

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

B.Tech. (VI Semester)(R14) Regular Re-admitted Students, November 2020

A.Y. 2019-20

Regulations :

R14

**REVISED TIME TABLE**

Time : 10.00 AM - 1.00 PM				
DATE	CSE	ASE	CE	EEE
16-11-2020 (Monday)	S415 - UML Design	S360 - Propulsion- II	S185 - Design of Steel Structures	S213 - Electrical Distribution Systems
18-11-2020 (Wednesday)	S163 - Compiler Design	S120 - Aircraft Stability and Control	S420 - Waste Water Engineering	S345 - Power System Analysis
20-11-2020 (Friday)	S425 - Web Technologies	S250 - Finite Element Method	S421 - Water Resources Engineering	S313 - Microprocessors and Microcontrollers
23-11-2020 (Monday)	S272 - Information Security	S303 - Mechanics of Composites	S256 - Geo Technical Engineering-II	S429 - Optimization Techniques in Engineering
25-11-2020 (Wednesday)	S200 - Distributed Operating Systems (PE-I)	S283 - Introduction to Space Technology (PE-I)	S413 - Transportation Engineering-II (PE-I)	S105 - Advanced Electrical Machines (PE-I)
27-11-2020 (Friday)	S137 - Artificial Intelligence (PE-II)	S260 - Helicopter Aerodynamics (PE-II)	S437 - Repair and Rehabilitation of Structures (PE-II)	S199 - Distributed Generation (PE-II)

**NOTE:**(i) Any omissions or clashes in this time table may please be informed to the Controller of Examinations immediately.

(ii) Even if government/JNTUK/College declares holiday on any of the above dates, the examinations shall be conducted as notified only.

(iii) For any clarification in respect of the above examinations, please contact the Controller of Examinations.

SRE

K. G. S. S. S.

Date: 21-10-2020

CONTROLLER OF EXAMINATIONS

[Signature]

PRINCIPAL

[Signature]

Copy to: 1. All H.o.Ds for N.A., 2. All Notice Boards

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

**S360 PROPULSION - II**  
(AE)

324

Time : 3 hours

Max. Marks : 75

**PART-A**

(Compulsory question)

- 1(a) What are components of SCRAMJET? [1M]
- (b) What is the equation used during multi staging of rockets? [1M]
- (c) What is meant by gelled propellants? [1M]
- (d) What is meant by cast modified composite propellants? [1M]
- (e) What are the typical values of specific impulse in Ion propulsion? [1M]
- (f) What are types of combustion chambers in SCRAMJET? [2M]
- (g) For a ideal rocket, the exhaust velocity is 2 km/s through a nozzle area of 2.5 m<sup>2</sup> and mass flow rate is 200kg/sec. Calculate specific impulse and thrust developed. [2M]
- (h) Explain what is thrusters? [2M]
- (i) What are the different types of igniters used in solid rockets? [2M]
- (j) Explain the concept of Solar sail. [2M]

**PART-B**

(Answer any FOUR questions all question carry equal marks)

- 2(a) Explain with a diagram the working principle of a ramjet engine. [7M]
- (b) Discuss the advantages and disadvantages of a ramjet engine along with its applications. [8M]
- 3(a) Describe the various factors considered for the design of a rocket. [7M]
- (b) Differentiate between a rocket and a missile. [8M]
- 4(a) Explain the combustion process of liquid propellants. [7M]
- (b) What are the different types of combustion instabilities in LPRE? [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 a short notes on Nuclear Fusion Rockets. [7M]
- (b) Explain briefly on Nuclear Fission Rockets. [8M]
- 7(a) Explain briefly the applications of rocket propulsion. [7M]
- (b) What are the various properties of Liquid propellants? [8M]
- 8(a) Draw a flow chart diagram for solid propellant processing and manufacture. [7M]
- (b) Mention various solid ingredients used in solid propellants with examples. [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) What is meant by statically unstable system? [1M]
- (b) What is the function spoiler aileron? [1M]
- (c) What is the direction side force created when the rudder is deflected towards right side? [1M]
- (d) What is the meaning of subsidence mode of response of a dynamic system [1M]
- (e) What is the meaning of pure divergence mode of response of a dynamics system? [1M]
- (f) What is the role of elevator? [2M]
- (g) What is the purpose of ailerons of an aircraft? [2M]
- (h) What is adverse yaw? [2M]
- (i) What is the type of response of dynamics system if the real part of the complex root is negative? [2M]
- (j) What is the type of response of dynamics system if the real part of the complex root is positive? [2M]

**PART-B**

(Answer any FOUR questions all question carry equal marks)

- 2(a) Derive the expression for pitching moment generated by the airplane tail. Discuss its contribution towards static longitudinal stability? [7M]
- (b) Given a rectangular wing of aspect ratio 6 and area 55.8 m<sup>2</sup>. The wing section employed is an NACA 4412 airfoil with aerodynamic centre at 0.24c ('c' chord length) and coefficient of pitching moment about aerodynamics center ( $C_{Mac}$ ) is -0.088. The center of gravity of the wing lies on the wing chord, but 15cm ahead of the aerodynamic center. Calculate (a) The lift coefficient for which the wing would be in equilibrium ( $C_{Mcg} = 0$ ), (b) The position of center of gravity for equilibrium at coefficient of lift ( $C_L$ ) is 0.4. [8M]
- 3(a) How does the vertical tail contribute towards the lateral static stability of an airplane? Explain. [7M]
- (b) Explain the effect of high-wing, mid-wing and low-wing configurations on lateral static stability with suitable diagrams. [8M]
- 4(a) Derive the expression for coefficient of yawing moment produced by the vertical tail of an airplane. [7M]
- (b) Define sidewash. How does the influence of wing-body on vertical tail of an airplane effect the directional static stability? [8M]

## S120-AIRCRAFT STABILITY AND CONTROL

- 5(a) Show that the real part of roots of the characteristic equation of the spring mass damper system governs damping of the response and the imaginary part is the damped natural frequency? [7M]
- (b) Consider the motion referred to an orthogonal axis set ( $oxyz$ ) with the origin 'o' coincident with the center of gravity of the aircraft. The components of velocity and force along the axes  $ox$ ,  $oy$  and  $oz$  are denoted ( $u$ ,  $v$ ,  $w$ ) and ( $X$ ,  $Y$ ,  $Z$ ) respectively. The components of angular velocity and moment about the same axes are denoted ( $p$ ,  $q$ ,  $r$ ). The X-force equation of an aircraft is as given below

$$X - mg \sin \theta = m(\dot{u} + qw - rv)$$

Applying the small disturbance theory, Show that the linearized longitudinal equation of motion in the x- direction as

$$\left(\frac{d}{dt} - X_u\right) \Delta u - X_w \Delta w + (g \cos \theta_0) \Delta \theta = X_{\delta_e} \Delta \delta_e + X_{\delta_T} \Delta \delta_T$$

Assume that  $\Delta X$  is a function of  $u$ ,  $w$ ,  $\delta_e$  (change in elevator angle) and  $\delta_T$  (throttle setting). [8M]

- 6(a) Consider the motion referred to an orthogonal axis set ( $oxyz$ ) with the origin 'o' coincident with the center of gravity of the aircraft. The components of velocity and force along the axes  $ox$ ,  $oy$  and  $oz$  are denoted ( $u$ ,  $v$ ,  $w$ ) and ( $X$ ,  $Y$ ,  $Z$ ) respectively. The components of angular velocity and moment about the same axes are denoted ( $p$ ,  $q$ ,  $r$ ). Derive the expression for rolling moment. [7M]
- (b) Consider the motion referred to an orthogonal axis set ( $oxyz$ ) with the origin 'o' coincident with the center of gravity of the aircraft. The components of velocity and force along the axes  $ox$ ,  $oy$  and  $oz$  are denoted ( $u$ ,  $v$ ,  $w$ ) and ( $X$ ,  $Y$ ,  $Z$ ) respectively. The components of angular velocity and moment about the same axes are denoted ( $p$ ,  $q$ ,  $r$ ). Derive the expression for yawing moment. [8M]

- 7(a) What is meant by roll stability of an airplane? What is the criterion of static roll stability? [7M]
- (b) Explain qualitatively the effect of wing dihedral, wing sweep and vertical tail on rolling moment created on airplane when it starts to sideslip. [8M unit 2]

- 8(a) Given the fourth order characteristic equation  $\lambda^4 + 6\lambda^3 + 11\lambda^2 + 6\lambda + k = 0$ . For what values of 'k' will the system be stable. [7M]
- (b) Derive the expression for longitudinal stability derivative in X-force ( $X_u$ ) and Z- force ( $Z_u$ ) due to change in forward speed. [8M unit 5]

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B.Tech. VI Semester Regular/Supplementary Examinations

**S250-FINITE ELEMENT METHOD**

(ASE)

Time : 3 hours

Max. Marks : 75

**PART-A**

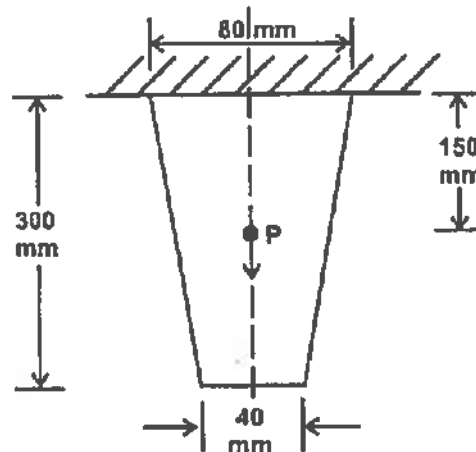
(Compulsory question)

- |      |  |      |
|------|--|------|
| 1(a) | What is meant by finite element method?  | [1M] |
| (b)  | What is CST element?   | [1M] |
| (c)  | Write the Gaussian quadrature expression for numerical integration.                          | [1M] |
| (d)  | State Fourier's law of heat conduction used in FEM.  | [1M] |
| (e)  | Write the expression for element mass matrix for a bar element.                              | [1M] |
| (f)  | State and explain the principle of minimum potential energy.                                 | [2M] |
| (g)  | Write the expression for the shape function for a constant strain triangular element.        | [2M] |
| (h)  | State the conditions to be satisfied in order to use axisymmetric elements.                  | [2M] |
| (i)  | Write the finite element equation used to analyze the two dimensional heat transfer problem. | [2M] |
| (j)  | List the properties of eigen vectors.  | [2M] |

**PART-B**

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

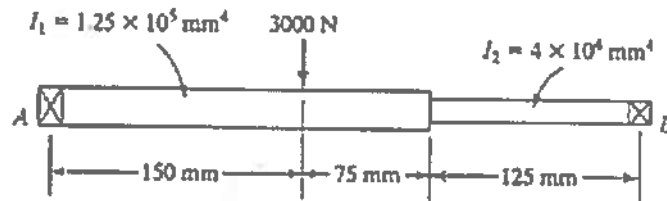
- |      |  |      |
|------|--|------|
| 2(a) | Briefly explain the concept of FEM and also describe the general steps of finite element method.   | [8M] |
| (b)  | Derive equations of equilibrium in case of three dimensional body subjected to body force and traction.  | [7M] |
| 3.   | A tapered bar of uniform thickness $t = 10$ mm as shown in figure. Find the displacements at the nodes by forming into two element model. The bar has a mass density $\rho = 7800$ kg/m <sup>3</sup> , the young's modulus $E = 2 \times 10^5$ MN/m <sup>2</sup> . In addition to self weight, the bar is subjected to a point load $P = 1$ kN at its centre. Also determine the reaction forces at the support. |      |



[15M]

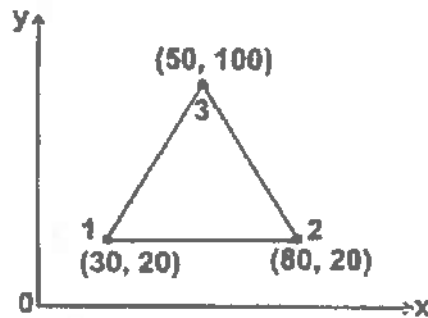
## S250-FINITE ELEMENT METHOD

4. Find the deflection at the load and the slopes at the ends for the steel shaft shown in figure. Consider the shaft to be simply supported at bearings A and B.



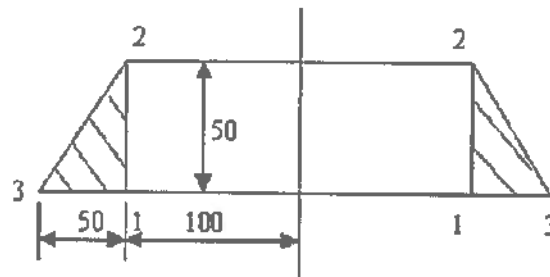
[15M]

- 5(a) Derive strain displacement matrix of CST element. [7M]  
 (b) Evaluate the stiffness matrix for the plane stress element shown in figure. Assume  $E = 210 \times 10^3 \text{ N/mm}^2$ , Poisson's ratio  $\nu = 0.25$  and element thickness  $t = 10 \text{ mm}$ . The coordinates are given in millimeters.



[8M]

6. An axi-symmetric ring element is shown in figure. Derive i) the matrices [B] and [D] ii) element stiffness matrix. Take  $E = 2 \times 10^5 \text{ N/mm}^2$  and  $\nu = 0.33$ .

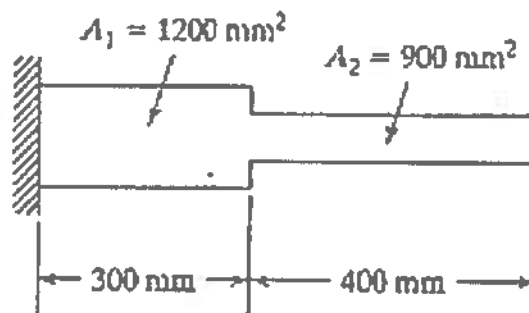


[15M]

7. A uniform aluminum circular fin of diameter 0.8 cm and 6 cm length is extruded from the surface whose temperature is  $100^\circ\text{C}$ . The convection takes place from the lateral surface and tip of the fin. Assuming  $k = 20 \text{ W/mK}$ ,  $h = 100 \text{ W/m}^2\text{K}$  and  $T_\infty = 20^\circ\text{C}$ , determine the temperature distribution in the pin using three element idealization.

[15M]

8. Determine the Eigen values and Eigen vectors for the stepped bar shown in figure. Take  $\rho = 7830 \text{ kg/m}^3$  and  $E = 2.1 \times 10^{11} \text{ N/m}^2$ .



[15M]

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B.Tech. (VI Semester) Regular/~~Supplementary~~ Examinations**S303-MECHANICS OF COMPOSITES**

(AE)

Time : 3 hours

Max. Marks : 75

**PART-A**

(Compulsory question)

- 1(a) Define filament and strand. [1M]
- (b) Define compliance matrix. [1M]
- (c) Define unsymmetrical laminate. [1M]
- (d) List out core materials used in sandwich structures. [1M]
- (e) What is Gel coat? [1M]
- (f) Explain role of reinforcement in composites. [2M]
- (g) Explain volume fractions of fibers and matrix in composite. [2M]
- (h) Explain anti-symmetric laminate with example. [2M]
- (i) Explain general buckling of sandwich panel. [2M]
- (j) List out the compression molding techniques. [2M]

**PART-B**

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

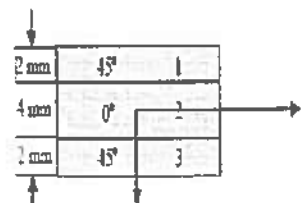
- 2(a) Classify the Polymer matrix composites? Explain [7M]
- (b) Discuss different materials used for fiber reinforcement in composites and their advantages. [8M]
- 3(a) Calculate transverse modulus  $E_1$ ,  $E_2$ , fraction of load carried by the fibers of glass epoxy composite with 30% fibers by volume. Elastic moduli of glass fibers and epoxy resin are 70 and 3.5 Gpa respectively. [7M]
- (b) Derive the stress strain relation of lamina with respect to arbitrary orientation [8M]
- 4(a) Explain the stiffness matrices [A] [B] and [D] of a laminate. [8M]
- (b) Explain CLT and Write the assumptions used in classical lamina theory. [7M]
- 5(a) What is sandwich composite material? Explain the design principals of sandwich constructions. [8M]
- (b) List out the advantages of sandwich constructions. [7M]
6. Explain Pultrusion method with neat sketch? Describe the advantages and limitations. [15M]
- 7(a) With help of neat sketch explain spray layup process mention the advantage and limitations. [8M]
- (b) Discuss about processing of composites by autoclave. [7M]
8. Analyze the laminate and find A, B, and D matrices for the laminate as shown in the figure. Assume stiffness matrix Q as follows:

For layers 1 and 3

$$[Q]_0 = \begin{bmatrix} 2 & 1.5 & 0 \\ 1.5 & 5 & 0 \\ 0 & 0 & 1.5 \end{bmatrix} \text{ GPa}$$

For layer 2

$$[Q]_0 = \begin{bmatrix} 13 & 2.5 & 0 \\ 2.5 & 1 & 0 \\ 0 & 0 & 3.5 \end{bmatrix} \text{ GPa}$$



[15M]



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

**S283- INTRODUCTION TO SPACE TECHNOLOGY**  
(AE)

304

Time : 3 hours

Max. Marks:75

**PART-A**

(Compulsory question)

- 1(a) State the reason for difficulty in flying airplanes in Martian atmosphere. [1M]
- (b) Define true anomaly. [1M]
- (c) Define structural ratio. [1M]
- (d) Write the equation for maximum deceleration achieved from steep ballistic reentry. [1M]
- (e) State the equation of precession rate in terms of spin rate. [1M]
- (f) Write about the advantage of subsurface explorers when compared with other space missions. [2M]
- (g) State Kepler's laws. [2M]
- (h) Define parallel staging and series staging. [2M]
- (i) Summarize types of reentry possible from outer space. [2M]
- (j) Define oblate and prolate bodies with sketch. [2M]

**PART-B**

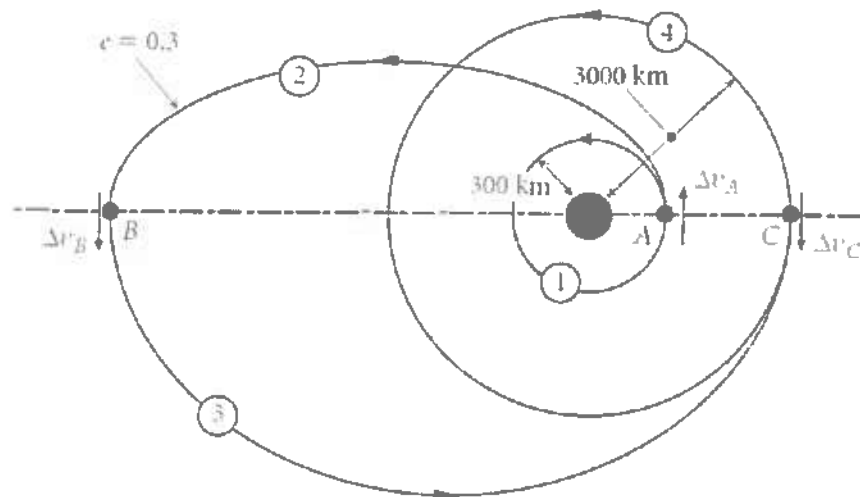
(Answer any four questions. All questions carry equal marks)

- 2(a) Summarize the missions that are going to accomplish in future for space exploration. [7M]
  - (b) Explain the classification of rocket propulsion systems. [8M]
  - 3(a) Develop an expression to show that path of  $m_2$  around  $m_1$  lies in a single plane. [7M]
  - (b) At two points on a geocentric orbit the altitude and true anomaly are  $Z_1 = 1545$  km,  $\theta_1 = 126^\circ$  and  $Z_2 = 852$  km,  $\theta_2 = 58^\circ$ . Find (a) eccentricity (b) the altitude of perigee (c) the semi major axis and (d) the period [8M]
  - 4(a) A two staged Gemini Titan II has following specifications. Calculate Trade-off Ratios for this spacecraft.
- |                   | Stage I | Stage II |
|-------------------|---------|----------|
| Initial Mass (kg) | 150500  | 32630    |
| Final Mass (kg)   | 39370   | 6099     |
| $V_e$ (m/sec)     | 2900    | 3097     |
- (b) Derive an expression for burnout velocity in terms of payload and structural ratios and state the drawback in single stage rocket with graph. [7M]
  - 5(a) Explain about aero braking with a neat sketch. [8M]
  - (b) State kinematic and dynamic equations of motion in lifting body reentry. [7M]



## S283- INTRODUCTION TO SPACE TECHNOLOGY

6. Discuss briefly about yo-yo de-spin mechanism in satellite attitude control. [15M]
- 7(a) Explain about typical features of liquid propellant feed systems. [7M]  
(b) Tabulate the classification of solid propellant rocket motor with examples. [8M]
- 8(a) Compare Von Braun and space shuttle and discuss the possible advantages and disadvantages of one over other. [7M]  
(b) A spacecraft is in a 300 km circular earth orbit. Calculate  
(i) The total delta-v required for the bi-elliptical transfer to a 3000 km altitude coplanar circular orbit shown, and  
(ii) The total transfer time.



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H.T.No

27 NOV 2020

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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)

- |      |                          |      |
|------|--------------------------|------|
| 1(a) | Define VTOL.             | [1M] |
| (b)  | Define STOL.             | [1M] |
| (c)  | Define Cyclogyro.        | [1M] |
| (d)  | Define Tiltrotor.        | [1M] |
| (e)  | Define Tiltjet.          | [1M] |
| (f)  | Explain Tilt wing.       | [2M] |
| (g)  | Explain Tilt sitter.     | [2M] |
| (h)  | Explain Lift fans        | [2M] |
| (i)  | Explain Lift jets.       | [2M] |
| (j)  | Explain Vectored Thrust. | [2M] |

**PART-B**

(Answer any FOUR questions all question carry equal marks)

- |      |  |      |
|------|--|------|
| 2(a) | Explain the term 'Collective Pitch' mechanism and it's utility in piloting the helicopter.                                   | [7M] |
| (b)  | Make use of sketches to compare a 'hinge less rotor' with a 'bearing less' rotor.  | [8M] |
| 3(a) | Explain blade element theory in detail.  | [7M] |
| (b)  | Distinguish between momentum theory and blade element theory as applied to the lifting rotors, Also state their assumptions. | [8M] |
| 4(a) | Calculate Profile drag -lift ratios using graphs?  | [7M] |
| (b)  | Determine the effects of aerofoil characteristics on performance.  | [8M] |
| 5(a) | What are the principle details of a 'HOVERCRAFT'? How does it obtain forward motion?   | [7M] |
| (b)  | How does the 'tilt wing' technology achieve V/STOL modes for such airplanes?   | [8M] |
| 6(a) | Explain the term HOVER CEILING. How it is estimated for aircraft?  | [7M] |
| (b)  | What does u understand by "ground effect machines" and how do you classify it?   | [8M] |
| 7(a) | Explain the Principles of Operation and Design Features of Rotor Systems.  | [7M] |
| (b)  | Explain the principle involved in transition from hover to forward flight.   | [8M] |
| 8(a) | Explain the Hazards in a moving flight.  | [7M] |
| (b)  | Explain the steps to reduce vibration in a helicopter.   | [8M] |

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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**

(Answer all questions)

- 1(a) What is meant by HSFG bolts ? [1M]
- (b) Write the expression for rupture strength of critical section ( $T_{dn}$ ). [1M]
- (c) Define column base. [1M]
- (d) Will a beam buckle when loading is transverse to its minor axis ? [1M]
- (e) What is meant by bracing system in roof trusses ? [1M]
- (f) Distinguish between bearing bolts and friction grip bolts. [2M]
- (g) What are the different shapes of tension members ? [2M]
- (h) What are the different types of column base ? [2M]
- (i) Write the expression for web crippling. [2M]
- (j) What are the different types of main loads on trusses ? [2M]

**PART-B**

(Answer any FOUR questions)

- 2 Two plates 10 mm and 18 mm thick are to be joined by double cover butt joint, design the joint by bolted connection from the following data:
 

Factored design load	750 kN
Bolt diameter	20 mm
Grade of steel	Fe 410
Grade of bolts	4.6
Cover plates 2 (one on each side)	8 mm thick

 [15M]
- 3 Determine the axial load capacity of column ISHB 300@ 577 N/m. If the length of column is 3 m. Both ends hinged,  $f_y = 250 \text{ N/mm}^2$ ,  $f_u = 410 \text{ N/mm}^2$ ,  $E = 2 \times 10^5 \text{ N/mm}^2$ . Design a compression member. [15M]
- 4 Design a slab base for a column ISHB 300@ 577 N/m carrying an axial factored load of 1400 kN, M20 concrete is used for the foundation. Provide bolted connection between column and base plate. [15M]
- 5 Determine the design bending strength of ISLB 350 @486 N/m considering the beam as laterally unsupported. If the unsupported length of beam is 3 m. Assume steel of grade 410. [15M]
- 6(a) A roof truss shed is to be built in lucknow for an industry. The size of shed is 24 mX40 m. The height of building is 12 m at the eaves. Determine the basic wind pressure. [8M]
- (b) A roof truss set is to be build Jodhpur for an industrial use determine the basic wind pressure size 18 mX30 m. The height of building is 10 m at the eaves. Determine the basic wind pressure. [7M]
- 7 A column ISHB 300@577 N/m carries an axial compressive factored load of 1500 kN. Design a suitable bolted gusset base, the base rests on M20 grade concrete pedestal use 24 mm dia bolts of grade 4.6 for making the connection. [15M]
- 8 List the various steps involved in the design of a laterally supported beam. [15M]

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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)

- |  |      |
|--|------|
| 1(a) Define sewage.  | [1M] |
| (b) List out the different zones of pollution in a river.  | [1M] |
| (c) What is the purpose of providing screens in sewage treatment?  | [1M] |
| (d) Define recirculation factor of a trickling filter.   | [1M] |
| (e) Why manholes are provided in sewerage system?  | [1M] |
| (f) Calculate the velocity of flow in a sewer of diameter 1200 mm running full laid at a gradient of 1 in 400. Assume $N = 0.013$ .  | [2M] |
| (g) The sewage of a town is discharged into a river. The quantity of sewage produced is 85 m <sup>3</sup> /d and its BOD is 250 mg/L. The discharge in the river is 200 lps and its BOD is 2 mg/L. Determine the BOD of diluted mix.                 | [2M] |
| (h) A grit chamber is designed to remove particles with diameter 0.2 mm and specific gravity 2.65 with an average working temperature of 20 °C. Calculate the settling velocity of the particles.  | [2M] |
| (i) Sewage sludge from a treatment plant contains solids of weight 100 kg and initial moisture content of 95 (%). The percentage of moisture content is now reduced to 90 (%). Calculate the changed volume ( $V_2$ ) from initial volume ( $V_1$ ). | [2M] |
| (j) The BOD <sub>5</sub> of treated sewage is 50 mg/L. Where it can be discharged- water bodies or land or both? Justify.  | [2M] |

**PART-B**

(Answer any FOUR questions all question carry equal marks)

- 2 The catchment area of a city is 200 hectares. Assuming that the surface on which the rain falls is classified as follows: Roofs, Pavements & yards, Lawns, Roads, and Vacant plots occupy 20%, 15%, 30%, 20%, and 15% of total area. The runoff coefficients are 0.9, 0.8, 0.15, 0.4 and 0.1 respectively. The maximum intensity of rainfall is 35mm/hour, density of population is 280 persons/hectare and the rate of water supply is 220 litres/capita/day. Calculate impervious factor and quantity of sanitary sewage for (i) separate system (ii) combined system. Assuming  $N = 0.013$  and slope of 1 in 1000, calculate the diameter of sewer for combined system. [15M]
- 3(a) 6 mL of raw sewage is diluted to 300 mL in a BOD bottle. The DO concentration of the diluted sample at the beginning and end of 5-days are 6 mg/L and 3 mg/L, what is the BOD<sub>5</sub> of the sample? If this dilution of the sample is to be expressed in terms of % dilution, what will be the value? [8M]
- (b) Define BOD and COD. Explain their importance in sewage treatment. [7M]

**S420-WASTE WATER ENGINEERING**

- 4(a) What are the objectives of (i) Preliminary (ii) Primary (iii) Secondary treatment? List out the treatment techniques under these treatment options. [8M]
- (b) Determine the sizing, detention time and weir loading of a circular primary sedimentation tank for a total sewage flow of 7200 m<sup>3</sup>/d with a surface overflow rate of 40 m/d. [7M]
- 5(a) A wastewater treatment plant produces sludge of 1200 kg/d with a moisture content of 94%. The volatile solids (sp gravity 1.02) are 60% and fixed solids are 40% (sp gravity 2.5). Calculate the volume of sludge. [7M]
- (b) Why trickling filters are used in sewage treatment? Why recirculation of sewage is carried out in trickling filters? Differentiate between single stage and two stage trickling filters using neat sketches. [8M]
6. What is the purpose of providing traps in buildings? Write short notes on any five of the following (i) P-trap (ii) Q-trap (iii) S-trap (iv) intercepting trap (v) floor trap (vi) gully trap using neat sketches. [15M]
7. Design a rectangular storm water drain for the following data: Catchment area: 100 ha, rainfall intensity = 50 mm/hr, average impervious coefficient = 0.6, gradient of drain = 1 in 3000, Manning's coefficient = 0.0125. Calculate the maximum velocity in the drain and recommend the appropriate type of drains for use. Use Rational formula. [15M]
8. Explain in brief the following: (i) Working principles of aerobic pond, anaerobic pond, facultative pond (ii) Functional differences between oxidation pond and oxidation ditch (iii) Oxygen transfer efficiency in aeration systems. [15M]

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B.Tech. VI Semester Regular/Supplementary Examinations

**S421-WATER RESOURCES ENGINEERING**

(CE)

Time : 3 hours

Max. Marks : 75

**PART-A**

(Answer all questions)

- |      |  |      |
|------|--|------|
| 1(a) | How dams are classified based on Hydraulic design?   | [1M] |
| (b)  | What is a gravity dam?   | [1M] |
| (c)  | What is meant by storage head work?  | [1M] |
| (d)  | Write any two advantages to provide a berm in canal.   | [1M] |
| (e)  | List out the different types of semi-module?   | [1M] |
| (f)  | What is meant by a flood control reservoir?  | [2M] |
| (g)  | A rectangular dam has constant width 5 m and height 10 m with reservoir full upto its top. Determine the water pressure force on the dam. Take $c = 1$ and assume no tail water. | [2M] |
| (h)  | What is exit gradient?   | [2M] |
| (i)  | Sketch a typical cross-section of a canal which is partly in filling.  | [2M] |
| (j)  | List out the types of semi-modular outlets.  | [2M] |

**PART-B**

(Answer any FOUR questions)

- |      |   |       |
|------|---|-------|
| 2(a) | List out the merits and demerits of buttress dams.  | [7M]  |
| (b)  | What factors affect the selection of site for a dam? Discuss them briefly.  | [8M]  |
| 3    | Explain briefly with neat sketches the different forces that may act on a gravity dam. Indicate their magnitudes, directions and locations.   | [15M] |
| 4(a) | Describe briefly with neat sketches the various types of weirs.   | [7M]  |
| (b)  | A weir on a permeable foundation has a level floor of negligible thickness and is 10 m long in the direction of flow. At the two ends of the floor 2.5 m deep piles are provided. Using Khosla's theory calculate the uplift pressure at the mid-length of the floor and at quarter points. The effective head of water can be assumed to be 2 m.   | [8M]  |
| 5(a) | Explain the procedure for designing an irrigation channel using Lacey's theory.   | [7M]  |
| (b)  | Find the channel section and discharge $Q$ that can be allowed to flow in it, if $B/D = 5.7$ , bed slope $= 1/5000$ and $N = 0.0225$ . (Use Kennedy's theory).  | [8M]  |
| 6(a) | What is a rigid module? Describe with neat sketches the working of a Gibb's module.   | [7M]  |
| (b)  | Discuss the various factors affecting the suitability of aqueduct and syphon aqueduct.  | [8M]  |
| 7(a) | Derive an expression for the limiting height of a low gravity dam. Differentiate between low and high gravity dam.  | [7M]  |
| (b)  | A weir across an alluvial river has a horizontal floor of length 60 m and retains 6 m of water under full pond condition. If the downstream sheet pile is driven to a depth of 6 m below the average bed level, calculate the exit gradient. Further, assuming a porosity of 30 % and the relative density of soil particles as 2.70, estimate the critical exit gradient and the factor of safety of the system with respect to the exit gradient. | [8M]  |
| 8(a) | What are the requirements of channel lining?  | [7M]  |
| (b)  | Describe with a neat sketch a non-modular type of outlet.   | [8M]  |

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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) List out various stages in sub-surface exploration programme. [1M]
- (b) Define ultimate bearing capacity of soils. [1M]
- (c) Write classification of piles according to mode of transfer of loads. [1M]
- (d) Define earth pressure at rest condition. [1M]
- (e) What are the types of caissons? [1M]
- (f) Define area ratio. Write its formula. [2M]
- (g) Write Terzaghi's semi-empirical equation for bearing capacity of cohesionless soil. [2M]
- (h) What is Feld's rule for pile group efficiency? [2M]
- (i) Determine the active earth pressure coefficient, if the angle of friction is  $30^\circ$ . [2M]
- (j) What is stability factor? Write its units. [2M]

**PART-B**

(Answer any FOUR questions)

- 2(a) Enumerate the types of soil samples and distinguish them. [8M]
- (b) Explain wash boring method of soil exploration. [7M]
3. Compute the safe bearing capacity of a square footing  $1.5 \text{ m} \times 1.5 \text{ m}$  located at a depth of  $1 \text{ m}$  below the ground level in a soil of average density  $20 \text{ kN/m}^3$ . Take  $c' = 15 \text{ kN/m}^2$ ,  $\phi = 20^\circ$ ,  $N_c = 17.7$ ,  $N_q = 7.4$  and  $N_\gamma = 5$ . Assume a factor of safety 3 and that the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rises to the ground level. [15M]
4. Describe various types of piles. [15M]
- 5(a) Determine the passive pressure by Rankine's theory per unit run for a retaining wall  $4 \text{ m}$  high, with  $i = 15^\circ$ ,  $\phi = 30^\circ$  and  $\gamma = 19 \text{ kN/m}^3$ . The back face of wall is smooth and vertical. [7M]
- (b) Determine the active pressure by Rankine's theory per unit run for a retaining wall  $4 \text{ m}$  high, with  $i = 15^\circ$ ,  $\phi = 30^\circ$  and  $\gamma = 19 \text{ kN/m}^3$ . The back face of wall is smooth and vertical. [8M]
- 6(a) Describe the various components of pneumatic caisson with the help of a sketch. [8M]
- (b) Explain briefly on open caissons and box caissons. [7M]
7. Describe various geophysical methods. Discuss their limitations and uses. [15M]
- 8(a) Explain different types of shear failures. [8M]
- (b) Discuss Meyerhof's bearing capacity theory. How does it differ from Terzaghi's theory? [7M]

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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 TRT in railways. [1M]
- (b) What is meant by left hand turnout in railways? [1M]
- (c) Mention the used of disc signals in railways. [1M]
- (d) Define the term apron. [1M]
- (e) Mention the objective of navigational signals in harbour. [1M]
- (f) What are the basic requirements of good alignment in railways? [2M]
- (g) Enlist the various types of safety devices. [2M]
- (h) Differentiate between semaphore signal and Warner signal. [2M]
- (i) Write a short note on clear zone. [2M]
- (j) Distinguish between transit sheds and warehouses. [2M]

**PART-B**

(Answer any FOUR questions all question carry equal marks)

- 2(a) Define the term permanent way. What are main requirements of an ideal permanent way? [8M]
- (b) Write short notes about renewal of track. [7M]
3. Draw the line diagrams for the following track junctions [15M]
  - (i) Double turnout (ii) Three throw switches (iii) diamond crossing.
4. Explain the classification and types of signals in Indian railways. [15M]
- 5(a) What is meant by basic runway length? Discuss the three cases to be considered. [7M]
- (b) Describe the corrections to be applied to the calculated basic runway length to get its actual length. [8M]
- 6(a) Write about the fender accessories used in harbours. [7M]
- (b) Explain and classify the mooring accessories used in harbours. [8M]
- 7(a) What is the necessity of maintenance in railways and what are its advantages? [7M]
- (b) Explain about various types of maintenance of railway track. [8M]
8. Explain any four types of navigational aids with neat sketches and state their functions. [15M]

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

**S437-REPAIR AND REHABILITATION OF STRUCTURES**  
(CE)

3074

Time : 3 hours

Max. Marks: 75

**PART-A**

(Compulsory question)

- |      |  |      |
|------|--|------|
| 1(a) | Distinguish between repair and rehabilitation.                                   | [1M] |
| (b)  | Name any two atmospheric agents responsible for corrosion.                       | [1M] |
| (c)  | Define polymer concrete.   | [1M] |
| (d)  | In what way carbonation of concrete affects the structures.                      | [1M] |
| (e)  | Define dry pack.   | [1M] |
| (f)  | Distinguish between structural cracks and non-structural cracks with an example. | [2M] |
| (g)  | List the importance of quality control in concrete structures.                   | [2M] |
| (h)  | Name any two special mortars for repair with applications.                       | [2M] |
| (i)  | State any two NDT tests.   | [2M] |
| (j)  | Define dormant crack with example.   | [2M] |

**PART-B**

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

- |      |   |       |
|------|---|-------|
| 2(a) | Discuss the causes of deterioration in structure.   | [7M]  |
| (b)  | Discuss different types of maintenance to be followed for structural elements.  | [8M]  |
| 3(a) | Explain the factors affecting the permeability of concrete.   | [7M]  |
| (b)  | Define the following thermal properties of concrete (i) Thermal conductivity (ii) Thermal diffusivity (iii) Specific heat (iv) Co-efficient of thermal expansion. | [8M]  |
| 4(a) | Discuss in detail the essential parameters for selecting appropriate materials for repair.  | [7M]  |
| (b)  | Write the step by step procedure adopted in epoxy injection for repair works.   | [8M]  |
| 5(a) | Describe the steps in the assessment procedure to evaluate damages in a structure and to carry out rehabilitation work.   | [7M]  |
| (b)  | Discuss any one NDT technique used in investigation for repair works in concrete structures.  | [8M]  |
| 6(a) | Explain the steps needed to strengthen a heavily corroded RCC beam in a structure.  | [7M]  |
| (b)  | Describe various jacketing methods for rehabilitation of columns.   | [8M]  |
| 7(a) | Explain in detail, Polymer Concrete and its types.  | [7M]  |
| (b)  | Describe the various strengthening techniques to overcome low member strength.  | [8M]  |
| 8    | Write one case study on Repairs and Rehabilitation of RC structures.  | [15M] |

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

**S415-UML DESIGN  
(CSE)**

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Time : 3 hours

Max.Marks:75

**PART-A**

(Compulsory question)

- |      |  |      |
|------|--|------|
| 1(a) | UML is a language for what?  | [1M] |
| (b)  | Write any 2 diagrams that represent static aspects of a system.                    | [1M] |
| (c)  | Give the name of Model to Code transformation.                                     | [1M] |
| (d)  | Define the term "Use Case".  | [1M] |
| (e)  | Give the definition of "Process".  | [1M] |
| (f)  | Mention different building blocks of UML.  | [2M] |
| (g)  | Draw the symbol of "Association" relationship with "Multiplicity" between classes. | [2M] |
| (h)  | Define the term "Object Diagram".  | [2M] |
| (i)  | List out the different features of Communication Diagram in UML.                   | [2M] |
| (j)  | Differentiate "Time Expression" and "Timing Constraint".                           | [2M] |

**PART-B**

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

- |      |  |       |
|------|--|-------|
| 2.   | Summarize the Conceptual Model of UML with their notations.  | [15M] |
| 3.   | Categorize different Stereotypes related to Dependency Relationship and Explain briefly.   | [15M] |
| 4(a) | Analyze different steps needed for Modeling the Logical Database Schema in Class Diagram.  | [8M]  |
| (b)  | Discuss the steps needed to Forward Engineer a Class Diagram.  | [7M]  |
| 5.   | Describe the following with relevance to Sequence Diagram:<br>i) Focus of Control    ii) Object Lifeline    iii) Messages.   | [15M] |
| 6.   | Write about different kinds of Events in UML with their notations.   | [15M] |
| 7(a) | Identify the Activities for Money Withdrawal and Money Deposit in ATM. Design an Activity Diagram using Swimlane for the identified activities.                    | [7M]  |
| (b)  | Analyze the Objects and Messages that participate in ONLINE BOOK SHOPPING. Create a Sequence Diagram by using the objects and messages which you analyzed earlier. | [8M]  |
| 8(a) | Discuss the Architecture of UML with a neat diagram.   | [7M]  |
| (b)  | Demonstrate different Principles of Modeling briefly.  | [8M]  |

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B.Tech. VI Semester Regular/Supplementary Examinations

**S163-COMPILER DESIGN**

(CSE)

Time : 3 hours

Max. Marks : 75

**PART-A**

(Compulsory question)

- 1(a) Which phases constitute front end of the compiler. [1M]
- (b) Define top-down parsing. [1M]
- (c) In LR(0) grammar, R stands for what. [1M]
- (d) What is syntax directed translation? [1M]
- (e) What is loop fusion? [1M]
- (f) Give the general format of a LEX program. [2M]
- (g) List out strategies to recover from syntactic errors. [2M]
- (h) What is cross compiler? [2M]
- (i) Construct triples of an expression:  $x = a * (b + c)$ . [2M]
- (j) Write about strength reduction in optimization of code. [2M]

**PART-B**

(Answer any FOUR questions all question carry equal marks)

2. Describe the Analysis - Synthesis Model of compilation. [15M]
- 3(a) Define a context free grammar. Explain with example. [7M]
- (b) Consider the grammar,  

$$S \rightarrow (L) \mid a$$

$$L \rightarrow L, S \mid S$$
  - i) What are the terminals, non terminals and start symbol
  - ii) Find parse tree (with LMD) for  
 (i) (a,a) (ii) (a,(a,a)) (iii) (a,((a,a),(a,a))) [8M]
4. Find the canonical item sets for the following grammar  

$$E \rightarrow E + T \mid T$$

$$T \rightarrow T * F \mid F$$

$$F \rightarrow (E) \mid a$$

Construct SLR parsing table and parse the input string for  $a * a + a$  using above grammar. [15M]
- 5(a) Explain syntax directed translation schemes. [7M]
- (b) What is a three address code? List the common three address instruction forms. [8M]
6. Discuss about the principal sources of code optimization. [15M]
- 7(a) Write the comparisons of LR Parsers. [8M]
- (b) Differentiate pass and phase of a compiler. [7M]
- 8(a) Construct the transition diagram to recognize the tokens for identifiers and numeric constants. [8M]
- (b) Explain about left factoring and elimination of left recursion with example. [7M]

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

**S425-WEB TECHNOLOGIES  
(CSE)**

Max. Marks : 75

Time : 3 hours

**PART-A**

(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	How an Image is inserted in a webpage? Give an example.	1M	CO1	L1
(b)	What is a JavaBean?	1M	CO2	L1
(c)	Define Servlet. List the ways for creating a Servlet.	1M	CO3	L1
(d)	Define Java Server Page (JSP) declaration tag.	1M	CO4	L1
(e)	List the different types of layout managers used in Swings.	1M	CO5	L1
(f)	Give the syntax for function in JavaScript.	2M	CO1	L2
(g)	What is a well-formed eXtensible Markup Language (XML) document?	2M	CO2	L1
(h)	What is the purpose of ServletConfig interface?	2M	CO3	L1
(i)	What are the tags used in JSP bean development?	2M	CO4	L1
(j)	List the methods and constructors of JButton component of Swings.	2M	CO5	L1

**PART-B**

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

2(a)	Outline the following Hypertext Markup Language (HTML) tags with suitable examples. (i) Bold (ii) Italic (iii) Underline (iv) Paragraph (v) Strike (vi) Break a line (vii) Horizontal line (viii) Pre-Formatting (ix) Font.	7M	CO1	L2
(b)	Develop a JavaScript program to validate the following fields in registration form. (i) User Name (ii) Password (iii) Gender (iv) Hobbies (v) Email Id.	8M	CO1	L3
3(a)	What is XML Style Sheet Language (XSLT)? Develop XSL code to display employee details in HTML table format which is stored in XML.	7M	CO2	L3
(b)	Develop a JavaBean program to create the button and list the steps to deploy it in Bean Development Kit (BDK).	8M	CO2	L3
4(a)	Develop a Servlet program to display student table data (includes sid, sname, sage, scgpa) from Oracle Database.	7M	CO3	L3
(b)	Illustrate the process of forward and include Servlet pages by using Request Dispatcher interface.	8M	CO3	L2
5(a)	How session management can be done in JSP? Give an example program.	7M	CO4	L1
(b)	Describe the process of accessing JavaBean classes in JSP with an example.	8M	CO4	L2
6(a)	Sketch and elaborate the hierarchy of Java Swing API.	7M	CO5	L3
(b)	Describe the usage of J Text Field with its constructors and methods in Swings with an example program.	8M	CO5	L2
7.	Distinguish different types of Cascading Style Sheets (CSS) with example programs.	15M	CO1	L4
8(a)	Develop a servlet program to create a session by using HttpSession.	7M	CO3	L3
(b)	Demonstrate the process of creating, deleting and getting Cookies information in Servlet.	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) | Define Cryptography and cryptology.                           | [1M] |
| (b)  | Calculate 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 malicious program?                        | [1M] |
| (f)  | Define strong and weak collision resistance in Hash function. | [2M] |
| (g)  | Distinguish between session key and Master key.               | [2M] |
| (h)  | Distinguish 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 questions carry equal marks)

- |      |   |      |
|------|---|------|
| 2(a) | Illustrate different ways of providing Message Authentication using MAC (Message Authentication Code) and hash functions. | [7M] |
| (b)  | Construct message digest using HMAC algorithm.  | [8M] |
| 3(a) | Analyze the requirements for a digital signature.   | [7M] |
| (b)  | Describe how Digital Signature Algorithm (DSA) is used to generate digital signature.                                     | [8M] |
| 4(a) | Discuss how PGP Message Generation and Reception is done form user A to user B.   | [7M] |
| (b)  | Write a short note on Encapsulating Security Payload (ESP) protocol.  | [8M] |
| 5(a) | Identify the role of payment gateway in payment Authorization.  | [7M] |
| (b)  | Differentiate between SSL and TLS.  | [8M] |
| 6(a) | Examine the concept of trusted systems.   | [7M] |
| (b)  | List and analyze different phases of a virus during its lifetime.   | [8M] |
| 7(a) | Classify and illustrate various types of Security Attacks.  | [7M] |
| (b)  | List and briefly define the principal categories of SET participants.   | [8M] |
| 8(a) | Perform Encryption and decryption using RSA algorithm.  |      |
|      | (i) $P=3; q=11, e=7; M=5$   |      |
|      | (ii) $P=7; q=11; e=17; M=8$   | [8M] |
| (b)  | Write a short note on Authentication Header (AH) protocol.  | [7M] |

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

**S200-DISTRIBUTED OPERATING SYSTEMS  
(CSE)**

Time : 3 hours

Max. Marks : 75

**PART-A**

(Compulsory question)

- 1(a) Draw the ATM reference model neatly. [1M]
- (b) What are the three organizations of threads in a process? [1M]
- (c) What is meant by Clock Synchronization? [1M]
- (d) What is the significance of directories in DSM? [1M]
- (e) Draw the structure of the CHORUS kernel. [1M]
- (f) What are the advantages of Distributed systems over independent PCs? [2M]
- (g) Define Client stub and Server stub with the help of a diagram. [2M]
- (h) Compare Two-phase locking and Strict Two-phase locking protocols. [2M]
- (i) What are the key properties of NUMA multiprocessors? [2M]
- (j) List out various types of ports used in processes of MACH. [2M]

**PART-B**

(Answer any FOUR questions all question carry equal marks)

- 2 Distinguish between Multiprocessors and Multicomputers? How they are classified and explain each one in detail with a neat diagram? [15M]
- 3(a) What do you mean by Thread? How threads are implemented in Distributed System? [7M]
- (b) How to design a Distributed File System? [8M]
- 4(a) What is the need of Clock Synchronization in Distributed System? Explain it briefly. [7M]
- (b) What do you mean by Mutual Exclusion? Explain a distributed approach for handling mutual exclusion. [8M]
- 5(a) Explain briefly about Ring-based Multiprocessors. [7M]
- (b) Discuss about Switched Multiprocessors. [8M]
- 6 Discuss about the system architecture and describe various features of CHORUS distributed operating system. [15M]
7. Write a short notes on i. Caching in Distributed File system  
ii. Replication in Distributed File system. [15M]
- 8(a) What are the issues in client server binding? Explain how these issues handled in RPC. [7M]
- (b) Why is scalability an important feature in the design of a distributed system? [8M]

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

L.B.Reddy Nagar :: Mylavaram - 521230:: Krishna Dist.: A.P.

B.Tech. **V** Semester Regular/Supplementary Examinations .**S137-ARTIFICIAL INTELLIGENCE**

(CSE)

Time: 3 hours

Max.Marks: 75

**PART-A**

(Compulsory question)

- |      |  |      |
|------|--|------|
| 1(a) | State Turing Test.   | [1M] |
| (b)  | What is Strong Slot Filler Structure?  | [1M] |
| (c)  | Define Fuzzy Set.  | [1M] |
| (d)  | What is continuous plan?   | [1M] |
| (e)  | What is Expert System?   | [1M] |
| (f)  | Define effect of Heuristic accuracy on performance.  | [2M] |
| (g)  | Construct truth table for $(P \leftrightarrow Q) \leftrightarrow (P \rightarrow Q) \wedge (Q \rightarrow P)$ | [2M] |
| (h)  | State Baye rule for uncertainty.   | [2M] |
| (i)  | What is Genetic learning?  | [2M] |
| (j)  | What is Any colony system?   | [2M] |

**PART-B**

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

- |      |  |      |
|------|--|------|
| 2(a) | Differentiate DFS and BFS. Is Best-First Search better than BFS and DFS? Justify.    | [7M] |
| (b)  | What is Means Ends Analysis? Explain in detail.                                      | [8M] |
| 3(a) | Explain Backward chaining process in detail.   | [7M] |
| (b)  | List the steps involved in Unification process.                                      | [8M] |
| 4(a) | What is Dempster Shafer Theory? How it used to handle the uncertainty?               | [7M] |
| (b)  | Discuss various certainty factors of rule based systems.                             | [8M] |
| 5(a) | Does Decision Trees are useful in learning process of a system? Justify your answer. | [7M] |
| (b)  | What is Multi - Agent Planning? Explain in detail.                                   | [8M] |
| 6(a) | How Alpha-Beta cutoffs reduce the search space? Discuss.                             | [8M] |
| (b)  | Knowledge acquisition is necessary for expert systems. Explain.                      | [7M] |
| 7(a) | Discuss about Knowledge based agent.   | [7M] |
| (b)  | How Bayesian Networks are useful in handling of uncertainty?                         | [8M] |
| 8(a) | Explain perceptron learning with an example.   | [8M] |
| (b)  | Discuss about various Hardware component used for Robotics.                          | [7M] |

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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

**S213 -ELECTRICAL DISTRIBUTION SYSTEMS  
(EEE)**

Time : 3 hours

Max. Marks : 75

**PART-A**

(Compulsory question)

- 1(a) Define diversity factor. [1M]
- (b) What is voltage square factor? [1M]
- (c) Which gas is used in Gas insulated substation? [1M]
- (d) Name any two functionalities of distribution automation system. [1M]
- (e) List out the methods of voltage control. [1M]
- (f) A load in an area has a load factor 0.6. What is the approximate loss factor? [2M]
- (g) What are the basic types of distribution system? [2M]
- (h) Outline the significance of a substation in a distribution system. [2M]
- (i) What is ripple control? [2M]
- (j) Mention the benefits of p.f. improvement. [2M]

**PART-B**

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

- 2(a) Discuss the characteristics of different loads and load models. [7M]
- (b) The supply system has following type of loads:

Type of load	M.D(KW)	L.F.(%)	Diversity factor	Overall diversity
Domestic	2000	25	1.2	1.35
Commercial	5000	30	1.15	
Industrial	8000	75	1.25	

What are the connected load of each category if the demand for domestic, Commercial and industrial loads are 50, 60 and 80 percent respectively?

Find (i) Maximum Demand (ii) Daily energy consumption.

[8M]

- 3(a) Derive voltage drop for a DC distributor fed at both ends with equal voltages of concentrated loads? [7M]
- (b) A 800 meters 2-wire dc distributor AB from both ends is uniformly loaded at the rate of 1.25A/meter run. Calculate the voltage at the feeding points A and B if the minimum potential of 220V occurs at point C at a distance of 450m from end A. Resistance of each conductor is 0.05Ω/Km. [8M]
- 4(a) What are the factors to be considered for location of a substation? [7M]
- (b) Compare four feeder pattern and six feeder pattern. [8M]
- 5(a) Briefly describe distribution automation software and hardware. [7M]
- (b) Compare advantages and disadvantages of each wired and wireless communication equipment. [8M]
- 6(a) Describe the operation of AVR with neat diagram. [7M]
- (b) How do you determine the best capacitor location? [8M]
- 7(a) Define the following terms: (i) Coincident demand (ii) Contribution factor (iii) Load Diversity (iv) non coincident demand. [7M]
- (b) Describe the types of primary feeders and discuss the merits and demerits of them. [8M]
- 8(a) Outline the major elements of an RTU. [7M]
- (b) Discuss the effect of shunt capacitors in improving p.f. [8M]

**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING  
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L.B. Reddy Nagar :: Mylavaram – 521 230 :: Krishna Dist.: A.P.

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

**S345-POWER SYSTEM ANALYSIS**

(EEE)

Time : 3 hours

Max. Marks : 75

**PART-A**

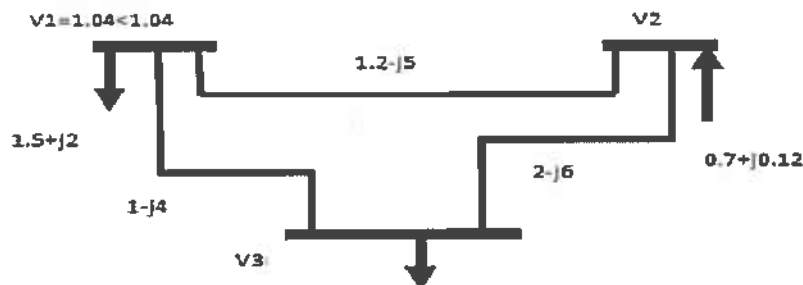
(Compulsory question)

- 1(a) What are the applications of Y-bus matrix. [1M]
- (b) Define base impedance of a power system and write an expression for it in terms of MVA and KV. [1M]
- (c) Write static load flow equations. [1M]
- (d) How are the faults classified? [1M]
- (e) Define steady state stability limit. [1M]
- (f) Define a branch and link in graph theory. [2M]
- (g) What is per unit system, How is the base quantities are selected? [2M]
- (h) What is the need for load flow study? [2M]
- (i) What are sequence impedances? [2M]
- (j) What is synchronizing coefficient? [2M]

**PART-B**

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

2. Write the four types of modifications required in building Z-bus matrix with necessary expressions [15M]
3. A three bus system is shown in below figure. Calculate the bus 2 & 3 voltage at the end of first iteration by G.S method. All values are in P.U.



- 4(a) Write comparisons and differences between G-S and N-R Power flow methods. [8M]
- (b) Derive the power flow equation for decoupled load flow method. [7M]
5. A 30 MVA 11 KV generator has  $Z_1 = Z_2 = j0.2$  p.u,  $Z_0 = j0.05$  p.u. A line to ground fault occurs on the generator terminals. Find the fault current and line to line voltages during limit conditions. Assume that the generator neutral is grounded and that the generator is operating at no load and at rated voltage at the occurrence of fault. [15M]
- 6(a) What is power angle curve and how to determine steady state stability from that? [8M]
- (b) Give the elementary concepts of three types of power system stabilities. [7M]
7. Explain the method of equal area criteria for transient stability analysis, define and derive critical clearing time and critical clearing angle. [15M]
8. Derive the expression for fault current for a double line to ground fault in an unloaded generator in terms of symmetrical components. [15M]

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING**  
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L.B. Reddy Nagar :: Mylavaram - 521 230 :: Krishna Dist.: A.P.

B.Tech. VI Semester Regular/Supplementary Examinations

**S313-MICROPROCESSORS AND MICROCONTROLLERS**

Time : 3 hours

(EEE)

Max. Marks : 75

**PART-A**

(Compulsory question)

- 1(a) What is purpose of AX Register in 8086? [1M]
- (b) How to operate 8086 Microprocessor in minimum mode of operation? [1M]
- (c) Discuss the purpose of data bus buffer in 8255. [1M]
- (d) Describe the TXRDY pin of 8251 USART. [1M]
- (e) What is the size of internal data RAM in 8051 Microcontroller? [1M]
- (f) Explain any two data transfer instructions with an examples. [2M]
- (g) What are the control signals derived by 8086 Microprocessor in Minimum mode, Maximum mode of operations? [2M]
- (h) Describe the bit definitions of Status Register of 8257. [2M]
- (i) Describe the bit definitions of Mode Instruction Format of 8251 in Asynchronous mode. [2M]
- (j) Discuss the following signal descriptions of 8051 Microcontroller. [2M]

a) ALE/PROG b) T<sub>0</sub> and T<sub>1</sub>

**PART-B**

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

- 2(a) Explain why assembler directives are required. [7M]
  - (b) Write an assembly language program in 8086 to arrange the given numbers in descending order. [8M]
  - 3(a) Differentiate between minimum mode and maximum mode operation of 8086 Microprocessor. [7M]
  - (b) Design an interface between 8086 CPU and two chips of 16K×8 EPROM two chips of 32K×8 RAM. Select the starting address of EPROM suitably. The RAM address must start at 00000H. [8M]
  - 4(a) Draw and discuss the architecture of 8257. [7M]
  - (b) With a neat block diagram explain the operation of ADC 0808. [8M]
  - 5(a) Draw and explain the architecture of 8259 programmable Interrupt Controller. [8M]
  - (b) Describe the interrupt structure of 8086 Microprocessor. [7M]
  6. Draw and discuss the formats and bit definitions of the following SFRs of 8051 Microcontroller. [15M]
- i. PCON ii. TCON iii. TMOD iv. PSW v. IP
- 7(a) Explain the different types of Instruction Formats used in 8086. [7M]
  - (b) Explain the interrupt structure of the 8051 microcontroller. [8M]
  - 8(a) Interface ADC 0808 with 8086 using 8255 ports. Use Port A of 8255 for transferring digital data output to the CPU and Port C for control signals. Assume that analog input is presented at i/p2 of ADC and clock frequency is available for ADC. Draw the schematic and write required ALP. [8M]
  - (b) Discuss about the following control word formats of 8259: [7M]

i. Initialization Command Words (ICWs).

ii. Operational Command Words (OCWs).

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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**

(Answer all questions)

- 1(a) Write a note on linear optimization problems. [1M]
- (b) Define duality. [1M]
- (c) State the various methods available for solving a multi variable optimization problem. [1M]
- (d) Write any one KKT condition. [1M]
- (e) Define functional? [1M]
- (f) Write the necessary and sufficient conditions single variable optimization problem. [2M]
- (g) How do you identify the pivot element in dual simplex method? [2M]
- (h) Write Lagrange Multiplier equation. [2M]
- (i) Describe the Global minima. [2M]
- (j) Describe the term personal best in particle swarm optimization. [2M]

**PART-B**

(Answer any FOUR questions)

- 2(a) Classify optimization techniques with brief note. [7M]
- (b) Find the optimum solution of the function  $f(x) = 4x^3 - 18x^2 + 27x - 7$  [8M]
3. Solve the following LP problem using dual simplex method:  
 Minimize  $f = 20x_1 + 16x_2$   
 $x_1 \geq 2.5$   
 $x_2 \geq 6$   
 Subject to  $2x_1 + x_2 \geq 17$   
 $x_1 + x_2 \geq 12$   
 $x_1 \geq 0, x_2 \geq 0$  [15M]
- 4(a) State the iterative approach used in Davidon-Fletcher-Powell method. [7M]
- (b) Construct the  $\phi_k$  function according to exterior penalty function method and complete the minimization of  $\phi_k$  for the following problem: Minimize  
 $f(x) = (x-1)^2$  Subject to  $g_1(x) = 2-x \leq 0, g_2(x) = x-4 \leq 0$  [8M]
5. Solve KKT condition for the problem  
 Minimize  $f(x_1, x_2) = x_1^2 + x_2^2 - 2x_1 - 2x_2 + 2$   
 Subject to  $g_1 = -2x_1 - x_2 + 4 \leq 0, g_2 = -x_1 - 2x_2 + 4 \leq 0$  [15M]
- 6(a) Describe the following terms in particle swarm optimization:  
 (i) personal best (ii) Global best (iii) swarm. [7M]
- (b) Describe in detail about optimal saturating controllers. [8M]
- 7(a) Express the function  
 $f(x_1, x_2, x_3) = -x_1^2 - x_2^2 + 2x_1x_2 - x_3^2 + 6x_1x_3 + 4x_1 - 5x_3 + 2$   
 In matrix form as  $f(x) = \frac{1}{2} X^T [A] X + B^T X + C$  and determine whether the matrix [A] is positive definite, negative definite or indefinite. [8M]
- (b) Illustrate simplex method with flow chart. [7M]
8. Minimize  $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$  by taking the starting point as  $X_1 = \{0 \ 0\}$ . Use Newton's method. [15M]

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING  
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L.B. Reddy Nagar :: Mylavaram – 521 230 :: Krishna Dist.: A.P.

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

**S105-ADVANCED ELECTRICAL MACHINES  
(EEE)**

Time : 3 hours

Max. Marks : 75

**PART-A**  
(Compulsory question)

Q.No	Questions	Marks	CO	BL
1(a)	Define AC servo motor and DC servo motor.	1M	CO1	L1
(b)	Define pull-in and pull-out range.	1M	CO1	L1
(c)	What is switched reluctance motor?	1M	CO1	L2
(d)	Draw B-H curve of permanent magnet.	1M	CO2	L4
(e)	What is Linear motor?	1M	CO1	L2
(f)	Write some applications of DC servo motor.	2M	CO5	L3
(g)	A stepper motor is operating a pulse rate of 5000 pulse/sec. It travels $100^\circ$ in 0.02 sec. Find its resolution.	2M	CO2	L5
(h)	Disadvantages of switched reluctance motor.	2M	CO4	L4
(i)	Write some applications of BLDC motor.	2M	CO5	L3
(j)	Draw the phasor diagram of Repulsion motor.	2M	CO3	L2

**PART-B**

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

2(a)	Obtain the transfer function of an armature –controlled DC servo motor. Give its block diagram.	7M	CO3	L5
(b)	Describe the construction of AC servo motors of different types.	8M	CO1	L4
3(a)	With a block diagram, explain the open loop control of a stepper motor.	7M	CO2	L2
(b)	Discuss applications of stepper motors.	8M	CO5	L3
4	Derive torque equation of an SRM and also explain characteristics of SRM.	15M	CO4	L4
5(a)	With a constructional diagram, explain the working of permanent magnet DC motor.	7M	CO1	L2
(b)	Comparison of PMDC motor with conventional DC motor.	8M	CO4	L1
6(a)	What are the merits of brushless DC motors? With a neat diagram, explain the principle of operation.	7M	CO4	L2
(b)	Explain d-q analysis of BLDC motor.	8M	CO1	L1
7(a)	Sketch and explain the various characteristics of repulsion motor.	7M	CO1	L3
(b)	Describe the various types of linear motors.	8M	CO2	L6
8(a)	Discuss the role of AC and DC servo motors in automation systems.	7M	CO2	L2
(b)	With a block diagram explain a control scheme for SRM.	8M	CO1	L6

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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) Is the wind energy is Sustainable? [1M]
- (b) Define angle of Incidence. [1M]
- (c) What is the amount of power available in the wind? [1M]
- (d) Draw the block diagram of drive train model. [1M]
- (e) Write the Fuel cell chemical equation. [1M]
- (f) Explain how DG improving payback of emergency. [2M]
- (g) What is PV cell and PV Array? [2M]
- (h) What is stall and active stall control? [2M]
- (i) What are the draw backs of WRIG based wind energy grid integrated systems? [2M]
- (j) Draw the characteristics of Fuel cell. [2M]

**PART-B**

(Answer any FOUR questions all question carry equal marks)

- 2(a) Discuss the technologies of Distributed Generation. [7M]
- (b) Explain the Indian scenario of Distributed Generation. [8M]
- 3(a) Illustrate how electric power can be generated by solar pond and solar chimney. [7M]
- (b) Discuss the working principle and operation of parabolic trough solar thermal power plant. [8M]
- 4(a) Explain the factors to be considered in site selection for wind power plant. [7M]
- (b) Discuss about Blade type and Multiple Blade type HAWTs. [8M]
- 5(a) Explain the different modes of operation of wind power plant. [7M]
- (b) Develop the model of drive tran and PMSG. [8M]
- 6(a) Discuss about the different types of Fuel Cells. [7M]
- (b) Discuss about the Micro turbuines. [8M]
- 7(a) Discuss the steps involved in implementation of PV systems. [7M]
- (b) Explain the PV cell characteristics and effect of temperature. [8M]
- 8(a) Discuss different mechanical power controlling methods of wind turbine. [7M]
- (b) Discuss about the blade pitch angle, Drag Force, Lift Force and Attack angle. [8M]

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