
Floating tendency
Elevator free factor. [8M]
- 3(a) Explain the criteria for lateral stability of an airplane [7M]
- (b) i) Obtain the relation for lateral control power, $C_{l_{\delta a}}$.3
ii) Explain the various methods of aileron balancing. [8M]
- 4(a) Write a note on the following :
i) Derivatives due to change in forward speed.
ii) Explain about power effects. [7M]
- (b) What is the function of dorsal fin? Explain with example, the effect of dorsal fin on pedal force versus sideslip characteristics. [8M]
- 5(a) Explain how dynamic stability of an aircraft is established with the help of Routh's criteria. [7M]
- (b) Describe Phugoid mode of an aircraft. [8M]
- 6(a) Explain instability of an airplane in spin. [7M]
- (b) Explain how the design of the airplane can be modified to avoid such an instability. [8M]
- 7(a) What are static stability and dynamic stability? [7M]
- (b) With respect to an aero plane, explain the
(i) Longitudinal stability (ii) Lateral stability
iii. Directional stability and (iv) Control. [8M]
- 8(a) Write short notes on stick force gradient. [7M]
- (b) An Airplane has the following characteristics:
 $C_{L_{\alpha}} = 0.085 \text{deg}^{-1}$ $\epsilon = 0.5\alpha$
 $C_{L_{\delta e}} = 0.058 \text{deg}^{-1}$ $S_t = 0.25 \text{ S}$
 $\frac{dC_L}{d\delta_e} = 0.032 \text{deg}^{-1}$ $l_t = \bar{c}$ Aerodynamic center location $= 0.25\bar{c}$
 $C_{h_{\alpha t}} = -0.003 \text{deg}^{-1}$ $\eta = 1$
 $C_{h_{\delta t}} = -0.0055 \text{deg}^{-1}$ $(C_{m\alpha})_{\delta, n, p} = 0.37 \text{ rad}^{-1}$
 Calculate: i) Stick fixed neutral point: ii) Stick free neutral point: iii) Shift in centre of gravity. [8M]

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S360-PROPULSION-II

(ASE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks
1(a)	Explain how for ideal ramjet engine, the exit mach number is equal to incoming Mach number.	1M
(b)	Explain operating principle of Rocket.	1M
(c)	What is meant by non Hypergolic propellants?	1M
(d)	What is meant by double base propellants?	1M
(e)	Explain principle in electric propulsion.	1M
(f)	Explain combustion process in ramjet engine.	2M
(g)	For a ideal rocket, the exhaust velocity is 2 km/s through a nozzle area of 2.5 m ² and mass flow rate is 200kg/sec. Calculate specific impulse and thrust developed.	2M
(h)	Explain Storable liquid propellants.	2M
(i)	What are the different types of combustion instabilities in solid rocket motor?	2M
(j)	Differentiate between electro thermal and non electro thermal propulsions.	2M

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	Define Effective jet Mach number for a ramjet engine and derive the relationship for it.	7M
(b)	Write a short note on External Drag of ramjet engine.	8M
3(a)	Explain the general principle of a rocket motor with the help of a suitable diagram.	7M
(b)	Explain the various applications of the rockets.	8M
4(a)	Compare the features of large liquid propulsion engines and small auxiliary engines and explain them.	7M
(b)	What are the applications of large liquid propulsion engines and small auxiliary engines?	8M
5(a)	Explain the types of double base propellants in a solid rocket motor.	7M
(b)	Explain the types of composite propellants in a solid rocket motor.	8M
6(a)	Write brief notes on Electro static thrusters.	7M
(b)	Explain briefly Electro thermal propulsion devices.	8M
7(a)	Define specific impulse and explain its significance. Derive its unit. Mention the typical values of specific impulse for different chemical rocket.	7M
(b)	Explain typical features of liquid propellant feed systems.	8M
8(a)	Explain two types of propellant grains loaded in solid rockets.	7M
(b)	Explain Electromagnetic thrusters.	8M

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B.Tech. (VI Semester) Regular/Supplementary Examinations

S437-REPAIR AND REHABILITATION OF STRUCTURES

(CE)

Time : 3 hours

Max. Marks: 75

PART-A

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	Define the term 'Repair'.	1M	CO1	L1
(b)	Name the quality management system which is responsible by the owner.	1M	CO2	L1
(c)	Enlist the shrinkage compensating compounds.	1M	CO3	L2
(d)	List out the limitations of rebound number readings.	1M	CO4	L1
(e)	Define the term 'grouting'.	1M	CO5	L1
(f)	Differentiate between 'remedial maintenance and routine maintenance'.	2M	CO1	L2
(g)	Define settlement cracks with sketch.	2M	CO2	L1
(h)	Define polymer impregnated concrete.	2M	CO3	L1
(i)	List two methods of semi-destructive testing systems commonly used in construction industry.	2M	CO4	L2
(j)	Differentiate between active cracks and dormant cracks.	2M	CO5	L2

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	Discuss the need for rehabilitation of structures.	7M	CO1	L2
(b)	Describe the structural defects and its causes in a masonry building and the approaches for prevention.	8M	CO1	L1
3(a)	Outline the checks that are made on the day of concreting to assure quality of concrete.	7M	CO2	L2
(b)	Discuss the freezing-Thawing of concrete and the preventive measures to be taken to avoid freezing and thawing effect on concrete.	8M	CO2	L2
4(a)	Classify the Repair materials based on types of application.	7M	CO3	L1
(b)	Discuss the steps of concrete repairing by grouting.	8M	CO3	L2
5.	List different types of non-destructive testing and illustrate the functioning of ultrasonic pulse velocity test with diagrams.	15M	CO4	L3
6(a)	State various methods used to enhance shear strength and flexure strength of beam.	7M	CO5	L1
(b)	Illustrate the process of jacketing and strengthening to a column with neat sketches.	8M	CO5	L3
7(a)	Discuss the steps for sealing of cracks by epoxy injection.	7M	CO3	L2
(b)	Describe the procedure for repair of chloride induced corrosion.	8M	CO4	L2
8.	Describe the procedure for repair of cracks in columns when corrosion has reached reinforcement level.	15M	CO5	L2

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B.Tech. (VI Semester) Regular/Supplementary Examinations

S413 –TRANSPORTATION ENGINEERING-II

(CE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) Define the term permanent way. [1M]
- (b) Distinguish between flange way clearance and flange way depth. [1M]
- (c) Define the term reception signals in railways. [1M]
- (d) State the term terminal building. [1M]
- (e) Justify the necessity of entrance channels in harbour. [1M]
- (f) List out the various requirements of an ideal permanent way. [2M]
- (g) Name the various types of safety devices in railways. [2M]
- (h) State the principle of automatic train control system in railways. [2M]
- (i) Justify the effect of noise on airport planning. [2M]
- (j) Distinguish between the components quays and jetties in harbours. [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2. Enumerate the various stages of construction of railway track. [15M]
- 3(a) State the term turnout in railway. Distinguish between right hand turnout and left hand turnout with neat sketch. [8M]
- (b) Discuss about the split switches in railways. [7M]
- 4(a) Describe the working principle of semaphore signal and Warner signal. [7M]
- (b) Discuss briefly about the MRTS and sub urban rails. [8M]
- 5(a) State the concept of wind rose diagram. Discuss the different types of wind rose diagrams. [7M]
- (b) Elaborate the factors that influence in site selection of airport. [8M]
- 6(a) Classify various types of lock-gates. Mention the forces acting on lock gates. [8M]
- (b) Discuss briefly about the fender accessories used in harbours. [7M]
- 7(a) State the characteristics of a well-planned airport layout. [7M]
- (b) Define and classify various types of rail joints in railways. [8M]
8. Draw and explain any one layout of harbour in India with salient features. List available terminal facilities. [15M]

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B.Tech. VI Semester Regular/Supplementary Examinations

S256-GEO TECHNICAL ENGINEERING-II

(CE)

Time : 3 hours

Max. Marks : 75

PART-A

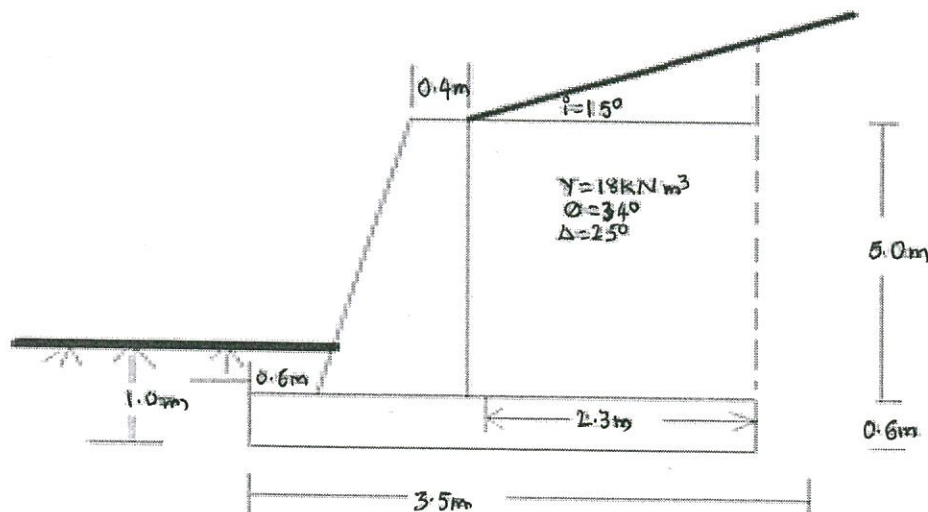
(Answer all questions)

- 1(a) Define significant depth. [1M]
- (b) List out various types of shear failures. [1M]
- (c) Define pile driving. [1M]
- (d) List out various types of retaining walls. [1M]
- (e) Define resonance. [1M]
- (f) Which properties of soils determined from undisturbed samples? [2M]
- (g) What are the uses of plate load test? [2M]
- (h) Write formula for load carrying capacity of piles according to Danish. [2M]
- (i) Determine active earth pressure coefficient, if the angle of friction is 30° ? [2M]
- (j) Write an expression for Taylor's stability number. [2M]

PART-B

(Answer any FOUR questions)

2. Describe the procedure to conduct the Standard Penetration Test and corrections to be applied. [15M]
3. Compute the safe bearing capacity of footing is (i) continuous (ii) square (iii) circular. Assume that the water table is at greatest depth and the failure is general shear failure. Take $\phi=22^\circ$, $\gamma=18\text{kN/m}^3$, and $c=15\text{kN/m}^2$. $N_c=17.7$, $N_q=7.4$ and $N_\gamma=5.0$. Assume $D_f=1\text{m}$ and $B=1\text{m}$. [15M]
4. A square group of 9 piles each of 0.5m diameter is installed at 2.5m c/c in a uniform clay stratum of 18m depth underlain by rock. Depth of piles extends to 14m below the ground surface. Average unconfined compressive strength of soil is 100kN/m^2 . Determine the settlement of pile group carries a load of 2500kN. The clay may be assumed as normally consolidated with liquid limit of 60%. Take unit weight of soil is 18kN/m^3 and void ratio as 0.7. [15M]
- 5(a) Explain the active and passive states of earth pressure acting on retaining wall. [8M]
- (b) Define earth pressure at rest. Show the earth pressure distribution on a retaining wall, assuming the soil is dry. [7M]
- 6(a) What are the common causes of moisture changes in soils? [7M]
- (b) What are the effects of swelling of soils on buildings? [8M]
- 7(a) What are the conditions where a pile foundation is more suitable than a shallow foundation? [7M]
- (b) Discuss various dynamic pile formulae. What are their limitations? [8M]
8. Check the stability of cantilever retaining wall shown in fig the allowable soil pressure is 500kN/m^2 . [15M]



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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)**

L.B. Reddy Nagar :: Mylavaram – 521 230 :: Krishna Dist.: A.P.

B.Tech. (VI Semester) Regular/Supplementary Examinations

S421-WATER RESOURCES ENGINEERING

(CE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	List out the various types of reservoir.	1M	CO1	L1
(b)	Classify the rolled-fill earth dams.	1M	CO2	L2
(c)	List out the component parts of a diversion head work.	1M	CO3	L1
(d)	Classify the irrigation canals based on canal alignment.	1M	CO4	L4
(e)	Define a Canal outlet.	1M	CO5	L1
(f)	Differentiate between the safe yield and Secondary yield.	2M	CO1	L4
(g)	A rectangular dam has constant width 5 m and height 15 m with reservoir full upto its top. Determine the uplift pressure force on the dam. Take $c = 1$ and assume no tail water.	2M	CO2	L3
(h)	A horizontal impervious floor of length 20 m is provided with a cutoff of 4 m depth at its downstream end. Determine the hydraulic gradient, if the head causing seepage is 3 m.	2M	CO3	L3
(i)	Define the balancing depth in a canal.	2M	CO4	L1
(j)	Distinguish between Hyper proportional outlet and Sub proportional outlet.	2M	CO5	L4

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	Discuss the various factors which govern the selection of type of dam.	7M	CO1	L2
(b)	Explain the method of calculating reservoir capacity for a specified yield, from the mass inflow curve.	8M	CO1	L4
3(a)	A masonry dam 8 m high is 2 m wide at top and 6 m wide at the bottom, with vertical water face. Determine the normal stresses at the toe and heel for reservoir full conditions. Take unit weight of concrete 24 kN/m^3 . Neglect all other forces except hydrostatic water pressure, uplift pressure and self-weight. There is no drainage gallery and no tail water.	7M	CO2	L3
(b)	Illustrate the components of a homogeneous embankment type dam, along with their functions.	8M	CO2	L2

S421-WATER RESOURCES ENGINEERING

4(a)	List out the limitations of Bligh's creep theory.	7M	CO3	L2
(b)	A horizontal impervious floor of a weir on permeable soil is 16 m long and has sheet piles at both the ends. The upstream pile is 4 m deep and the downstream pile is 5m deep. The weir creates a net head of 2.5m. Neglecting the thickness of the weir floor and consider the interference of piles, determine analytically the uplift pressures at the junction of the inner faces of the pile with the weir floor, by using Khosla's theory.	8M	CO3	L3
5(a)	By using Kennedy's theory determine the channel section and discharge Q that can be allowed to flow in it, if $B/D = 5.7$, bed slope $= 1/5000$ and $N = 0.0225$.	7M	CO4	L3
(b)	Describe the procedure for designing a Sarda type fall.	8M	CO4	L2
6(a)	Define sensitivity and flexibility of an outlet and derive the relation between sensitivity and flexibility of an outlet.	7M	CO5	L5
(b)	Differentiate between (i) aqueduct and syphon aqueduct, (ii) super passage and canal syphon.	8M	CO5	L4
7(a)	Illustrate the straight drop spillway and ogee spillway.	7M	CO2	L2
(b)	Discuss in brief various causes of failure of weirs and their remedies.	8M	CO3	L2
8(a)	Design a concrete lined channel to carry a discharge of 150 cumecs at a slope of 1 in 6000. The side slopes of the channel are 1.5 : 1 and limiting velocity 1.5 m/s is to be maintained. The value of Manning's N may be taken as 0.015. (Trapezoidal section with circular bottom).	7M	CO4	L5
(b)	Describe the procedure for designing a cross regulator.	8M	CO5	L2

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B.Tech. (VI Semester) Regular/Supplementary Examinations

S420-WASTE WATER ENGINEERING

(CE)

Time : 3 hours

Max. Marks : 75

PART-A
(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	State the reason why sewers are run partially full.	1M	CO1	L1
(b)	Define the term initial oxygen deficit.	1M	CO2	L1
(c)	State the purpose of providing screens in sewage treatment.	1M	CO3	L1
(d)	Define the term sludge digestion.	1M	CO4	L1
(e)	Mention the purpose of providing manholes in sewerage system.	1M	CO5	L1
(f)	State the condition for fixing the width (B) and depth (Y) of storm water drains for carrying a discharge of 12 m ³ /s.	2M	CO1	L1
(g)	List the outputs from the different stages of nitrogen decomposition cycle.	2M	CO2	L1
(h)	Give the reasons for using broken stones, broken bricks etc as filter medium in Trickling filter.	2M	CO3	L1
(i)	Differentiate between primary and secondary sludge.	2M	CO4	L4
(j)	State the purpose of providing storm regulators.	2M	CO5	L1

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	Define the following: (i) sewerage system (ii) night soil (iii) sewer (iv) Dry weather flow.	7M	CO1	L1
(b)	Elaborate the advantages and disadvantages of conservancy system and water carriage system.	8M	CO1	L2
3(a)	Define and explain the importance of Population equivalent.	7M	CO2	L2
(b)	Describe the importance of the following with respect to sewage quality: (i) Organic solids (ii) Temperature (iii) BOD.	8M	CO2	L2
4(a)	Differentiate between an oxidation pond and oxidation ditch.	7M	CO3	L4
(b)	An oxidation pond is handling 1000 m ³ /d of wastewater with an inlet BOD of 250 mg/L and an applied BOD loading of 250 kg/ha/d. If the detention period should not exceed 10days, determine (i) area of the pond (ii) depth of the pond (iii) the effluent BOD from the pond. Assume pond constant as 0.1 d ⁻¹ .	8M	CO3	L3
5(a)	State the purpose and explain the construction and operation of sludge drying beds.	7M	CO4	L2
(b)	The volume of fresh sludge is 20 m ³ and digested sludge is 5 m ³ . Compute the following for an anaerobic digester (i) Capacity of digester including monsoon storage (ii) Diameter of the digester. Assume (i) depth of digester = 6m (ii) digestion period = 30 days (iii) monsoon storage period = 60 days.	8M	CO4	L3
6(a)	Discuss the purpose and operation of storm regulators and inverted siphon.	7M	CO5	L2
(b)	Describe the process of laying and testing of sewers.	8M	CO5	L2
7(a)	Describe the purposes of the following: (i) Preliminary treatment (ii) Primary treatment (iii) Secondary treatment.	7M	CO3	L2
(b)	Mention the different treatment units provided in the Preliminary, Primary and secondary treatment and explain the working principles of each of these individual treatment units.	8M	CO3	L2
8(a)	Seeding of the sludge and pH are important parameters of sludge digestion. Justify.	7M	CO4	L4
(b)	Differentiate between suspended and attached growth biological treatment systems with suitable examples.	8M	CO3	L4

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B.Tech. (VI Semester) Regular/Supplementary Examinations

**S185-DESIGN OF STEEL STRUCTURES
(CE)**

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) What are High strength friction grip bolts? [1M]
- (b) Define block shear failure. [1M]
- (c) What is a slab base? [1M]
- (d) What do you mean by plastic shear resistance? [1M]
- (e) What are end bearings of a roof truss? [1M]
- (f) Draw sketches of double vee and double bevel types of welds. [2M]
- (g) Differentiate between braced column and un-braced column. [2M]
- (h) Differentiate between slab base and gusset base. [2M]
- (i) Write a short note steel sections that are used for beams. [2M]
- (j) Define basic wind speed and design wind speed. [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2. Design a lap joint between the two plates each of width 120 mm, if the thickness of one plate is 16 mm and the other is 12 mm. The joint has to transfer a design load of 160 kN. The plates are of Fe 410 grade. Use bearing type bolts. [15M]
3. Determine the axial load carrying capacity of the column ISHB 300 @ 577 N/m if the length of the column is 3.5 m and its both ends are pinned. [15M]
4. Design a built up column consisting of two channels placed toe to toe. The column carries an axial factored load of 1600 kN. The effective height of the column is 5 m. Design the lacing also. [15M]
5. Design a simply supported beam of effective span 1.5 m carrying a factored concentrated load of 360 kN at mid span. [15M]
6. A roof truss shed is to be built in Lucknow for an industry. The size of shed is 24 m x 40 m. The height of building is 12 m at the eaves. Determine the basic wind pressure. [15M]
7. Design a slab base for a column ISHB 300 @ 577 N/m carrying an axial factored load of 1000 kN. M20 concrete is used for the foundation. Provide welded connection between column and base plate. [15M]
8. Design a gusseted base to carry an axial factored load of 2000 kN. The column is ISHB 450 @ 835 N/m with two 250 x 22 mm cover plates on either side. The effective height of the column is 5 m. The column is to rest on M20 concrete pedestal. [15M]

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S137-ARTIFICIAL INTELLIGENCE

(CSE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	What is an Intelligent agent?	1M	CO1	L1
(b)	Represent the following fact in predicate logic: All Pompeians were Romans.	1M	CO2	L3
(c)	Write Bayes' rule for conditional Probability.	1M	CO3	L2
(d)	List various forms of learning.	1M	CO4	L1
(e)	Write the components of an Expert System.	1M	CO5	L1
(f)	What is Means-Ends Analysis?	2M	CO1	L2
(g)	List the properties of good system for knowledge representation.	2M	CO2	L1
(h)	Distinguish monotonic and non-monotonic reasoning.	2M	CO3	L2
(i)	What is Multi-agent Planning?	2M	CO4	L1
(j)	Distinguish traditional system and expert system for solving a given problem.	2M	CO5	L2

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	What is State Space search? Explain problem solving using this technique, with an example.	7M	CO1	L1
(b)	Explain Problem Reduction using AND-OR graph with an algorithm.	8M	CO1	L4
3(a)	Enumerate the steps in the process of resolution.	7M	CO2	L2
(b)	Explain the primitives used in Conceptual Dependency.	8M	CO2	
4(a)	Explain about Bayesian Networks.	7M	CO3	L2
(b)	Explain how Fuzzy logic can be used to reason uncertain information.	8M	CO3	L2
5(a)	Explain how planning is accomplished with state space search.	7M	CO4	L3
(b)	Explain how learning is performed with Decision trees.	8M	CO4	L3
6(a)	Explain about Minmax search strategy with an example.	7M	CO5	L2
(b)	Explain the working of Ant Colony System.	8M	CO5	L4
7(a)	Represent the following sentence in Conceptual Dependency: Since smoking can kill you, I stopped.	7M	CO2	L3
(b)	Explain about Alpha-beta cutoffs.	8M	CO5	L2
8(a)	Explain how Constraint satisfaction is used to solve crypt-arithmetic problems, with a suitable example.	7M	CO1	L3
(b)	Explain about Unification procedure for resolving conflicts in predicate logic.	8M	CO2	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S200-DISTRIBUTED OPERATING SYSTEMS

(CSE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	What command is used to log into another workstation remotely?	1M	CO1	L1
(b)	Write any two comparisons of stateless and stateful servers.	1M	CO2	L5
(c)	What are the short comings of the Ricart and Agrawala's mutual exclusion algorithm?	1M	CO3	L1
(d)	What is the disadvantage of write through protocol?	1M	CO2	L1
(e)	Write some MACH calls for managing virtual memory.	1M	CO3	L2
(f)	Draw the structure of request and reply protocol.	2M	CO1	L2
(g)	What are the design issues used for processor allocation algorithms?	2M	CO2	L2
(h)	What is meant by atomic transactions?	2M	CO4	L1
(i)	Write any two comparisons of shared memory systems.	2M	CO3	L5
(j)	Write the CHORUS layered structure.	2M	CO5	L2

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	What are the key design issues that the distributed system must deal? Explain.	8M	CO1	L2
(b)	Discuss in detail about the basic operation of RPC with neat diagrams.	7M	CO2	L6
3(a)	With neat diagram Describe the workstation model with advantages and disadvantages.	7M	CO3	L2
(b)	The directory server Interface provides what type of operations? Describe the operations with examples.	8M	CO4	L2
4(a)	Write and explain the bully election algorithm with an example.	8M	CO3	L2
(b)	Write about distributed deadlocks how to prevent deadlocks in distributed system.	7M	CO4	L2
5(a)	Illustrate the process where the system with three CPU's and memory shared among them and how the bus load is reduced with snooping cache.	8M	CO3	L2
(b)	What are the properties of NUMA multi processors? Explain.	7M	CO5	L2
6(a)	What are the Goals of MACH? With neat diagram discuss the abstract model for Unix emulation using MACH.	7M	CO5	L6
(b)	Discuss the process management in CHORUS.	8M	CO5	L6
7(a)	Differentiate between switches multiprocessors and switched multi computers.	8M	CO3	L4
(b)	Illustrate the scheduling procedure in distributed system.	7M	CO2	L2
8(a)	Differentiate between client server algorithm and ring based mutual exclusion algorithm.	7M	CO3	L3
(b)	Draw and explain the simplified view of the DASH architecture.	8M	CO3	L2

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B.Tech. VI Semester ~~Regular~~ / Supplementary Examinations**S272-INFORMATION SECURITY****(CSE)**

Time : 3 hours

Max.Marks:75

PART-A

(Compulsory question)

- 1(a) What is the difference between reversible and irreversible mappings? [1M]
- (b) What are the primitive roots of an integer 5? [1M]
- (c) List out different MIME transfer encodings. [1M]
- (d) Which SSL protocol is used to indicate cipher suite change? [1M]
- (e) What do you mean by virus malicious program? [1M]
- (f) Define strong and weak collision resistance in Hash function. [2M]
- (g) What are the differences between session key and Master key? [2M]
- (h) What is the difference between link and end-to-end encryption? [2M]
- (i) List out the participants of SET protocol [2M]
- (j) What properties are required of a reference monitor? [2M]

PART-B

(Answer any FOUR questions all question carry equal marks)

- 2(a) What are the design objectives for HMAC? [7M]
- (b) Explain how message digest is generated using HMAC algorithm? [8M]
- 3(a) What are the requirements for a digital signature? [7M]
- (b) Describe how Digital Signature Algorithm (DSA) is used to generate digital signature? [8M]
- 4(a) What are the limitations of RFC 822? Explain how MIME addresses these problems? [7M]
- (b) What is R64 conversion? Explain how 24-bit raw sequence 00100011 01011100 10010001 is converted to radix 64 encoding? [8M]
- 5(a) Explain the role of payment gateway in payment Authorization. [7M]
- (b) What is the difference between SSL and TLS? [8M]
- 6(a) Explain the concept of trusted systems. [7M]
- (b) What are the different phases a virus can be during its lifetime? [8M]
- 7(a) Write a short note on Security Attacks. [7M]
- (b) List and briefly define categories of security services. [8M]
- 8(a) perform Encryption and decryption using RSA algorithm.
P=3;q=11,e=7; M=5
P=7;q=11,e=17;M=8. [8M]
- (b) Write a short note on Authentication Header (AH) protocol. [7M]

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S425-WEB TECHNOLOGIES

Time : 3 hours

[CSE & IT]

Max. Marks : 75

PART-A

(Compulsory question)

- | | | |
|------|---|------|
| 1(a) | List out different types of list in HTML. | [1M] |
| (b) | What are the advantages of JavaBeans? | [1M] |
| (c) | Define Cookies. | [1M] |
| (d) | List implicit JSP objects. | [1M] |
| (e) | What are the key features of swings? | [1M] |
| (f) | Define CSS and write different types of CSS with syntax. | [2M] |
| (g) | Write the basic structure of an XML document with an example. | [2M] |
| (h) | Outline the classes and interfaces of <i>javax.servlet.*</i> Package. | [2M] |
| (i) | Create a JSP using scriplet tag to print "HELLOWOLD". | [2M] |
| (j) | Write the syntax of JFrame and JComponent. | [2M] |

PART-B

(Answer any FOUR questions. All questions carry equal marks)

- 2(a) Design the following Registration form using HTML.

Registration Form

Roll Number:	<input type="text"/>
Branch	--Select Your Branch--
Name:	<input type="text"/>
Password:	<input type="text"/>
Email-Id:	<input type="text"/>
Phone Number:	<input type="text"/>
Sex:	<input type="radio"/> Male <input type="radio"/> Female
Date Of Birth:	<input type="text"/>
Languages Known	<input checked="" type="checkbox"/> English <input type="checkbox"/> Telugu <input type="checkbox"/> Hindi <input type="checkbox"/> Tamil
Address:	<div><input type="text"/></div>
Upload your Id Card:	<input type="button" value="Browse..."/>
<input type="button" value="Submit"/>	<input type="button" value="Reset"/>

- | | | |
|------|--|------|
| (b) | Define an event. Explain how events are handled in JavaScript with an example. | [8M] |
| 3(a) | Differentiate DOM and SAX XML Parsers. | [7M] |
| (b) | Explain the following: | |
| | i) Bean events. ii) Bean methods. | |
| | iii) Bean properties. iv) Bean Persistence. | [8M] |

- 4(a) Define Servlet and explain Servlet Life Cycle mechanism. [7M]
(b) Write and discuss a Servlet program for reading servlet parameters and reading initialization parameters. [8M]
- 5(a) Exemplify JSP processing. [7M]
(b) Write a JSP expression to display current date and time in a web page. [8M]
- 6(a) What are the steps in swing applet creation? [7M]
(b) Draw and explain the MVC architecture in Struts framework. [8M]
- 7(a) Design the following web page using HTML Frames. Fill all the Frames with different colors.

One	Two	Three
Four		

- (b) Illustrate various control statements available with JavaScript. [8M]
[7M]
- 8(a) Illustrate the Document Type Definition (DTD) in XML and describe in detail Internal and External DTDs with examples. [8M]
(b) Construct a Servlet that greets the user by name. Accept the username through a HTML form. [7M]

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B.Tech. (VI Semester) ~~Regular~~ / Supplementary Examinations

S163-COMPILER DESIGN

(CSE & IT)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) List out the cousins of a compiler. [1M]
- (b) Define left factoring of a grammar. [1M]
- (c) Write the YACC specifications. [1M]
- (d) Define S-attributed grammar. [1M]
- (e) What is Directed Acyclic Graph? [1M]
- (f) What is the role of lexical analyzer? [2M]
- (g) Define recursive descent parser. [2M]
- (h) List out the actions performed in shift reduce parser. [2M]
- (i) What is an activation record? [2M]
- (j) What is common sub expression elimination? Give an example. [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

- 2(a) Write the regular expression for an identifier. Draw the transition diagram for an identifier. [8M]
- (b) Explain bootstrapping a compiler with suitable diagrams. [7M]
- 3(a) What is left recursion? Illustrate the left recursion elimination algorithm with an example. [8M]
- (b) Construct predictive parser for the following grammar
 $E \rightarrow E + T / T, T \rightarrow T * F / F, F \rightarrow (E) / id.$ [7M]
- 4(a) What is shift reduce parser? Consider the following grammar
 $E \rightarrow E + E, E \rightarrow E * E, E \rightarrow (E), E \rightarrow id$
 Show the shift-reduce parser action for the string $id*(id+id).$ [8M]
- (b) Construct SLR parsing table for the following grammar
 $S \rightarrow L = R, S \rightarrow R, L \rightarrow *R, L \rightarrow id, R \rightarrow L.$ [7M]
- 5(a) What is an intermediate code and what is its purpose? Explain different forms of intermediate codes with example. [8M]
- (b) Define back patching. Explain how it works with an example. [7M]
- 6(a) What is the purpose of code optimization? Explain in detail optimization of basic blocks with example. [7M]
- (b) Discuss in detail code generation using DAG with example. [8M]
- 7(a) Discuss in detail automatic parser generator tool. [8M]
- (b) Give an SDT scheme for statements that alters the program control flow. [7M]
- 8(a) Construct canonical collection of LR(1) items for the following grammar
 $S \rightarrow CC, C \rightarrow cC, C \rightarrow d.$ [8M]
- (b) Write an algorithm for simple code generation. [7M]

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S415-UML DESIGN

(CSE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	How to represent the visibility of its attributes and operations in a class?	1M	CO1	L3
(b)	Write the mechanism to represent Tagged Value?	1M	CO2	L3
(c)	What you mean by reverse engineering in UML?	1M	CO3	L2
(d)	Define an interaction.	1M	CO4	L2
(e)	What is signal?	1M	CO5	L2
(f)	How many views are there in Software Architecture? What are they?	2M	CO1	L2
(g)	Write the syntax of an attribute, in its full form, in the UML.	2M	CO2	L3
(h)	What are the uses of class diagram?	2M	CO3	L2
(i)	List out the parts of State.	2M	CO4	L2
(j)	What are the parts of "Transition"?	2M	CO5	L2

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	Explain four basic principles of modeling.	7M	CO1	L2
(b)	Explain different types of relationships in UML.	8M	CO1	L2
3(a)	How to model the distribution of responsibilities in a system?	7M	CO2	L3
(b)	How to represent operation in its full form? Explain all fields in the syntax in detailed.	8M	CO2	L3
4(a)	<p>Write the steps need to be followed to reverse engineer a class diagram.</p> <p>Transform the following code into a model through a mapping from Java language.</p> <pre>public abstract class EventHandler { EventHandler successor; private Integer currentEventID; private String source; EventHandler() { } public void handleRequest() { } }</pre>	7M	CO3	L3

S415-UML DESIGN

(b)	How to model logical database schema using class diagram?	8M	CO3	L3
5(a)	Compare the sequence diagram and collaboration diagram in the view of dynamic interaction between objects.	7M	CO4	L4
(b)	When and how the following are used in activity diagram? i) Activity ii) Branching iii) Synchronization bar iv) Swimlanes.	8M	CO4	L4
6	What are the four common uses of Component diagrams? How to model component diagrams in those four ways?	15M	CO5	L3
7(a)	Describe the Architecture in UML with a neat diagram.	7M	CO1	L2
(b)	How to model group of elements using Packages in UML?	8M	CO2	L3
8(a)	A Library lends books and magazines to member, who is registered in the system. It also maintains the purchase of new books and magazines for the Library. The library can easily create, replace and delete information about the books, members, and reservation in the system. The books transactions are stored in the database. You can also search for a book. Analyze the users and actors of this system, and depict them in a Use Case Diagram.	7M	CO4	L4
(b)	How to model the processors and devices of system's deployment view?	8M	CO5	L3

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S190-DIGITAL IMAGE PROCESSING
(ECE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) Define neighbors of a pixel. [1M]
- (b) Write 2X2 slant transformation matrix. [1M]
- (c) Draw the 2D Butterworth lowpass filter transfer function. [1M]
- (d) Define brightness, hue and saturation. [1M]
- (e) Define Compression Ratio. [1M]
- (f) What is meant by pixel depth? [2M]
- (g) State any 2 properties of two dimensional DFT. [2M]
- (h) Explain about Contrast stretching. [2M]
- (i) Draw the model of Image degradation/Restoration process. [2M]
- (j) Explain how a point can be detected in an image. [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

- 2(a) Explain various types of connectivity relations and distance measures between pixels with an example of each. [8M]
- (b) Explain about the fundamental steps in image processing system. [7M]
- 3(a) Find the kernel coefficients for N=8 of 1-D Hadamard Transform. [7M]
- (b) Define Haar Transform and explain its properties. [8M]
- 4(a) Prove that for continuous signal Histogram equalization results in flat histogram. [7M]
- (b) Explain the concept of Unsharp masking and Highboost filtering. [8M]
- 5(a) Explain the concept of minimum mean square error filtering. [7M]
- (b) Discuss the procedure for conversion from RGB color model to HSI color model. [8M]
- 6(a) Discuss edge detection algorithms in detail. [7M]
- (b) Explain about (i) One-dimensional run-lengths coding [8M]
(ii) Two-dimensional run-lengths coding
- 7(a) Explain the process of image Sampling and Quantization. [8M]
- (b) With an example, explain Huffman coding. [7M]
- 8(a) Mention the properties and applications of DCT. [7M]
- (b) Derive the Laplacian coefficients for 3*3 mask? Explain how the Laplacian operator improves the quality of image. [8M]

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)

L.B. Reddy Nagar :: Mylavaram - 521 230 :: Krishna Dist.:A.P.

B.Tech. VI Semester ~~Regular~~ / Supplementary Examinations

S419-VLSI DESIGN

(ECE)

Time : 3 hours

Max.Marks:75

PART-A

(Compulsory question)

- 1(a) What is the diameter of thin wafer cut from single crystal of silicon? [1M]
- (b) Draw different MOS layers with color code. [1M]
- (c) Which gate is used for equality check between two binary numbers. [1M]
- (d) Describe levels in physical domain. [1M]
- (e) What are the fault models? [1M]
- (f) Design AND gate using pass transistors. [2M]
- (g) Draw stick diagram for NMOS inverter. [2M]
- (h) Write the simplified equations for full adder sum, carry. [2M]
- (i) What are the domains in an IC design? [2M]
- (j) Test vector for SA0 fault for a single AND gate. [2M]

PART-B

(Answer any FOUR questions all questions carry equal marks)

- 2(a) Illustrate in detail various processing steps involved in the fabrication of NMOS transistor with necessary diagrams [7M]
- (b) Explain the operation of Enhancement mode NMOS transistor [8M]
- 3(a) Design the complete layout diagram of NAND gate [7M]
- (b) Explain with suitable diagrams Lambda based design rules [8M]
- 4(a) Describe the nature of a parity generator and design stick diagram for unit cell. [7M]
- (b) Draw the logic diagram of zero/one detector and explain its operation with the help of unit cell CMOS circuit. [8M]
- 5(a) Discuss in detail about design capture tools. [7M]
- (b) Compare all available design verification tools. [8M]
- 6(a) Discuss Ad-hoc testing. [7M]
- (b) Discuss Scan- based techniques. [8M]
- 7(a) Describe choice of layers in stick and layout design. [7M]
- (b) Explain the concepts of NMOS inverter pair delay with necessary circuit diagram. [8M]
- 8(a) With neat sketches explain Bi-CMOS fabrication steps. [7M]
- (b) Define the following terms with necessary equations. [8M]
 - (i) trans conductance
 - (ii) Drain conductance
 - (iii) figure of merit
 - (iv) threshold voltage.

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S179-DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING

(ECE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) Give the worst case time complexity of linear search. [1M]
- (b) List various operations performed on doubly linked list. [1M]
- (c) List the features of object oriented programming. [1M]
- (d) Define term class. [1M]
- (e) Define the term Exception. [1M]
- (f) List the applications of sorting. [2M]
- (g) Give the time complexity to insert a node at the end of the singly linked list. [2M]
- (h) List various java data types. [2M]
- (i) Why access control for a class is required, explain? [2M]
- (j) Define Thread. [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

- 2(a) Sort the following data using merge sort and selection sort
23,45,12,56,34,78,6. [7M]
- (b) Explain Binary search algorithm with example. [8M]
- 3(a) Write a C function to delete a number from the single linked list. [7M]
- (b) Explain Stack operations PUSH and POP. What will be the stack after performing the following operations?
PUSH(23),PUSH(3),POP(),PUSH(24),PUSH(73),PUSH(90),POP() and POP(). [8M]
- 4(a) What are the problems with procedure languages? How object oriented languages overcomes the problems of procedural languages? [7M]
- (b) Give a brief note on Java Virtual Machine. [8M]
- 5(a) How to assign the values to the variables in the class at the time of creation of object to that class? Explain with example. [7M]
- (b) Write a java program to illustrate "Constructor Overloading". [8M]
- 6(a) What is package? How to create package? Give examples. [7M]
- (b) Write a java program which illustrates the try, catch, throw and throws and finally blocks. [8M]
- 7(a) Why do constructors does not have any return type? Explain it with proper example. [7M]
- (b) What are the various types of exceptions available in Java? Also discuss on how they are handled. [8M]
- 8(a) Write a Java program to generate a pyramid of numbers for given number N using for loop. [7M]
- (b) Explain how a linked list is used in polynomial representation and addition of two polynomials. [8M]

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S194-DIGITAL SYSTEMS DESIGN USING VERILOG

(ECE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- | | | |
|------|--|------|
| 1(a) | Give the truth table for the ex-or gate primitive. | [1M] |
| (b) | Write notes on intra-assignment delay. | [1M] |
| (c) | Mention the structure of continuous assignments. | [1M] |
| (d) | Memorize the syntax for task definition. | [1M] |
| (e) | What is FPGA? | [1M] |
| (f) | Analyze gate delays with necessary instantiations. | [2M] |
| (g) | Construct a Verilog module for AOI gate at behavioral level. | [2M] |
| (h) | Prepare a Verilog module for 2x1 mux at data flow level. | [2M] |
| (i) | Illustrate the differences between Mealy and Moore state machines. | [2M] |
| (j) | Draw the structure of CPLDs. | [2M] |

PART-B

(Answer any FOUR questions. All questions carry equal marks)

- | | | |
|------|---|-------|
| 2. | Design a 4-bit ALU and write Verilog module at gate level. | [15M] |
| 3(a) | Apply casex statement, to develop Verilog code for an 8-to-3 priority encoder. | [7M] |
| (b) | Use the repeat construct along with the disable construct to realize an AND gate. | [8M] |
| 4(a) | Explain RAM cell and model using Verilog HDL | [7M] |
| (b) | Discuss about the following operators available for data flow modeling in Verilog HDL with example.
i) Unary operators ii) Arithmetic operators. | [8M] |
| 5(a) | Illustrate Time format System task along with syntax. | [7M] |
| (b) | Define system function and explain how to generate test vectors using random system function. | [8M] |
| 6(a) | What is linked state machine? Derive linked state machine for dice game. | [7M] |
| (b) | Implement dice game control using serially linked state machine. | [8M] |
| 7(a) | Construct the gate-level model for a byte comparator circuit with relevant logic diagram and Verilog HDL source code. | [7M] |
| (b) | Write a Verilog code for D-latch using NAND gate, and its test bench code. | [8M] |
| 8(a) | Compare various kinds of Loop statement with necessary syntax and relevant example. | [7M] |
| (b) | Develop behavioral description for a four bit up/down counter circuit using an always statement with necessary logic diagram and Verilog HDL source code. | [8M] |

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B.Tech.VI Semester ~~Regular~~/Supplementary Examinations

S131-ANTENNAS AND WAVE PROPAGATION

(ECE)

Time : 3 hours

Max.Marks:75

PART-A

(Compulsory question)

- 1(a) Define an antenna. [1M]
- (b) Illustrate linear antenna array. [1M]
- (c) Write the advantages of log periodic antenna. [1M]
- (d) Mention the advantages of lens antennas. [1M]
- (e) What is the other name of Space wave propagation? [1M]
- (f) List out antenna properties using network theorems. [2M]
- (g) Write the Directivity expressions for broad side and end fire arrays. [2M]
- (h) What are the applications of rhombic antenna? [2M]
- (i) Mention the advantages of patch antennas. [2M]
- (j) What are the different modes of wave propagation? [2M]

PART-B

(Answer any FOUR questions all question carry equal marks)

- 2(a) Prove that the directivity of Hertzian dipole is 1.5. [7M]
- (b) Derive the electromagnetic fields of the half wave dipole. [8M]
3. Explain and derive all the properties of N element broad side array. [15M]
- 4(a) Design a rhombic antenna to operate at 20MHz with angle of elevation as 10° with respect to ground. [7M]
- (b) Explain constructional features of Helical antenna. [8M]
- 5(a) Write short notes on Patch antenna. [7M]
- (b) What is an electromagnetic horn antenna? What are its applications? The length of an E-plane sectoral horn is 15cms. Design the horn dimensions such that it is optimum at 10GHz. [8M]
- 6(a) Define MUF and derive the expression for the same. [7M]
- (b) Draw the ionosphere structure and explain about different layers. [8M]
- 7 Write a short notes on
 - (i) folded dipole antenna
 - (ii) V and inverted V antennas. [15M]
- 8(a) Explain the 3 antenna method of measurement of the gain with necessary relations. [7M]
- (b) Describe the measurement of aperture efficiency. [8M]

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L.B. Reddy Nagar :: Mylavaram – 521 230 :: Krishna Dist.: A.P.

B.Tech. (VI Semester) ~~Regular~~ / Supplementary Examinations

**S199-DISTRIBUTED GENERATION
(EEE)**

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) What is a fuel cell? [1M]
- (b) Mention types of solar tracking systems. [1M]
- (c) Give the feasible limits of tip speed ratio of a wind turbine. [1M]
- (d) What is meant by a stand-alone WECS? [1M]
- (e) Give the speed range of operation of micro turbines. [1M]
- (f) Write a short note on interconnection agreement. [2M]
- (g) What is meant by azimuth angle? [2M]
- (h) Give the expression for power generated by a wind turbine. [2M]
- (i) Explain the need for variable speed systems. [2M]
- (j) List out advantages of fuel cells. [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

- 2(a) Discuss Active vs Passive generation. [7M]
- (b) Briefly explain about various emerging power generation technologies in Distributed Generation. [8M]
- 3(a) What are various installation requirements and operational limitations of photo voltaic power? [7M]
- (b) Explain about the measurement of solar radiation data. [8M]
- 4(a) Discuss in detail the operation of major components of Wind Energy Conversion System. [7M]
- (b) Explain the various considerations for rotor design in a WECS. [8M]
- 5(a) Explain in detail the deciding factors for the choice of generators for constant speed constant frequency wind generation systems. [7M]
- (b) Describe various issues that surface in grid connection of WECS. [8M]
- 6(a) Outline and explain the installation requirements of fuel cells. [7M]
- (b) Explain the various components of small hydro power plant. [8M]
- 7(a) Outline and briefly explain the goals of distributed generation. [7M]
- (b) Mention different tracking systems for PV systems and explain the concept of maximum power point tracking. [8M]
- 8(a) Write a short note on ratings of micro turbine. [7M]
- (b) Explain about the power converter operation associated with a fuel cell. [8M]

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B.Tech. VI Semester Regular/Supplementary Examinations

S278-INTELLIGENT CONTROL SYSTEMS

(EEE)

Time : 3 hours

Max. Marks : 75

PART-A

(Answer all questions)

- 1(a) Draw the architecture of single layer feed forward neural networks. [1M]
- (b) Write the formula for hidden layer weight adjustment in BP algorithm. [1M]
- (c) Is recurrent neural networks are feed forward networks? Justify it. [1M]
- (d) What is crisp set? [1M]
- (e) Define cardinality of a Fuzzy set. [1M]
- (f) Distinguish between supervised and unsupervised learning. [2M]
- (g) Draw the BAM Architecture. [2M]
- (h) Define Universe of Discourse. [2M]
- (i) Define power of a Fuzzy set with example. [2M]
- (j) Write any four properties of Fuzzy sets. [2M]

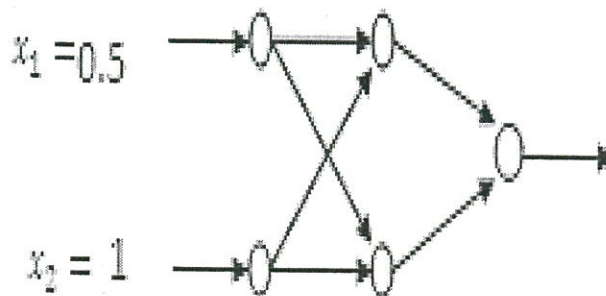
PART-B

(Answer any FOUR questions)

- 2(a) Using ADALINE model train the following ANN with 2 input neurons, 2 hidden neurons and 1 output neuron and use linear Activation function (with threshold 0.5) for the data

$$X = \begin{bmatrix} 1 \\ 1 \end{bmatrix}, d = 0.5, \eta = 0.3, V = \begin{bmatrix} 0 & 1 \\ 0.5 & 1 \end{bmatrix}, W = \begin{bmatrix} 0.5 \\ 0.5 \end{bmatrix}$$

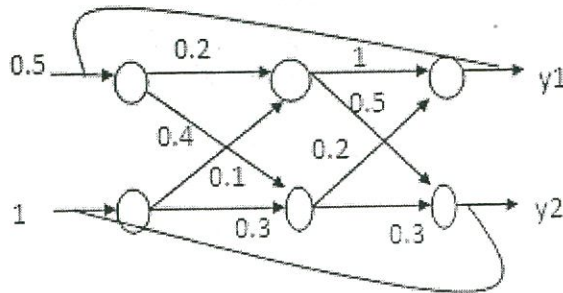
- (b) Illustrate Mc-Culloch Pitts model. [7M]
[8M]
3. Apply Back Propagation algorithm for multi layer feed forward networks for testing sets . $U = \begin{bmatrix} -0.5 & -0.6 \\ -0.8 & -0.2 \end{bmatrix}, V = \begin{pmatrix} 0.4 \\ 0.6 \end{pmatrix}, \eta = 0.2, D = 0.6$



[15M]

S278-INTELLIGENT CONTROL SYSTEMS

- 4(a) Train the following neural network by using Recurrent networks algorithm. Use sigmoidal function as activation function



- (b) Draw and discuss Hopfield neural network

[7M]
[8M]

- 5(a) Discuss how decision making and rules are framed in fuzzy logic with an example.

[7M]

- (b) Discuss about following defuzzification methods

i) Height ii) First of maxima iii) Centre of largest area.

[8M]

- 6(a) Describe Fuzzification with an example

[7M]

- (b) Explain about fuzzy decision making in detail

[8M]

- 7(a) Using MADALINE model train the following ANN with 2 input neurons, 2 hidden neurons with biases b_1 and b_2 and 1 output neuron with bias b_3 and use binary Activation function (with threshold 0.5) for the data

$$X = \begin{bmatrix} 1 \\ 1 \end{bmatrix}, d = 1, \eta = 0.2, V = \begin{bmatrix} 1 & 2 \\ 0.5 & 1 \end{bmatrix}, W = \begin{bmatrix} 0.6 \\ 0.8 \end{bmatrix}, b_1 = b_2 = b_3 = 0.5.$$

[7M]

- (b) What is activation function? Discuss the classification of the activation Function.

[8M]

- 8(a) Describe fuzzy rule based system with an example.

[7M]

- (b) Define the fuzzy membership Function along with an example.

[8M]

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B.Tech. VI Semester ~~Regular~~/Supplementary Examinations

S429-OPTIMIZATION TECHNIQUES IN ENGINEERING
(EEE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) List out the applications of optimization problems. [1M]
- (b) What is the criterion for entering a non-basic variable as basic variable in simplex method? [1M]
- (c) List out one merit and demerit of Newton's method. [1M]
- (d) Outline the characteristics of constrained optimization problems. [1M]
- (e) Define the transversity condition in optimal control. [1M]
- (f) Define a convex function. [2M]
- (g) Illustrate an extreme point in a convex set. [2M]
- (h) Derive the function of one variable that can be used to determine the step size for the given change in the direction at a point, for the given function

$f(x) = 0.1x_1^2 + x_2^2 - 10$ with $d = \begin{bmatrix} -1 \\ -2 \end{bmatrix}$ at $x = (5, 1)$ [2M]

- (i) List out the constrained optimization techniques. [2M]
- (j) Describe the extremal of a function. [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

- 2(a) Define the following (i) convex set (ii) concave set (iii) convex function (iv) concave function. [7M]
- (b) The profit per acre of a farm is given by $f(x_1, x_2) = 20x_1 + 26x_2 + 4x_1x_2 - 4x_1^2 - 3x_2^2$. where x_1, x_2 denotes labour cost and fertilizer cost respectively. Find x_1 and x_2 to maximize the profit. [8M]
- 3(a) With the help of flow-chart explain simplex method to solve linear programming problem. [7M]
- (b) Solve the given LPP using Simplex method
max: $x_1 + x_2$
 $4x_1 - x_2 < 8$
 $2x_1 + x_2 < 10$
 $-5x_1 + x_2 < 2$ [8M]
- 4(a) Develop the algorithmic steps of Newton's method for minimization of an unconstrained optimization problem. [7M]
- (b) Perform two iterations of the steepest descent method to minimize the function of $f(x) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ from the starting point $(0, 0)^T$. [8M]

S429-OPTIMIZATION TECHNIQUES IN ENGINEERING

- 5(a) Minimize $f(x_1, x_2) = (x_1 - 1)^2 + x_2^2$
Subjected to $g_1(x_1, x_2) = x_1^3 - 2x_2 \leq 0$
 $g_2(x_1, x_2) = x_1^3 + 2x_2 \leq 0$
Determine whether constraint qualification and Kuhn-Tucker conditions are satisfied at $(0, 0)$. [7M]
- (b) Illustrate the solution of quadratic programming problem using KKT necessary conditions. [8M]
- 6(a) Describe the computational procedure of finding the minimum of a given function using Genetic Algorithm. [7M]
- (b) List out the difference between linear, non-linear and dynamic programming problems. [8M]
- 7(a) Perform two iterations of the Newton's method to minimize the function of $f(x_1, x_2) = 100(x_1 - x_2)^2 + (1 - x_1)^2$ from the starting point $(-1.2, 1.0)^T$. [7M]
- (b) Outline the genetic operators (i) Selection (ii) reproduction (iii) Mutation (iv) cross-over [8M]
- 8(a) Obtain second-order Taylor's expansion for the function $f(x) = 3x_1^3x_2$ at the point $\mathbf{x}^* = (1, 1)$. [7M]
- (b) Write the standard form of Linear Programming problem and write its Dual
Maximize $f = x_1 + 2x_2 + x_3$
S.T $2x_1 + x_2 - x_3 \leq 2$
 $-2x_1 + x_2 - 5x_3 \geq -6$
 $4x_1 + x_2 + x_3 \leq 6$
 $x_1, x_2, x_3 \geq 0$ [8M]

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B.Tech. **V** Semester) Supplementary Examinations

S313-MICROPROCESSORS AND MICROCONTROLLERS

(EE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks
1(a)	What do you mean by control flag?	1M
(b)	Why should we need DMA in the computer system?	1M
(c)	How many no-of ports are in 8255? List them.	1M
(d)	Define Interrupt.	1M
(e)	How many pins are used as port pins in 8051?	1M
(f)	Explain any two conditional branch instructions of 8086 with examples.	2M
(g)	Differentiate between memory mapped IO and IO mapped IO.	2M
(h)	What is the role of IBF signal in 8255?	2M
(i)	List the dedicated interrupts in 8086.	2M
(j)	Explain the DJNZ instruction with example.	2M

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	Tell the functions of the general purpose registers of 8086 with examples.	7M
(b)	Briefly Explain the following instructions of 8086 with an example. (i) ADD (ii) SBB (iii) CMP (iv) AAA	8M
3(a)	Illustrate the general bus operation of 8086 with a timing diagram.	7M
(b)	Show the Interface details of 128KB EPROM to 8086 in even and odd banks from the address 80000H.	8M
4(a)	Design an interface an 8-bit ADC to 8255 and write a Program in 8086 to read an input channel-05.	7M
(b)	Interface 8255 to 8086 for the address A0-A3H.	8M
5(a)	Briefly Explain the control and status words of 8251A.	7M
(b)	Interface 8251 with 8086 with an address 80H.	8M
6(a)	Discuss the addressing modes of the 8051 with suitable examples.	7M
(b)	Explain the SCON and PCON registers with formats clearly.	8M
7(a)	Illustrate the functions of various registers in 8257.	7M
(b)	Explain the function of the following pins of 8257 (i) A ₀ -A ₃ (ii) $\overline{IO}/\overline{R}$ (iii) $\overline{IO}/\overline{W}$ (iv) D ₀ -D ₇	8M
8(a)	Write short notes on DOS and BIOS Interrupts.	7M
(b)	Interpret the interrupt vector table of 8086.	8M

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B.Tech. (VI Semester) Regular/Supplementary Examinations

S345-POWER SYSTEM ANALYSIS

(EEE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) Write the assumptions in drawing impedance diagram. [1M]
- (b) Define one line diagram. [1M]
- (c) Why do we go for iterative methods to solve load flow problem? [1M]
- (d) The most frequently occurring fault in power system. [1M]
- (e) Define steady state stability limit. [1M]
- (f) Define a tree and loop in graph theory. [2M]
- (g) Give the expression for converting per unit impedance in one base to another. [2M]
- (h) Write the importance of load flow analysis. [2M]
- (i) Define short circuit MVA. [2M]
- (j) What is synchronizing coefficient? [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

- 2(a) Explain the step by step procedure for obtaining bus impedance matrix. [8M]
- (b) Explain why often use bus admittance matrix rather than bus impedance matrix in load flow studies. [7M]
3. A two bus system is shown in below figure. Calculate the bus 2 voltage at the end of first iteration by G-S method. The elements of bus admittance matrix are $Y_{11} = Y_{22} = 1.5 \angle -86^\circ$ P.U and $Y_{21} = Y_{12} = 1.8 \angle 110^\circ$ P.U.



- 4(a) Explain the Fast Decoupled method with necessary load flow equations. [8M]
- (b) What are the significances of triangular factors and scarcity in load flow calculations? [7M]
5. A 20 MVA, 11kV generator solidly grounded neutral has a sub transient reactance of 0.25 P.u. The negative and zero sequence reactance's are $j0.14$, $j0.07$ respectively. A SLG fault occurs at the terminals of an unloaded generator. Determine the fault current and line to line voltages. [15M]
- 6(a) Distinguish between steady state, transient and dynamic stability and derive power angle equation. [8M]
- (b) Give any two methods to improve steady state stability. [7M]
- 7(a) Starting from first principle derive the swing equation of a synchronous machine. [8M]
- (b) Discuss the various factors affecting the transient stability of the system. [7M]
8. Explain the types of buses and derive the static power flow equations for load flow analysis. [15M]

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B.Tech. VI Semester ~~Regular~~/Supplementary Examinations

S213-ELECTRICAL DISTRIBUTION SYSTEMS
(EEE)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) What is Load curve? [1M]
- (b) What is AC distribution system? [1M]
- (c) What is meant by a distribution substation? [1M]
- (d) What is Distribution Automation? [1M]
- (e) Define Power factor. [1M]
- (f) Define Load diversity. [2M]
- (g) List the advantages of ring type distribution system. [2M]
- (h) Mention the advantages of optimal location of substation. [2M]
- (i) What are the problems with existing distribution system? [2M]
- (j) Discuss the function of AVR. [2M]

PART-B

(Answer any FOUR questions all question carry equal marks)

2. What are the Load and Loss Factors? Derive the relationship between them. [15M]
- 3(a) Compute the voltage drop for a AC distributor when power factors referred to receiving end voltages. [7M]
- (b) A single phase a.c. distributor AB 300 metres long is fed from end A and is loaded as under :
 - (i) 100 A at 0.707 p.f. lagging 200 m from point A
 - (ii) 200 A at 0.8 p.f. lagging 300 m from point A
 The load resistance and reactance of the distributor is 0.2Ω and 0.1Ω per kilometre. Calculate the total voltage drop in the distributor. The load power factors refer to the voltage at the far end. [8M]
- 4(a) Write the differences between AIS & GIS. [7M]
- (b) Compute the percent voltage drop of substation with 6 primary feeders. [8M]
- 5(a) Illustrate the need of ripple control of power line carrier for Distribution Automation. [8M]
- (b) Discuss the communication requirements for Distribution Automation system. [7M]
6. Describe the general economical justification for capacitors. [15M]
- 7(a) Illustrate the following loads
 - (i) Domestic and residential loads
 - (ii) Only lighting loads (such as for street lights etc.)
 - (iii) Commercial loads (shops, business establishments, hospitals)
 - (iv) Industrial loads. [8M]
- (b) A 800 metres 2-wire DC distributor AB fed from both ends is uniformly loaded at the rate of 1.25 A/metre run. Calculate the voltage at the feeding points A and B if the minimum potential of 220 V occurs at point C at a distance of 450 metres from the end A. Resistance of each conductor is $0.05 \Omega/\text{km}$. [7M]
- 8(a) Classify the substations based on service and design. [7M]
- (b) Discuss the effects of low power factor on power systems. [8M]

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)**

L.B. Reddy Nagar :: Mylavaram – 521 230 :: Krishna Dist.:A.P.

B.Tech (VI Semester) ~~Regular~~/Supplementary Examinations

**S334-P.C. BASED INSTRUMENTATION
(EIE)**

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

- 1(a) What is AGP? [1M]
- (b) Draw typical IEEE-488 bus configuration. [1M]
- (c) List different types of sensors based on the type of output they produce. [1M]
- (d) What is BITBUS? [1M]
- (e) How many number of analog inputs are there for general purpose DAQ board? [1M]
- (f) Compare 8 bit ISA bus to 16 bit ISA bus. [2M]
- (g) What is Blue chip technology? [2M]
- (h) List any four O/P devices which h can be interfaced to PC. [2M]
- (i) Explain industrial PC system. [2M]
- (j) List the three basic approaches to PC-based Instruments. [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2. Explain in detail the specific features of personal computer. [15M]
- 3(a) Draw the simplified block schematic of Blue chip technology AIP-24 Analogue Input card and describe its working. [8M]
- (b) Describe IEEE-488 bus signals and their functions along with pin-diagram of IEEE-488 bus connector. And list any two groups of IEEE-488 multiline commands. [7M]
- 4(a) How proximity detectors are interfaced to PC bus expansion system? Discuss with relevant circuits. [8M]
- (b) Describe the characteristics of Digital I/O. [7M]
- 5(a) Explain Network/distributed system. [7M]
- (b) Explain about the software, hardware and specifications in strain measurement process. [8M]
- 6(a) Explain Digital I/O board and Timing I/O board. [7M]
- (b) Explain DAQ using serial Interface. [8M]
- 7(a) Describe the following IEEE-488 devices?
(i) listener (ii) Talkers (iii) T-L Controllers [7M]
- (b) Discuss about development of PC expansion bus architecture. [8M]
- 8(a) What is optical isolation? Describe interfacing of optically isolated input to digital input port. [8M]
- (b) Discuss about RS-422. [7M]

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L.B. Reddy Nagar :: Mylavaram – 521 230 :: Krishna Dist.:A.P.

B.Tech (VI Semester) ~~Regular~~/Supplementary Examinations

S325-OBJECT ORIENTED PROGRAMMING USING JAVA
(EIE)

Time : 3 hours

Max. Marks:75

PART-A

(Compulsory question)

- 1(a) How can we say that java is a platform-independent language? [1M]
- (b) Can a subclass ever directly access the private members of its super class? [1M]
- (c) How do you create your own Exception? [1M]
- (d) Describe the importance of the paint() method. [1M]
- (e) List two methods can be called to determine the current selection for a JComboBox. [1M]
- (f) When do you call a method as recursive method? [2M]
- (g) Describe the access rules for protected member of a class. [2M]
- (h) List any two Built-in Exception classes in java. [2M]
- (i) How do you register an event listener with Button component? [2M]
- (j) Why does JComponent have add() and remove() methods but Component does not? [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

- 2(a) State and Explain various Object Oriented Principles. Explain in detail about each principle. [8M]
- (b) Illustrate the following
(i)final variable (ii)final method with example programs. [7M]
- 3(a) Write a program that illustrates Hierarchical inheritance in java [7M]
- (b) Define Package. List various steps required to create and accessing a package. [8M]
- 4(a) Define multi-threading. State and explain ways of creating a thread with examples. [8M]
- (b) Illustrate the use of throw keyword in java. [7M]
5. State and explain various types of AWT components. Draw AWT class hierarchy. Explain how these components are added to containers. [15M]
- 6(a) What do you mean by JButton? What is the use of JButton? Explain with its constructors, methods and Events. [7M]
- (b) Differentiate between Swing and AWT. [8M]
- 7(a) Define Array. Explain single dimension and multi-dimensional arrays with syntax, initialization and example program. [8M]
- (b) Differentiate Method Overloading and Overriding. [7M]
- 8(a) What is thread priority? How can it set for a thread? [7M]
- (b) Define applet. Explain life cycle of an applet with neat diagram and suitable example. [8M]

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B.Tech. (VI Semester) ~~Regular~~ / Supplementary Examinations

S141-AUTOMOBILE ENGINEERING

(ME)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	What is the purpose of Cylinder-Liner?	1M	CO1	L1
(b)	Enumerate any two disadvantages of Petrol Injection.	1M	CO2	L2
(c)	What is the type of sensor used to sense speed of rotating object?	1M	CO3	L1
(d)	List various Clutch-facing materials.	1M	CO4	L1
(e)	Define the term Slip-angle.	1M	CO5	L1
(f)	Why Valve Tappet-clearance is necessary?	2M	CO1	L2
(g)	What are the types of Fuel-feed systems?	2M	CO2	L2
(h)	Justify the need of capacitor in Battery ignition system.	2M	CO3	L2
(i)	Justify the need of gear-box in automobiles.	2M	CO4	L2
(j)	What are the advantages of hydraulic brakes over mechanical brakes?	2M	CO5	L1

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	Construct and explain the chassis and body of an automobile vehicle indicating all the components.	7M	CO1	L2
(b)	Sketch and explain the working of Turbocharger.	8M	CO1	L2
3(a)	With neat sketches discuss types of Diesel Injection systems.	7M	CO2	L1
(b)	Describe the constructional details of a heavy-duty type (Oil bath type) air filter.	8M	CO2	L2
4(a)	Demonstrate the working of Electronic ignition system in a motor vehicle.	7M	CO3	L2
(b)	Illustrate the working of Temperature sensor.	8M	CO3	L2
5(a)	Show the components by which engine power is transmitted to the road wheels and discuss the working of each component.	7M	CO4	L2
(b)	List different types of lights used in an automobile and explain.	8M	CO4	L1
6(a)	Justify the need of Suspension system in automobiles and explain the working of Torsion bar with diagram.	7M	CO5	L2
(b)	Describe the working of Davis steering gear mechanism with neat sketch.	8M	CO5	L1
7(a)	Demonstrate the working of constant mesh gear box with diagram.	7M	CO4	L2
(b)	Discuss briefly the constructional details and materials for piston with neat sketch.	8M	CO1	L1
8(a)	Illustrate the operational details of Disc braking system.	7M	CO5	L2
(b)	Distinguish between Independent suspension system and Rigid axle suspension system.	8M	CO5	L4

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S414-TRIBOLOGY

(ME)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	What is meant by asperity of a contact surface?	1M	CO1	L2
(b)	Name different types of viscosity of lubricant oil.	1M	CO2	L1
(c)	Define bearing characteristic number.	1M	CO3	L1
(d)	Sketch the partial bearings.	1M	CO4	L2
(e)	Mention the applications of air lubricated bearing.	1M	CO5	L2
(f)	Label the Laws of wear.	2M	CO1	L1
(g)	Draw the variation curve between temperature and viscosity.	2M	CO2	L2
(h)	Why thick film lubrication is necessary at high speeds?	2M	CO3	L2
(i)	What is the significance of oil rings?	2M	CO4	L2
(j)	Compare static load capacity and dynamic load capacity.	2M	CO5	L1

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	What are the different types of friction? Explain different theories of friction.	7M	CO1	L2
(b)	Differentiate between fatigue wear and fretting wear.	8M	CO1	L2
3(a)	Describe the saybolt viscometer to find kinematic viscosity with a neat sketch.	7M	CO2	L2
(b)	Discuss the concept of hydrodynamic lubrication.	8M	CO2	L2
4(a)	Enumerate different dimensionless variables used in journal bearing design.	7M	CO3	L2
(b)	A full journal bearing has the following specifications. Journal Diameter = 80mm Radial clearance = 0.03 mm Journal speed = 900 rpm. Mean viscosity of the lubricant oil = 0.02Pa s Eccentricity Ratio = 0.75. Determine (i) the load carrying capacity (ii) attitude angle and (iii) Power loss. Neglect the side leakage.	8M	CO3	L3
5(a)	Differentiate the pivoted and thrust bearings along with applications.	7M	CO4	L2
(b)	Summarize the advantages, disadvantages and applications of Air lubricated bearings.	8M	CO4	L2
6(a)	Discuss the design procedure for an anti friction bearing.	7M	CO5	L1
(b)	List the anti friction bearings along with their materials, characteristics and applications.	8M	CO5	L2
7(a)	Write a short note on (i) Static and Dynamic capacity (ii) Equivalent load.	7M	CO5	L2
(b)	Explain contact surface topography and also explain wear mechanisms with neat sketch.	8M	CO1	L2
8(a)	Discuss the process of wedge film formation in journal bearing.	7M	CO3	L2
(b)	Define Viscosity Index. Explain how viscosity index is determined for a given lubricant oil.	8M	CO2	L2

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

**S372-ROBOTICS
(ME)**

57X.

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

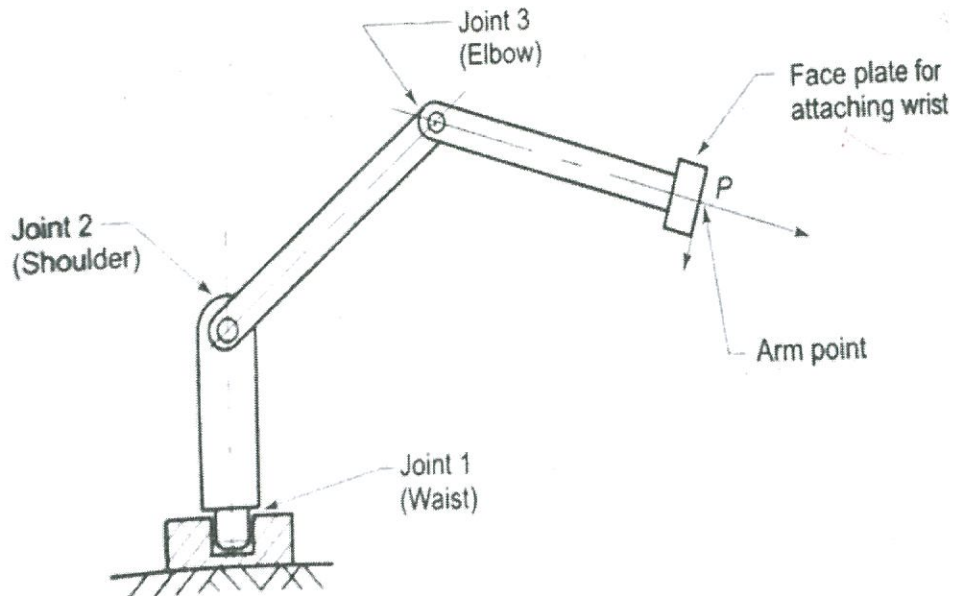
- 1(a) What is a redundant manipulator? [1M]
- (b) Define coordinate frame. [1M]
- (c) What is a differential motion? [1M]
- (d) Define path of robot. [1M]
- (e) What is compliance in assembly operations? [1M]
- (f) Classify robots by method of control. [2M]
- (g) Express overall homogenous transformation matrix. [2M]
- (h) Write the expression for differential rotation about x-axis. [2M]
- (i) Write any two differences between joint space and Cartesian trajectory planning. [2M]
- (j) List out any two differences between hydraulic and pneumatic actuators. [2M]

PART-B

(Answer any FOUR questions. All questions carry equal marks)

- 2(a) Elucidate with a neat sketch the rectangular and polar configurations of robot manipulator. [7M]
- (b) Illustrate the working of Vacuum grippers with a neat sketch. [8M]
- 3(a) Elucidate Euler angle representation. [7M]
- (b) List out D-H parameters and explain those with neat sketch. [8M]
- 4 Develop a dynamic model for the 1-R manipulator having mass M , length L , and angular displacement of θ using L-E formulation. [15M]
- 5(a) A single link robot with a rotary joint is motionless at $\theta = 15^\circ$. It is desired to move the joint in a smooth manner to $\theta = 60^\circ$ in 6 seconds. Find the coefficients of a cubic spline which accomplishes this motion and brings the arm to rest at the goal. [7M]
- (b) Explain the three basic modes of operation of a robot language operating system. [8M]
- 6(a) Describe the construction and working of linear and rotary encoders with neat sketches. [7M]
- (b) Discuss the applications of robots used in the field of Material Handling. [8M]

7. Develop a Forward Kinematic model for the 3-R manipulator given below.



[15M]

- 8(a) Explicate the characteristics of sensor to be considered while selecting a sensor for an application. [7M]
 (b) Elucidate the various end effector and sensor commands. [8M]

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B.Tech. (VI Semester) ~~Regular~~ / Supplementary Examinations

S317-MODERN MACHINING PROCESSES

(ME)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	Differentiate the conventional and unconventional machining processes in terms of principles.	1M	CO1	L1
(b)	Can Abrasive Jet Machining be applied to machine ductile materials. Why?	1M	CO1	L2
(c)	What are functions of dielectric fluid used in EDM?	1M	CO2	L2
(d)	How is ECM related to chemical machining?	1M	CO2	L2
(e)	What is laser and how is it used to machine materials?	1M	CO3	L2
(f)	List the factors that influence the quality of the cut in Plasma Arc Cutting.	2M	CO3	L1
(g)	How is the geometric data presented in the STL format?	2M	CO4	L1
(h)	List the factors that affect the dimensional accuracy in additive processes.	2M	CO4	L1
(i)	What are some of the disadvantages of solid ground curing?	2M	CO5	L2
(j)	List the build materials that can be used in selective laser sintering.	2M	CO5	L1

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	What are the basic factors upon which the unconventional manufacturing processes are classified? Explain.	7M	CO1	L1
(b)	During AJM, mixing ratio (Volume flow rate of abrasive particles/Volume flow rate of carrier gas) is 0.2. Calculate mass ratio, if the ratio of density of abrasives and density of carrier gas is equal to 20	8M	CO1	L3
3(a)	Explain the working principle of electrochemical discharge grinding and discuss the process capabilities and applications.	7M	CO2	L2
(b)	What are the important process parameters that control the material removal rate in EDM? Explain any four factors.	8M	CO2	L4
4(a)	Explain the features of EBM unit. Analyze the effect of increasing the accelerating potential on MRR.	7M	CO3	L4
(b)	Describe the unique characteristics a Laser machining technique possesses that make it the only choice for the job.	8M	CO3	L3
5(a)	Explain in detail the process chain of Rapid Prototyping.	7M	CO4	L2
(b)	Discuss the evolution of RP systems indicating the history and their growth rate in the industrial sector.	8M	CO4	L1
6(a)	Describe in detail with neat diagram, the process stereo lithography with photo polymerization.	7M	CO5	L3
(b)	List advantages and disadvantages when rapid prototyping concept is applied to solid ground curing.	8M	CO5	L4
7(a)	With suitable sketches, explain the need for the insulation in an ECM process. List the advantages, disadvantages and applications for this process.	7M	CO2	L2
(b)	Write advantages, disadvantages and applications of selective laser sintering process.	8M	CO5	L4
8(a)	Explain the disadvantages of relaxation circuit and show the alternative arrangement of a pulse generator used in EDM.	8M	CO2	L4
(b)	Explain the advantages and limitations of Plasma Arc Machining.	7M	CO3	L4

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B.Tech. (VI Semester) ~~Regular~~/Supplementary Examinations

S292-MACHINE DESIGN-II

(ME)

Time : 3 hours

Max. Marks : 75

PART-A

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	What is the theory used in design of journal bearing?	1M	CO1	L1
(b)	List out the types for the crank shaft.	1M	CO2	L1
(c)	Name the belt drive. Which is used with shafts arranged at right angles?	1M	CO3	L1
(d)	Write the formula used to calculate length of alaminated spring.	1M	CO4	L1
(e)	List out advantages of worm gears.	1M	CO5	L2
(f)	A ball bearing operating at a load F has 9000 hours of life. Estimate the life of the bearing, in hours, when the load is doubled to $2F$.	2M	CO1	L2
(g)	Describe the principle used for of design of bearings.	2M	CO2	L3
(h)	Draw the sketch of center crank shaft and show its parts.	2M	CO3	L1
(i)	Two closed coiled helical springs (S_1 and S_2) are connected in series. Write the stiffness of the equivalent spring.	2M	CO4	L2
(j)	How many shafts and gears required for 12-speed gear box?	2M	CO5	L1

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2.	The load on a 100mm full hydrodynamic journal bearing is 9000N. Speed of the journal bearing is 320rpm. Consider length to diameter ratio =1, $D/d = 0.0011$, The operating temperature =65°C and minimum oil film thickness = 0.022mm. Select an oil that will closely accord with the stated conditions. For selected oil, determine i) Friction loss ii) The hydro-dynamic oil flow through bearing iii) The amount of leakage v)The temperature rise of oil passes through the bearing and vi) Maximum oil pressure.	15M	CO1	L5
3.	The connecting rod for a four stroke petrol engine to be designed for the following data. Bore=80mm, Stroke=120mm, Weight of reciprocating parts=15N, Maximum speed=2800rpm, Length of connecting rod from center to center=240mm, Explosion pressure corresponding to 10° of crank angle=3 MPa, Compression ratio= 4:1, Factor of safety =6.	15M	CO2	L6
4(a)	A 6X19 steel wire rope is used to lift 25KN load in a mine hoist. The mine is 200m deep, the rope drum is 2m in diameter and the acceleration is 2 m/s ² . Determine i)Direct load ii) Load due to bending iii) Acceleration load.	7M	CO3	L3

S292-MACHINE DESIGN-II

(b)	A flat belt is required to transmit 30KW from a pulley of 1.5m effective diameter running at 300 rpm. The angle of lap is 165 degrees. Coefficient of friction is 0.3, Determine width of the belt, if thickness of the belt is 9.5mm, centre distance =4m and permissible working stress is 2.5MPa.	8M	CO3	L5
5.	A concentric spring for an aircraft engine valve is to exert a maximum force of 5000N under an axial deflection of 40mm. Both the springs have same free length, same solid length and are subjected to equal maximum shear stress of 850 MPa. If the spring index for both the springs is 6, find i) the load shared by each spring, ii) the main dimensions of both the springs, and iii) the number of active coils in each spring. Assume $G=80\text{KN/mm}^2$.	15M	CO4	L5
6.	Design a spur gear drive to transmit 25 kW at 1200 rpm. Speed reduction is 3. The center distance between the gear shafts is approximately 400 mm. Use AGMA standards.	15M	CO5	L6
7(a)	A semi-elliptical laminated spring is made of 60 mm wide and 3 mm thick plates. The length between the supports is 700 mm and the width of the band is 60 mm. The spring has two full length leaves and six graduated leaves. If the spring carries a central load of 1800 N, Compute (i) Maximum stress induced in full length and graduated leaves (ii) The deflection in leaves.	8M	CO4	L5
(b)	Select a wire rope for a vertical mine hoist to lift a load of 45 KN from a depth 300m. A rope speed of 500 m/min is to be attained in 10 sec.	7M	CO3	L3
8(a)	Select a single row deep groove ball bearing for a radial load of 4000N and an axial load of 5000N, operating at a speed of 1600r.p.m for an average life of 5years at 10 hours per day. Assume uniform and steady load.	8M	CO1	L6
(b)	Draw Speed diagram and Kinematic diagram for a 6 speed gear box using the following details. Motor power= 3KW, maximum speed= 800 rpm and minimum speed= 120 rpm.	[7 M]	CO5	L4

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B.Tech. (VI Semester) ~~Regular~~ / Supplementary Examinations

**S259-HEAT TRANSFER
(ME)**

Time : 3 hours

Max. Marks : 75

PART-A

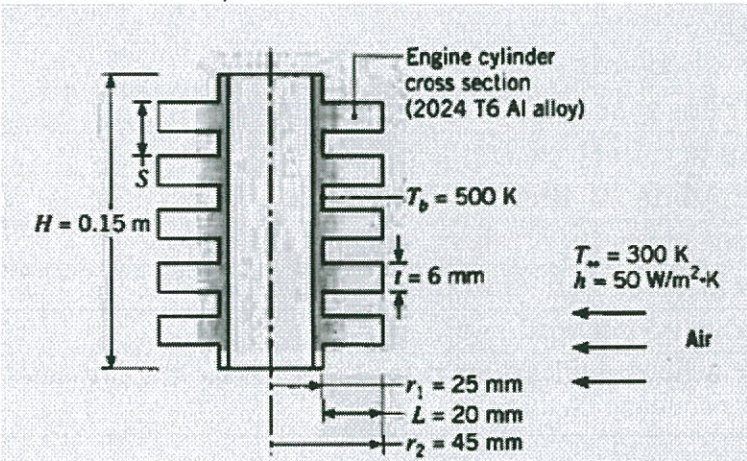
(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	What does the negative sign in Fourier heat conduction refer to?	1M	CO1	L2
(b)	Define fin efficiency.	1M	CO2	L1
(c)	State Newton's law of cooling.	1M	CO3	L1
(d)	What is meant by Film wise and Drop wise condensation.	1M	CO4	L4
(e)	Define effectiveness of a heat exchanger.	1M	CO5	L1
(f)	List out the assumptions for thermal resistance.	2M	CO2	L2
(g)	Explain lumped heat capacity analysis and its validity.	2M	CO2	L4
(h)	What is the significance of non-dimensional numbers?	2M	CO3	L4
(i)	Differentiate emissive power and radiosity.	2M	CO4	L2
(j)	What does NTU for a heat exchanger refer to? Provide its physical significance.	2M	CO5	L4

PART-B

(Answer any FOUR questions. All questions carry equal marks)

2(a)	Consider a plane composite wall that is composed of two materials of thermal conductivity $k_A = 0.1 \text{ W/mK}$ and $k_B = 0.04 \text{ W/mK}$. The thicknesses of material A and B are 10 cm and 20 cm respectively. The contact resistance at the interface between the two materials is known to be $0.3 \text{ m}^2\text{k/W}$. Material A adjoins a fluid at 200°C for which $h = 10 \text{ W/m}^2\text{K}$ and material B adjoins a fluid for which $h = 20 \text{ W/m}^2\text{K}$. What is the rate of heat transfer through the wall that is 2 m height and 2.5 m wide? Also sketch the temperature distribution.	8M	CO2	L3
(b)	An ice chest is constructed of Styrofoam ($k=0.033 \text{ W/mK}$) having inside dimensions of $25 \times 40 \times 100 \text{ cm}$. The wall thickness is 4 cm. The outside surface of the chest is exposed to air at 25°C with heat transfer coefficient of $10 \text{ W/m}^2 \text{ K}$. If the chest is completely filled with ice, calculate the time for ice to melt completely. The heat of fusion for water is 330 kJ/kg .	7M	CO1	L4

3.	<p>The engine cylinder of a motorcycle as shown in the below figure is constructed of 2024-T6 aluminum alloy and is of height $H=0.15$ m and outside diameter $D=50$ mm. Under typical operating conditions the outer surface of the cylinder is at a temperature of 500 K and is exposed to ambient air at 300 K, with a convection coefficient of $50 \text{ W/m}^2 \text{ K}$. Annular fins are integrally cast with the cylinder to increase heat transfer to the surroundings. Consider five such fins, which are of thickness $t=6$ mm, length $L=20$ mm, and equally spaced. What is the increase in heat transfer due to the use of the fins? Take thermal conductivity of 2024-T6 aluminum as 186 W/mK.</p> 	15M	CO2	L5
4(a)	<p>A $15 \text{ cm} \times 15 \text{ cm}$ circuit board dissipating 20 W of power uniformly is cooled by air, which approaches the circuit board at 20°C with a velocity of 6 m/s. Disregarding any heat transfer from the back surface of the board, determine the surface temperature of the electronic components (i) at the leading edge and (ii) at the end (trailing edge) of the board.</p> <p>Note: As the electronic components are expected to act as turbulators consider the flow to be turbulent.</p>	7M	CO3	L5
(b)	<p>Draw the hydrodynamic and thermal boundary layers for a fully developed laminar flow through a pipe. (i) When surface temperature $(T_s) >$ fluid temperature (T_f) and (ii) When $T_s < T_f$.</p>	8M	CO3	L6
5(a)	<p>Explain pool boiling phenomena and discuss about different regimes in the pool boiling with a neat sketch.</p>	7M	CO4	L2
(b)	<p>Two infinite parallel plates are maintained at 800°C and 35°C with emissivities of 0.5 and 0.8, respectively. To reduce the heat transfer rate a radiation shield is placed between the two plates. Both sides of the shield are associated with emissivities of 0.4. By sketching the network diagram, calculate the radiative heat transfer rate for with and without the shield.</p>	8M	CO4	L5

6.	<p>In a condenser, steam condenses on the outside of a tube bank pipes of 25 mm outer diameter at 35°C. The bank is 10 rows deep. Sea water flows inside the pipe at a velocity of 1 m/s. The water is heated from 15 to 25°C during the flow. The tubes are of brass with a thermal conductivity value of 60.6 W/m-K. Determine the value of overall heat transfer coefficient based on outside area. The tubes are 4 m long and with inner diameter of 20 mm.</p> <p>For condensation on the outside of the tube (assuming the tubes to be horizontal), use the following equation:</p> $h = 0.725 \left[\frac{k^3 \rho^2 g \lambda}{N \mu D \Delta T} \right]^{0.25}$ <p>Where, $\Delta T = 35 - 15 = 20^\circ\text{C}$</p> <p>At the film temperature, the physical properties are: Density = 997.5 kg/m³, Kinematic viscosity = 0.8315×10^{-6} m²/s, Thermal conductivity = 0.6129 W/m-K, Latent heat = 2430.5 kJ/kg For water flowing inside the tubes: Physical properties of water at 20°C: Density = 1000 kg/m³, Kinematic viscosity = 1.006×10^{-6} m²/s, Pr = 7.02 Thermal conductivity = 0.6 W/m-K, Specific heat = 4.178 kJ/kg-K.</p>	15M	CO5	L5
7(a)	Air at 3×10^{-4} kg/s and 27°C enters a rectangular duct that is 1 m long and 4mm(height)×16mm (width) on a side. A uniform heat flux of 600 W/m ² is imposed on the duct surface. What is the temperature of the air and of the duct surface at the outlet?	8M	CO3	L6
(b)	Define Nusselt number and Biot number. What are the differences between them in terms of the variables employed. Provide their physical significance?	7M	CO2 & CO3	L4
8.	<p>A thin walled copper tube of outside metal radius $r = 0.01$ m carries steam at 400K. It is inside a room where the surrounding air temperature is 300K. The tube is insulated with magnesia insulation of an approximate thermal conductivity of 0.07 W/m K</p> <p>(i) What is the critical thickness of insulation for an external convective coefficient $h = 4$ W/m² K? (assume negligible conduction resistance due to the wall of the copper tube)</p> <p>(ii) Under these conditions, determine the rate of heat transfer per meter of tube length for (a) a 0.002 m thick layer of insulation (b) the critical thickness of insulation (c) Comment on the observation made (if any).</p>	15M	CO2	L6
