

2016 BATCH
I M.TECH
I SEMESTER
REGULAR EXAMINATION
DEC-2016
QUESTION PAPERS
ACADEMIC YEAR
2016-17

Subject Code: R16MTE110**M.Tech - I Semester Regular Examinations, Dec - 2016**
THERMAL & NUCLEAR POWER PLANTS
(TE)**Time: 3 hours****Max Marks: 60****Answer any FIVE questions.**
All questions carry EQUAL marks*********

1. (a) Discuss general layout of thermal power plant with a suitable sketch. 6M
(b) Describe flue gas analysis in detail. 6M
2. (a) Why ash and dust handling problem is more difficult than coal handling problems. Explain 6M
(b) Explain high pressure ash handling hydraulic system. 6M
3. (a) Compare forced draught and induced draught. 6M
(b) What is a cooling tower? How are cooling towers classified? Explain any one of them with neat sketch. 6M
4. (a) What are the methods available for improving thermal efficiency of gas turbine plants? 6M
(b) Discuss the need of combining power plants. Explain IGCC power plant. 6M
5. (a) Draw a neat diagram of breeder reactor and list out its advantages and disadvantages. Why only sodium is used as coolant in breeder reactors? Explain. 6M
(b) Discuss the various factors for selection of site for steam power plant. 6M
6. (a) The following data pertain to a power plant of 120 MW capacity
The capital cost= Rs 15000/Kw
Interest and depreciation= 10% on capital
Annual running charges = Rs 20×10^6
Profit to be gained= 10% of the capital
The energy consumed by the power plant auxiliaries=5% of generated
Annual load factor= 0.6
Annual capacity factor= 0.5
Calculate a) reserve capacity b) cost of generation per kwh. 8M
(b) Describe the factors effecting economics of power plant. 4M
7. (a) sketch and explain Bourdon tube pressure gauge. 6M
(b) Write the importance of catalytic converters in controlling the pollution. 6M
8. (a) Distinguish impulse and Reaction turbines. 6M
(b) Write a short note on the following. 6M
 - i. Fixed cost
 - ii. Construction cost
 - iii. Maintenance cost
 - iv. Depreciation

Subject Code: R16MMD111

M.Tech - I Semester Regular Examinations, Dec - 2016

MATERIAL TECHNOLOGY

(MD)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. a) What are dislocations? Classify them and discuss any one of them. 5M
b) Explain the role of grain boundary in strengthening of a metal. 7M
2. a) What is super plasticity? Explain the conditions required for super plasticity. 7M
b) What is deformation? Explain the slip mode of deformation. 5M
3. a) Draw Fe-Fe₃C Diagram and explain cooling of 1.0 % C alloy in the Fe-Fe₃C 8M
Diagram.
b) Discuss the cooling of 0.4 % C steel. 4M
4. a) Discuss briefly any two processes used for forming the thermoplastics with neat 8M
sketches.
b) Give two examples for each (i) amorphous and (ii) semi-crystalline polymer. 4M
5. a) Discuss how fine ceramics are classified. Discuss their applications with suitable 8M
examples.
b) List any two ceramic components made by (i) hot pressing and (ii) hot isostatic 4M
pressing.
6. a) What are the advantages and applications of composite material? 7M
b) What are the general requirements of all composite materials? 5M
7. a) Discuss the Full Annealing heat treatment of Steel 7M
b) What is the role of a coupling agent present in the interface between reinforcement 5M
and matrix?
8. a) Discuss the important ceramics and their properties for use in thermal functions. 4M
b) Write a brief notes on Nickel and Titanium Aluminates 8M

Subject Code: R16MDS108

M.Tech - I Semester Regular Examinations, Dec - 2016
NETWORK SECURITY AND CRYPTOGRAPHY
(DSCE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) Discuss in detail about Feistel Cipher Structure. [6+6]
(b) Write about Differential and Linear Cryptanalysis.
2. (a) Explain the Characteristics of Advanced Symmetric block ciphers. [6+6]
(b) Discuss briefly about Blowfish algorithm.
3. Write about RSA algorithm with an Example. [12]
4. (a) Discuss in detail about public key encryption. [6+6]
(b) What are Simple Hash Functions?. Explain.
5. (a) Explain about HMAC. [7+5]
(b) Write about Digital signatures.
6. (a) Discuss about Oakley Key Determination Protocol. [6+6]
(b) Explain about Fire wall Design Principles.
7. (a) Explain briefly about S/MIME. [6+6]
(b) What are X.509 directory Authentication service-Certificates? Explain.
8. (a) Explain about Secure Electronic Transaction. [6+6]
(b) Discuss about Viruses and Related threats.

Subject Code: R16MDE107

M.Tech - I Semester Regular Examinations, Dec - 2016
OPTICAL COMMUNICATION TECHNOLOGY
(DECS)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) Explain how light propagates in an optical fiber using the geometrical optics approach.
(b) Discuss signal propagation in a non linear medium.
2. (a) What is the principle of operation of a laser? Explain its working.
(b) What is the use of gratings in an optical fibre? Explain
3. (a) State the principle of operation of Isolators and Circulators. Explain the working of any one device.
(b) Discuss types of multiplexer architectures used in fibre optics.
4. (a) Compare the various modulation schemes used in fibre optics.
(b) Deliberate on the use of subcarrier multiplexing in optical communication.
5. (a) Write short notes on ideal receivers for demodulation.
(b) What is the significance of coherent detection in demodulation of fibre optic signals.
6. (a) What are the measures that need to be taken to reduce cross talk?
(b) What are the limitations of dispersion? How can it be compensated?
7. (a) Explain how wavelength is stabilized against temperature variations?
(b) Discuss any three important fibre optic system design considerations
8. (a) Discuss how Reed Solomon codes are used for error detection and correction.
(b) Give an introduction to solitons. Where is it used?

Subject Code: R16MEE106

M.Tech - I Semester Regular Examinations, Dec - 2016

SPECIAL MACHINES AND CONTROL

(Common to PEED and PID)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.

All questions carry EQUAL marks

1. (a) Derive the Torque equation of Stepper Motor.
(b) Describe about Characteristics of Stepper Motor. [6+6]
2. (a) Compare and contrast the performances of SRM and Stepping motors. [6+6]
(b) Draw the inductance profile of SRM and explain in detail with reference to the rotor position.
3. (a) Depict the torque speed characteristics of PMBLDC motor and describe it in detail.
(b) Discuss the magnetic circuit analysis relevant to permanent magnet brushless DC motor. [6+6]
4. (a) Deduce the emf equation of BLPM sine wave motors.
(b) Draw the phasor diagram of PM sine wave motor and derive its torque equation. [6+6]
5. (a) Describe the construction and working of Servomotor.
(b) Enumerate about any two applications of Servo motor. [6+6]
6. (a) Analyse the edge effect of Linear motors.
(b) Detail about the characteristics of Linear motors. [6+6]
7. (a) Mention the features of stepping motor and narrate its characteristics with relevant diagrams.
(b) Illustrate the operation of hybrid stepping motor. [6+6]
8. (a) Brief the locus diagram features of PMSM.
(b) Explain about vector control of PMSM. [6+6]

Subject Code: R16MSE110

M.Tech - I Semester Regular Examinations, Dec - 2016

SPECIAL CONCRETES

(SE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. Write short notes on polymer concrete and its applications.
2. Discuss about the use following chemical admixtures in the concrete
(1) Air entraining admixtures (2) Accelerating admixtures (3) Water reducing admixtures .
3. What are the basic properties of fibre – reinforced concrete which can be advantageously made use of in the design of structural elements?
4. Discuss about mix proportioning, properties in fresh and hardened state and applications of high density concrete.
5. Discuss about strength and durability of light weight concrete and its applications.
6. What is Ferrocement, and discuss about strength and behaviour of ferrocement in tension, compression and flexure and also mention applications of ferrocement.
7. Describe the following
 - (i) High Performance concrete
 - (ii) High performance Fibre reinforced concrete.
 - (iii) Bacterial Concrete
8. Explain the proportioning, production and classification of Ready Mixed Concrete.

Subject Code: R16MSE107

M.Tech - I Semester Regular Examinations, Dec - 2016
REPAIR & REHABILITATION OF STRUCTURES
(SE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. a. Explain the causes of deterioration of concrete structures
b. Discuss in detail about the ultrasonic pulse velocity test
2. a. Explain the various methods of corrosion protection and its applications.
b. Explain the serviceability and durability requirement for the structures.
3. a. Explain the Assessment procedure for evaluating a damaged structure
b. Explain the preventive measures for damage of structures and various aspects.
4. a. What is fibre reinforced concrete? Explain its properties and applications
b. Explain the special concretes and mortars used for repair of the structures.
5. a. Explain i. foamed concrete and ii. Vacuum concrete
b. Explain the various techniques used for repair of cracks in structures.
6. a. Explain the Engineered demolition techniques for dilapidated structures.
b. Explain the procedure for structures under marine exposure.
7. a. Explain the testing of concrete using core drilling
b. Write short note on corrosion resistant steels.
8. a. Explain the necessity of maintenance of structures
b. Explain i. Sulphur infiltrated concrete and ii. Ferro cement.

Subject Code: R16MEE105

M.Tech - I Semester Regular Examinations, Dec - 2016
POWER SEMICONDUCTOR DEVICES AND PROTECTION
(Common to PEED and PID)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) Explain classification of Power semiconductor switching devices in detail.
(b) Analyze V-I characteristics of various real switching devices. [6+6]
2. (a) With the help of neat sketches explain the structure and V-I characteristics of Power diodes.
(b) Explain the operation of Schottky diode. [6+6]
3. (a) Explain in detail about the operation of BJT.
(b) Analyze ON/OFF transition loss analysis of Power transistors. [6 +6]
4. (a) Discuss in detail the ON to OFF state and OFF to ON state transitions of Power MOSFET.
(b) Briefly discuss about ratings and specifications of MOSFET. [6+6]
5. (a) Discuss in brief the protection of switching devices against overvoltages and currents. [6+6]
(b) Briefly discuss about Reverse recovery characteristics of switching devices.
6. (a) Briefly discuss the thermal model of semiconductor devices.
(b) Also discuss the effect of sizing of heat sink of thermal model. [6+6]
7. (a) Compare and analyze power handling capabilities of IGBT with respect to power diodes, power transistors and power MOSFET.
(b) Explain short notes on Emerging power switching devices. [6+6]
8. (a) What is effect of magnetic circuit on the performance of power semiconductor devices?
(b) Briefly discuss the design of high frequency inductor for power semiconductor devices. [6+6]



Subject Code: R16MMD108

M.Tech - I Semester Regular Examinations, Dec - 2016
DESIGN FOR MANUFACTURING AND ASSEMBLY
(MD)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) Describe the steps in engineering design process with suitable example.
(b) What are the general design considerations in manufacturing? Explain
2. (a) Enumerate design rules applicable to dimensional tolerances of various machining processes.
(b) Explain the design rules applicable to surface roughness of various machining processes
3. (a) List all casting processes and explain briefly.
(b) Explain sand casting with a neat sketch.
4. (a) Explain general design rules in pre and post treatment of welds.
(b) Explain the effect of thermal stresses in welded joints
5. (a) Explain the design for plastic components manufacturability and its applications.
(b) Explain various methods of inspection of injection moulding effects.
6. (a) What is Visco elastic and creep behaviour of plastics? Explain its effects on the design of plastic components.

(b) Discuss the design principles of punching and deep drawing operations.
7. (a) With a neat sketch explain design of closed die forging design and drop forging die design.
(b) Explain the design guidelines for extruded sections.
8. (a) Write about the impact of DFM decisions and Design rules for manufacturability with reference to a case
(b) What are the factors for selection of manufacturing process?

Subject Code: R16MTE106

M.Tech - I Semester Regular Examinations, Dec - 2016

FUELS AND COMBUSTION

(TE)

Time: 3 hours

Max. Marks: 60

**Answer any FIVE questions.
All questions carry EQUAL marks**

1. (a) write about gasification and liquification methods.
- (b) Classify fuels based on phase at ambient conditions and explain about blast furnace gas ,production process [12]
2. (a) Explain the methods of quantifying fuel and air content of combustible mixtures.
- (b) brief out first and second order reactions with suitable equations [12]
3. (a) . What is chain reaction? Explain the elementary reactions from chain initiation to chain termination considering a simple reaction system like H₂-O₂.
- (b) Write in detail about Adiabatic flame temperature and sketch the necessary diagram [12]
4. (a) write in detail about the factors which are influencing the flame velocity
- (b) what is stoker and explain in detail [12]
5. (a) what are the types of gas burners and explain the functional requirements
- (b) Derive the expression for ratio of flame standoff distance for a droplet burning. [12]
6. (a) What are the different methods for burning velocity measurement? Explain any two methods in detail.
- (b) Determine the detonation pressure for a gaseous mixture of H₂ and O₂ at initial pressure of 0.2 MPa and 3000K assuming the products to be only H₂O when its density gets increased by three times due to formation of detonation wave. [12]
7. a) Narrate briefly about burning velocity of fuels
- b) what are the principle pollutants? Which causes civiour health hazards to humanbeibg [12]
8. (a) What are the mechanisms for NO_x formation? Discuss about the methods available for NO_x emission control.
- (b) What are the internal standards and legislative measures to controll the emisson pollutants. [12]



Subject Code: R16MDE105

M.Tech - I Semester Regular Examinations, Dec - 2016
EMBEDDED REAL TIME OPERATING SYSTEMS
(DECS)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) what should be the goal of an OS and List the functions of kernel services in an OS.
(b) Explain the memory management functions and memory allocation of the kernel . [6+6]
2. (a) Explain the principles and encapsulation in basic design using an RTOS.
(b) when do you use cooperative scheduling and preemptive scheduling. [6+6]
3. (a) when do you use cooperative scheduling and preemptive scheduling.
(b) List the Linux functions for the signal, multithreading, and semaphore and message Queue for IPC . [6+6]
4. (a) what are the important features of Vx Works that are essential in embedded system design.
(b) List the classes for host of smart card used in the Bank ATM. [6+6]
5. (a) Explain all the specifications of hardware and software architecture of AVCM.
(b) Briefly explain about hardware architecture of a camera system. [6+6]
6. (a) Explain the process of creating a target image for windows XP embedded platform .
(b) write short note on shell programming. [6+6]
7. (a) What is an RT Linux module? What are the function calls provided for timer management in RT Linux.
(b) explain briefly about Appliance control by RT Linux system. [6+6]
8. write short note on [12]
(a) Semaphore management
(b) Mutex management

Subject Code: R16MDS106

M.Tech - I Semester Regular Examinations, Dec - 2016
ADVANCED COMPUTER ARCHITECTURE
(DSCE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) Define Instruction Set. 4M
(b) Explain Principle of Locality and Amdahl's law 8M
- 2.(a) Find the die yield for dies that are 2cm on a side and 0.8 cm on a side, assuming a defect density of 0.6 per cm². 6M
(b) List and explain Memory Addressing Modes . 6M
3. (a) Explain basic RISC Instruction Set Processor. 6M
(b) Explain basic performance in pipelining. 6M
4. (a) Explain about Memory Hierarchy. 6M
(b) How do you improve performance of Cache memory explain in detail 6M
5. (a) Discuss the need of Dynamic Scheduling. 6M
(b) Explain about Control Dependencies. 6M
6. Explain the Process of detecting and enhancing of loop level parallelism. 12M
7. (a) What is Systematic Shared Memory Architecture? 6M
(b) Explain about Multi Processors and Thread level Parallelism. 6M
8. Explain in detailed about Interconnection Network Media. 12M



Subject Code: R16MCS105

M.Tech - I Semester Regular Examinations, Dec - 2016
COMPUTER COMMUNICATIONS
(CSE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) How data is transmitted in OSI? Explain in detail with neat diagram.
(b) Differentiate among LAN, WAN and MAN. [8+4]
2. (a) Explain working of CRC by considering the transmitted bit string is 1101011 and generator polynomial is $g(x)=x^4+x^3+1$
(b) Explain Go back N sliding Window Protocol. [6+6]
3. (a) Explain the frame format of HDLC.
(b) Write about the architecture of Internet. [6+6]
4. (a) What is CSMA? Discuss various Persistence methods in CSMA.
(b) Write about IEEE 802.5. [6+6]
5. (a) Explain in detail about source routing bridges.
(b) How Flooding algorithm will works for routing? Explain in detail. [6+6]
6. (a) Discuss about network layer Designing issues.
(b) Write a short note on Congestion control principles. [8+4]
7. (a) Explain connection establish and connection release in transport layer.
(b) Discuss the services provided to the upper layer by the transport layer. [6+6]
8. (a) Explain E-Mail architecture and its services.
(b) Differentiate between static Web Document and Dynamic Web Document. [8+4]

Subject Code: R16MSE104

M.Tech - I Semester Regular Examinations, Dec - 2016
STRUCTURAL DYNAMICS
(SE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) State and explain D'Alembert's principle. (4 M)
1. (b) Explain the method of determination of damping coefficient of a dynamic system. (8 M)
2. (a) Explain the characteristics of various types of damped systems. (6 M)
2. (b) Explain the application of principle of virtual work. (3 M)
2. (c) Explain the concept of degrees of freedom. (3 M)
3. (a) Derive the expression for the steady state response of an undamped SDOF system of mass ' m ' and stiffness ' k ' subjected to forced vibrations $F(t) = F_0 \sin(\omega t)$. (7 M)
3. (b) Explain the working principle of a seismometer. (5 M)
4. Using Duhamel's Integral, determine the displacement at $t = 6$ sec of an undamped single degree of freedom system of mass $50 \times 10^3 \text{ kg}$ and natural frequency 1 rad/sec is subjected to the forcing function as shown in Fig.1. (12 M)

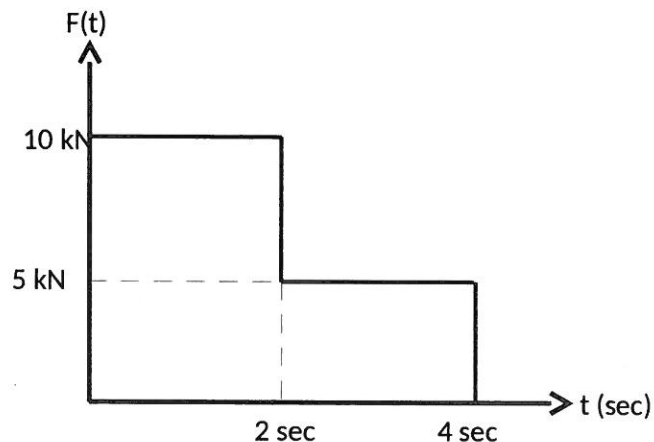


Fig. 1

5. Draw the mode shapes of a shear building frame shown in Fig. 2. Adopt $m = 1500 \text{ kg}$ and $k = 60 \text{ kN/m}$. (12 M)

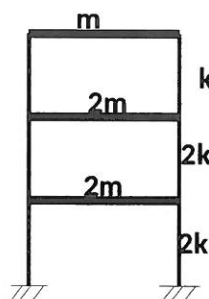


Fig. 2

6. Determine the maximum response at each floor level of a shear building frame due to the action of triangular impulsive forces ($P_1 = 5 \text{ kN}$ and $P_2 = 10 \text{ kN}$) as shown in Fig. 3. Assume $m = 2000 \text{ kg}$ and $k = 60 \text{ kN/m}$. (12 M)

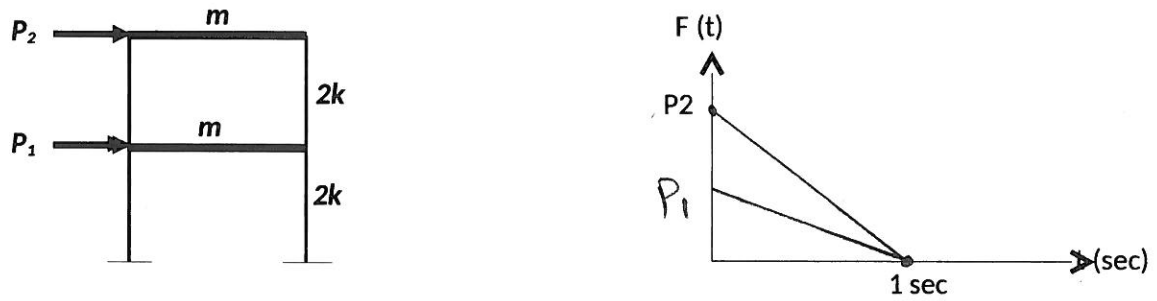


Fig. 3

7. Compute the fundamental natural frequency of the structural system shown in Fig.4. Use Rayleigh's method. Assume $k = 500 \text{ N/m}$ and $W = 20 \text{ kN}$. (12 M)

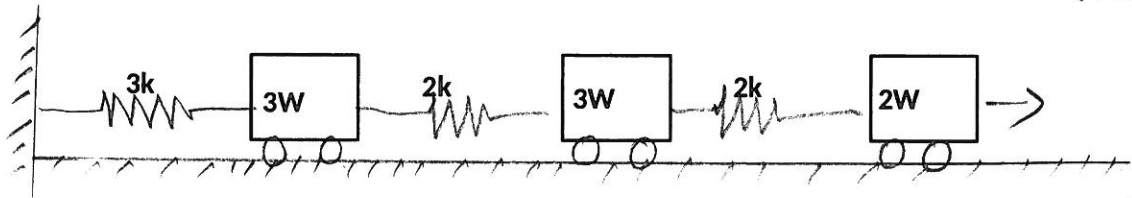


Fig. 4

8. Determine the consistent mass matrix of a beam segment of length ' L ' subjected to the loading as shown in Fig.5. (12 M)

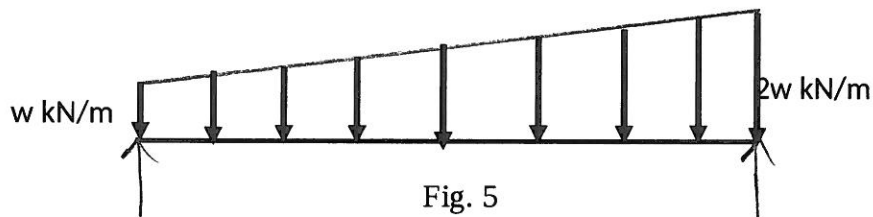


Fig. 5

Subject Code: R16MEE104

M.Tech - I Semester Regular Examinations, Dec - 2016

FLEXIBLE AC TRANSMISSION SYSTEMS

(Common to PEED and PID)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.

All questions carry EQUAL marks

1. (a) Explain the need for transmission interconnections in power systems
(b) Briefly discuss about the basic types of FACTS controllers
2. (a) With the help of circuit diagram and waveforms explain the principle of operation of Three phase full wave voltage sourced bridge converter.
(b) Compare the salient features of Current sourced converter with those of Voltage sourced converters
3. (a) Proves that in a two bus system, an ideal mid point shunt compensation doubles the maximum transmittable power
(b) Explain the power oscillation damping for static shunt compensation.
4. (a) Discuss the principle of operation and the characteristics of Thyristor Controlled Reactor
(b) Explain the operation of switching converter type reactive power generator.
5. (a) How to improve the transient stability by using static series compensators
(b) Explain the effect of series compensation of the end of a radial line on voltage stability
6. Explain the GCSC and TCSC type series compensators in detail.
7. Explain the principle of operation of a phase shifter
8. With the help of a block diagram explain the basic UPFC scheme. Discuss on the functional control modes of UPFC.

Subject Code: R16MTE104**M.Tech - I Semester Regular Examinations, Dec - 2016****ADVANCED IC ENGINES****(TE)****Time: 3 hours****Max Marks: 60****Answer any FIVE questions.****All questions carry EQUAL marks***********

1. (a) Derive an expression for geometrical properties of reciprocating engines.
(b) Explain the following:
 - i) Engine design and performance data
 - ii) Road load power. [12]
2. A petrol engine uses a fuel of calorific value 42000 kJ/kg. The compression and expansion curves follow the law $Pv^{1.3} = \text{constant}$. At 25% and 75% of the stroke on the compression curve, the pressures are found to be 2 bar and 5.2 bar respectively. If the relative efficiency of the engine is 50% and mechanical efficiency is 75%, find the specific fuel consumption on B.P basis. [12]
3. (a) Describe with a neat sketch the working Wankel engine.
(b) Discuss in detail:
 - i) Lean limit and Adiabatic concepts
 - ii) Exhaust gas treatment. [12]
4. (a) Exhaust emission and factors affecting the emission in S.I. Engines. Discuss green-House effect in detail.
(b) Discuss green-House effect in detail. [12]
5. Write short notes on:
 - a) Free piston engine
 - b) Modification to IC Engines to suitable Bio-fuels
 - c) CNG [12]
6. a) Explain the concept of hybrid vehicles.
(b) what is fuel cell? Explain in detail about any two of them. [12]
7. a) Sketch and explain the stratified charge engines.
b) Sketch and explain the working of adiabatic engines. [12]
8. a) Explain the concept of Squish.
b) Discuss the turbo charging and super charging of IC Engines with suitable diagrams.
c) What are the types of pre-chambers used in engines. [12]

Subject Code: R16MMD104

M.Tech - I Semester Regular Examinations, Dec - 2016

MECHANICAL VIBRATIONS

(MD)

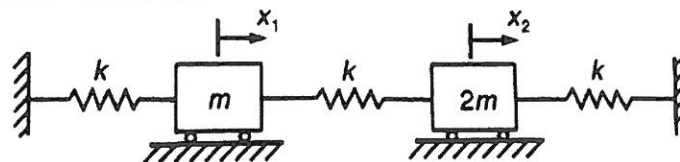
Time: 3 hours

Max Marks: 60

Answer any FIVE questions.

All questions carry EQUAL marks

1.
 - a. Briefly explain about the classification of vibrations [6M]
 - b. The frequency of Vibrations of a machine is 150 Hz. Determine (I) Its frequency in rad/sec. (II) Time Period of oscillations. If the amplitude of vibrations is 0.8 mm, determine the acceleration i) In m/s^2 ii) In terms of g . [6M]
2.
 - a. Differentiate between free vibrations and damped vibrations? [2M]
 - b. Derive the general solution of the equation of motion of free vibrations with viscous damping. [10M]
3.
 - a. Explain the following terms – Damping ratio, Critical damping, and Under-damping. [6M]
 - b. What is meant by damping factor? [3M]
 - c. What is meant by over damping? [3M]
4. Derive the natural frequency equation of a 'two degrees of freedom' system. [12M]
5. Determine the natural frequencies and amplitude ratios of the system. [12M]
Take $m = 20 \text{ kg}$ and $k = 500 \text{ N/m}$.



6.
 - a. Explain a two disc torsional rotor system. [6M]
 - b. Determine natural frequencies and mode shapes for a rotor system as shown in Figure 6. Neglect the mass of the shaft and assume that discs as lumped masses. The shaft is 1 m of length, 0.015m of diameter, and $0.8 \times 10^{11} \text{ N/m}$ of modulus of rigidity. Discs have polar mass moment of inertia as 1 0.01 Kg-m^2 and 2 0.015 Kg-m^2 . [6M]

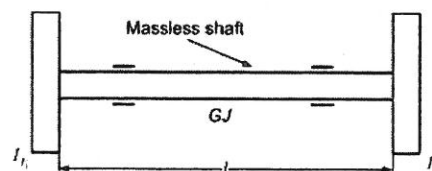


Figure 6. A two-disc rotor system

7. a) What are the principles on which a Vibrometer and an accelerometer are based? [6M]
b) Discuss Seismic instrument with the help of a sketch. [6M]
8. A rectangular bar of length l and uniform cross section is fixed at one end and free at other end. Derive the suitable expression for longitudinal vibrations. [12M]

Subject Code: R16MEC104**M.Tech - I Semester Regular Examinations, Dec - 2016**
WIRELESS COMMUNICATION AND NETWORKS
(Common to DECS and DSCE)**Time: 3 hours****Max Marks: 60****Answer any FIVE questions.**
All questions carry EQUAL marks*********

1. (a) What is the significance of frequency reuse in cellular networks? 4M
(b) Derive an expression for frequency reuse ratio? 4M
(c) Write a note on different channel assignment strategies in cellular networks. 4M
2. (a) Explain the two-ray ground reflection model and derive an expression for received power. 9M
(b) What is Brewster angle? 3M
3. Explain Longley-Rice and Durkin's outdoor propagation models in detail. 12M
4. (a) What is the difference between flat fading and frequency selective fading? 6M
(b) What are important parameters for mobile multipath channels? 6M
5. (a) Explain the significance of equalizers in a communication receiver. 6M
(b) Explain the operation of maximum likelihood sequence estimation (MLSE) equalizer with a neat sketch. 6M
6. (a) What is a wireless personal area network (WPAN)? 6M
(b) Explain various HIPERLAN standards. 6M
7. (a) Define the common terminology used in Trunking theory? 6M
(b) Write a short note on knife-edge diffraction model? 6M
8. (a) Write a note on spread spectrum channel impulse measurement system with a neat sketch. 6M
(b) Describe the structure of a linear equalizer. 6M

Subject Code: R16MCS104

M.Tech - I Semester Regular Examinations, Dec - 2016
OPERATING SYSTEMS
(CSE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

- | | |
|--|----|
| 1. (a) What are the functions of operating system? | 6M |
| (b) Explain evaluation of operating systems. | 6M |
| 2. (a) What is Process? Explain PCB. | 6M |
| (b) Illustrate RR scheduling algorithm with example. | 6M |
| 3. (a) What is semaphore? Illustrate semaphore operations | 6M |
| (b) Illustrate <i>dinning philosophers problem</i> with example. | 6M |
| 4. (a) Explain demand paging. | 6M |
| (b) Illustrate optimal page replacement algorithm with example. | 6M |
| 5. (a) Discuss file access methods. | 6M |
| (b) Explain File allocation methods. | 6M |
| 6. (a) Give principles of protection. | 6M |
| (b) Explain importance of cryptography. | 6M |
| 7. (a) What are the necessary and sufficient conditions for deadlock occurrence? | 6M |
| (b) Explain deadlock prevention. | 6M |
| 8. (a) Explain I/O accessing methods. | 6M |
| (b) Explain disk scheduling algorithms. | 6M |

Subject Code: R16MSE103

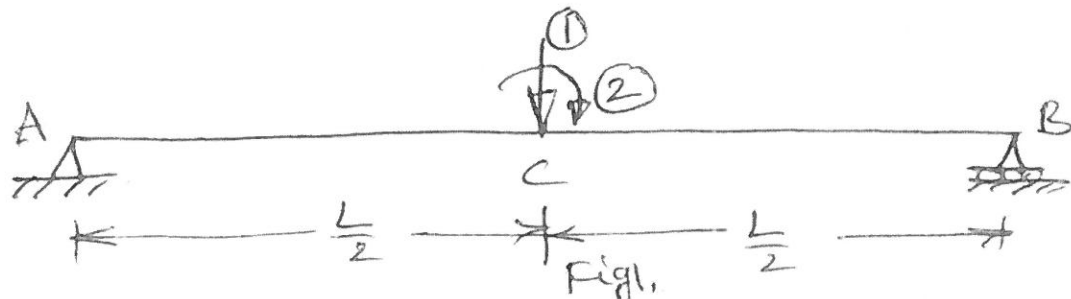
M.Tech - I Semester Regular Examinations, Dec - 2016
MATRIX ANALYSIS OF STRUCTURES
(SE)

Time: 3 hours

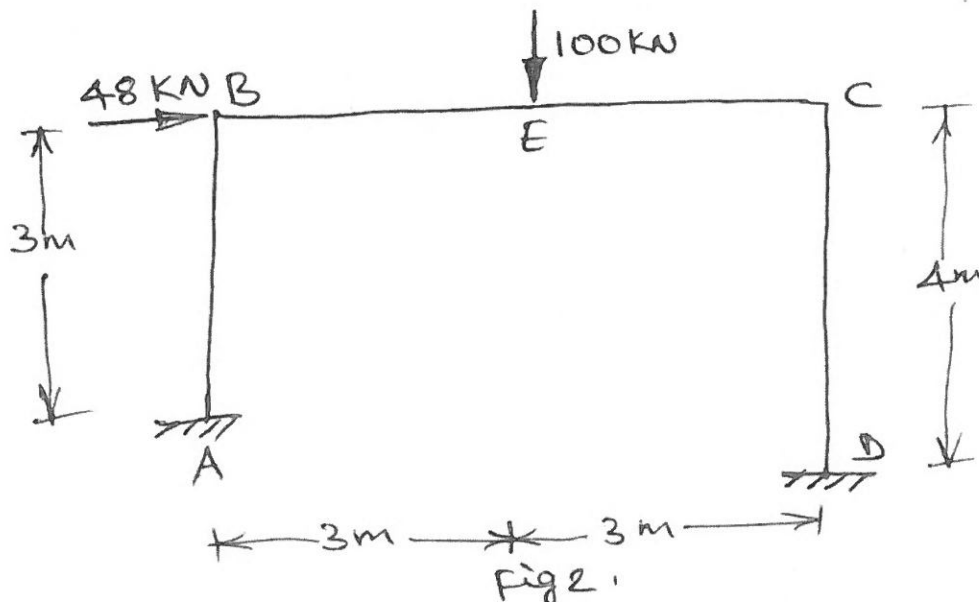
Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. a. Define stiffness and flexibility with examples and obtain the relationship between the same.
b. What is structural idealization? Explain.
2. a. Obtain the stiffness matrix of a bar element subjected to axial force
b. Obtain the stiffness matrix for a simply supported beam with nodes as shown in fig. 1

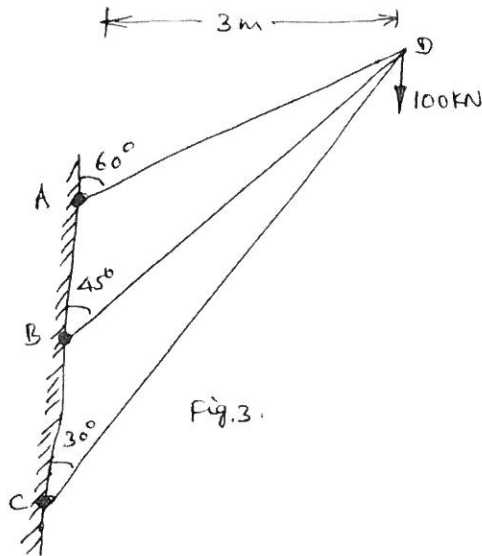


3. Using displacement method, Analyse the rigid jointed frame shown in fig 2. And draw the bending moment diagram.

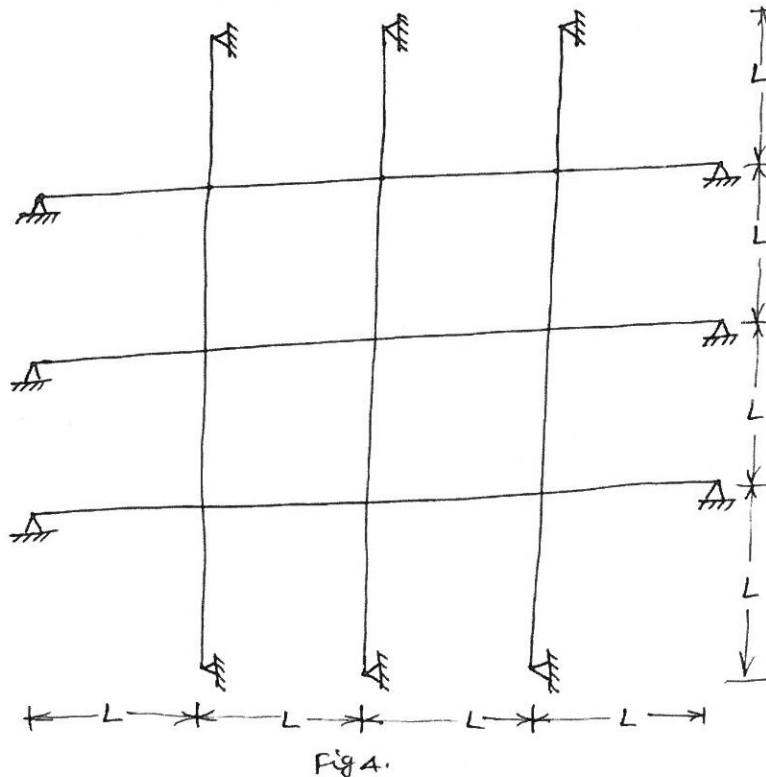


4. a. Obtain the stiffness matrix for simple grid element.
b. Explain the coordinate transformations in the matrix displacement analysis of grillage.
5. a. Obtain the stiffness matrix for the space truss element.

- b. Explain the coordinate transformations in the matrix displacement analysis of three dimensional structures.
6. What are the computer packages available for the analysis of structures? Explain any one software application in detail.
7. Analyse the pin jointed frame shown in fig 3. Using the stiffness method. All the members are having the same axial rigidity.



8. A four bay orthogonal grid has identical beams as shown in fig 4. is subjected to concentrated load P at all intersection points. Compute the reaction at all intersection points.





Subject Code: R16MEE103

M.Tech - I Semester Regular Examinations, Dec - 2016

ELECTRIC DRIVES - I
(Common to PEED and PID)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. Derive the expressions for average load voltage and load current for single phase semi converter fed separately excited dc motor drive with help of neat circuit diagram and waveforms. [12]
2. Explain the operation of three phase full converter fed dc series motor drives of continuous and discontinuous with neat waveforms. [12]
3. (a) A 200 Volts, 875 RPM, 150 A separately excited D.C. motor has an armature resistance of 0.06 ohms. It is fed from a single phase fully controlled rectifier with an ac source voltage of 220V, 50 Hz. Assuming continuous conduction, calculate
 - i. Firing angle for rated motor torque and 600 RPM.
 - ii. Firing angle for rated motor torque and (-750) RPM.(b) Discuss the speed torque characteristics of self excited dc motor drive. [6+6]
4. Draw and explain the block diagram of the open and closed – loop system of phase controlled DC motor drive. Also explain the block diagram of current control loop. [12]
5. (a) Explain the four quadrant operation of chopper controlled DC motor drives. [6+6]
(b) Explain the steady state analysis of a chopper controlled DC motor drive.
6. (a) Explain the pulse width modulation (PWM) current controller used in speed control of chopper fed DC motor.
(b) Discuss the design principles of speed and current controllers used in chopper fed DC motor. [6+6]
7. (a) Elaborate the dynamic simulation aspects of speed controlled DC motor drives.
(b) Discuss the operation of a speed feedback speed controller. [6+6]
8. Draw the schematic diagram of speed controlled two-quadrant separately excited DC motor drive and explain its operation in detail. [12]

Subject Code: R16MTE103

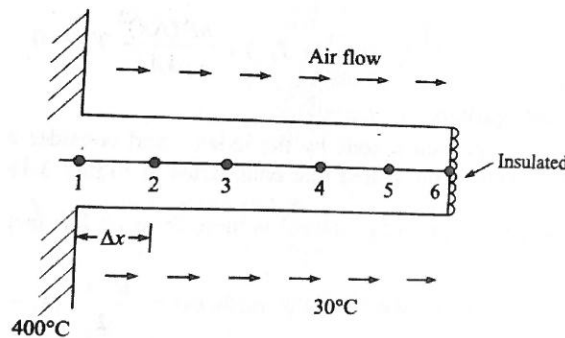
M.Tech - I Semester Regular Examinations, Dec - 2016
ADVANCED HEAT & MASS TRANSFER
(TE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions. All questions carry EQUAL marks

- Write a short note on shape factor.
 - A 40 x 40 cm copper slab 5 mm thickness at a uniform temperature of 250°C. Suddenly has its surface temperature lowered to 30°C. find the time at which the slab temperature becomes 90°C:
 $\rho = 9000 \text{ kg/m}^3$, $C = 0.38 \text{ kJ/kg K}$, $k = 370 \text{ W/m K}$ and $h = 90 \text{ W/m}^2 \text{ K}$ [6+6]
- An aluminium rod ($k = 200 \text{ W/m K}$) of 20 mm diameter and 0.2 m long protrudes from a wall which is maintained at 400°C as shown in Fig. The end of the rod is insulated and the surface of the rod is exposed to air at 30°C. The air is flowing around the rod gives a convective heat transfer coefficient of 40 W/m²K. With the help of numerical method determine (a) calculate the temperature at six nodes as shown in figure (b) determine the rate of heat loss from the base through the fin.



- Define laminar and turbulent flows. What is Reynolds number
 - Using the approximate integral approach derive the equation for local skin friction coefficient for hydrodynamic boundary layer and show that: [6+6]

$$C_{fx} = \frac{0.646}{\sqrt{Re_x}}$$

- Explain about pool boiling and flow boiling.

- (b) Dry saturated steam at a pressure of 2.45 bar condenses on the surface of a vertical tube of height 1m. The tube surface temperature is kept at 117°C . Estimate the thickness of condensate film and the local heat transfer coefficient at a distance of 0.2 m from upper end of the tube. [6+6]
5. (a) Significance of Grashoff Number in natural convection.
 (b) A vertical plate 15 cm high and 10 cm wide is maintained at 140°C . Calculate the maximum heat dissipation rate from the both sides of the plate in an ambient of 20°C . The radiation heat transfer coefficient is $9.0 \text{ W/m}^2\text{K}$. For air at 80°C , take Kinematic viscosity as $21.09 \times 10^{-6} \text{ m}^2/\text{sec}$, $\text{Pr} = 0.692$, $k_f = 0.003 \text{ W/m K}$ [6+6]
6. (a) Explain the difference between radiation from gases and that from solids. Why gases called selective radiators.
 (b) A Pipe carrying steam having an outside diameter of 20 cm runs in a large room and is exposed to air at a temperature of 30°C . The pipe surface is maintained temperature is 200°C . Find the heat loss per meter length of the pipe by convection and radiation, taking emissivity of pipe as 0.8 [6+6]
7. (a) Explain Fick's law of diffusion?
 (b) A vessel contain a binary mixture of O_2 and N_2 with partial pressure in the ratio of 0.21 and 0.79 at 15°C . The total pressure of the mixture is 1.1 bar. Calculate the following
 (a) Molar concentration (b) Mass densities (c) Mass fractions (d) Molar fractions [4+8]
8. Air at 10°C and at a pressure of 100 kPa is flowing over a plate at a velocity of 3 m/s. If the plate is 30 cm Wide and at a temperature of 60°C . Calculate the following quantities at $x = 0.3 \text{ m}$.
 (a) Boundary layer thickness
 (b) Local friction coefficient
 (c) Local shearing stress
 (d) Total drag force
 (e) Thermal boundary layer thickness
 (f) Local convective heat transfer coefficient
 (g) The heat transfer from plate [12]

Subject Code: R16MEC103

M.Tech - I Semester Regular Examinations, Dec - 2016

DIGITAL DATA COMMUNICATIONS

(Common to DECS and DSCE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.

All questions carry EQUAL marks

- 1 Explain the various types of QAM techniques with truth tables and constellation diagrams.
- 2 (a) Compare LAN, MAN and WAN systems with details.
(b) Define Network Topology. Explain the various types of topologies used in LAN network.
- 3 Explain in detail Error correction using Hamming code with an example
- 4 (a) Describe and explain the need of "Piggy Bucking" in bidirectional protocols with an example.
(b) Elaborate the concept of Character Oriented Protocols.
- 5 (a) Differentiate the Circuit Switching and Packet Switching
(b) Write a short notes on token Ring
- 6 Discuss in detail the Carrier Sense Multiple Access with Collision Avoidance (CSMA / CA) protocol.
- 7 (a) Explain different transmission modes used in Data Communication
(b) Summarize the importance of Routers in Data Communication
- 8 (a) Write a short note on Stop-and-Wait ARQ concept.
(b) Distinguish the TDMA with FDMA



Narasaraopeta Engineering College (Autonomous)
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Subject Code: R16MCS103

M.Tech - I Semester Regular Examinations, Dec - 2016
DATABASE MANAGEMENT SYSTEMS

(CSE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks.

1. (a) What is data model? Explain different types of Data models.
(b) Explain about Database Users
2. (a) What are null values? Are they supported in a relation? How do they affect the meaning of the query? Can primary key fields of a table contain null values?
(b) Explain the difference between weak entity and strong entity sets? How to represent strong and weak entity sets through ER diagram.
3. (a) Explain about Aggregate Operators
(b) Write the SQL expressions for the following relational database?
Sailors (sailor id, boat id, sailor name, rating, age)
Reserves (sailor id, boat id, day)
Boats (boat id, boat name, color)
 - i) Find the age of the youngest sailor for each rating level?
 - ii) Find the No. of reservations for each red boat?
 - iii) Find the average age of sailor for each rating level that at least 2 sailors.
4. (a) What is decomposition? Explain lossless and functional dependency preserving decomposition.
(b) What is 3NF? Explain difference between 3NF and BCNF
5. (a) Explain the distinction between the terms *serial schedule* and *serializable schedule*.
(b) Explain ACID properties.
6. (a) What is Hash based Indexing and Tree based Indexing.
(b) Explain about B+ tree file organization in detail.
7. (a) Explain different Locking Techniques for Concurrency Control.
(b) Discuss about ISAM
8. (a) What restrictions are necessary to ensure that view is updatable? State any three advantages and disadvantages of views? [4M]
(b) Explain the Architecture of DBMS with neat diagram. [8M]



Subject Code: R16MCS102

M.Tech - I Semester Regular Examinations, Dec – 2016
COMPUTER ORGANIZATION AND ARCHITECTURE
(CSE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) Explain with necessary block diagram of the basic functional unit of a computer ?
(b) Represent the decimal values 5, -2 and -10 in the following binary formats
i) Signed Magnitude ii) 1's Complement iii) 2's complement
2. (a) What is stored program concept ? Explain the functional units of a stored program digital computer along with a block diagram?
(b) Explain logical and arithmetic shift instructions with an example?
3. (a) Explain the characteristics of RISC and CISC processors
(b) Explain in detail about Interrupt Handling
4. Explain booth's multiplication algorithm with an example?
5. (a) Explain Associative memory with its hardware organization ?
(b) Explain cache memory organization in detail?
6. (a) What is DMA ? Explain basic DMA operation with neat diagram
(b) What are the characteristics of Multiprocessors? Explain Time shared common bus interconnection structure?
7. (a) Write about Decimal arithmetic unit with neat block diagram?
(b) Write about Asynchronous communication between I/O devices?
8. (a) Explain different phases of instruction cycle with neat flowchart?
(b) Explain Memory Hierarchy in detail?



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Subject Code: R16MSE102

M.Tech - I Semester Regular Examinations, Dec - 2016

THEORY OF ELASTICITY

(SE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. Determine the magnitude and direction of the principal stresses and the maximum shear stress when $\sigma_x = 1500\text{Mpa}$, $\sigma_y = -1000\text{Mpa}$ and $\sigma_z = 1000\text{Mpa}$, $\tau_{xy} = -300\text{Mpa}$, $\tau_{yz} = 0$ and $\tau_{zx} = 100\text{Mpa}$.
2. Prove that the following Airy's stress functions and examine the stress distribution represented by them.
(a) $\phi = AX^2 + BY^2$ (b) $\phi = AX^3$ and $\phi = A(X^4 + 3X^2Y^2)$
3. A prismatic bar of $2a \times 2b$ cross section is bent by two equal and opposite couples. Determine the equations for the bent shape of the prismatic bar.
4. A thick cylinder of internal radius 100mm and external radius 150mm is subjected to an internal pressure of 6Mpa. using polar co-ordinate system, determine the variation of radial and hoop stresses in the cylindrical wall.
5. (a) A circular disc of uniform thickness has external radius of 250mm and internal radius of 50mm. It is rotated at 750 rpm. Determine the maximum circumferential, radial and shear stresses in the disc. Density of material is 7470kg/m^3 and $1/m = 0.28$.
6. (a) Discuss plane stress and plane strain problems with examples.
(b) Explain the use of Airy stress function in the solution of two dimensional problems in elasticity.
7. (a) Derive the stress components of a rotating circular disc of uniform thickness with a central hole of radius 'a'.
(b) Discuss the effect of a circular hole in stress distribution of plates.
8. Show that in the torsion effect of thin-walled tubes, the ratio of rate of twists approaches unity

Subject Code: R16MPE102

M.Tech - I Semester Regular Examinations, Dec - 2016
ANALYSIS OF POWER ELECTRONIC CONVERTERS
(PEED)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) Draw and explain the V-I characteristics of Thyristor
(b) Draw and explain the V-I characteristics of Power BJT
2. (a) What is Synchronous tap changer? Discuss the application of ac voltage controller as tap changer
(b) Explain operation of single phase bridge type step down cyclo converter with RL load for firing angle of 30° and $f_o = f_s/4$
3. (a) Explain the operation of Symmetrical angle control using necessary circuit diagram and waveforms.
(b) Explain the operation of single phase sinusoidal PWM using necessary circuit diagram and waveforms.
4. (a) Explain the operation of three phase full converter with inductive load at firing angle 30°
(b) Explain in detail about three phase Pulse width modulation method.
5. (a) What are the types of multilevel converters? Explain the operation of diode clamped multilevel inverter with neat Schematic diagrams.
(b) Explain the features of Flying-Capacitors Inverter
6. Explain briefing the following modulation techniques with relative advantages and disadvantages.
i. Multiple PWM ii. Sinusoidal PWM iii. Trapezoidal modulation
7. (a) Explain the three phase thyristorised bridge inverter with star connected resistance load, assuming 180° mode of operation. Draw the corresponding output phase and line voltage of inverter
(b) Explain the principle of Boost inverter
8. Explain the space vector PWM technique as applicable to 3-phase inverter control with neat schematic diagrams.

Subject Code: R16MMD102

M.Tech. - I Semester Regular Examinations, Dec - 2016

ADVANCED MECHANICS OF SOLIDS

(MD)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.

All questions carry EQUAL marks

1. a) Explain plane stress and plane strain with examples.
- b) The state of stress at a point is characterised by the components(in MPa)

$$\sigma_x = 12.31, \sigma_y = 8.96, \sigma_z = 4.34$$

$$\tau_{xy} = 4.20, \tau_{yx} = 5.27, \tau_{zx} = 0.84$$

Find the values of the principal stresses and their directions.

[4+8]

2. a) State and explain Hooke's law for anisotropic and isotropic materials.

- b) The displacement field in micro units for a body is given by

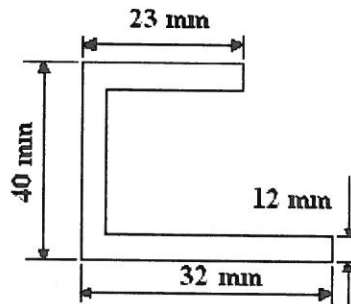
$$u = (x^2 + y)i + (3 + z)j + (x^2 + 2y)k$$

Determine the principal strains at (3, 1, -2) and the direction of the minimum principal strain.

[4+8]

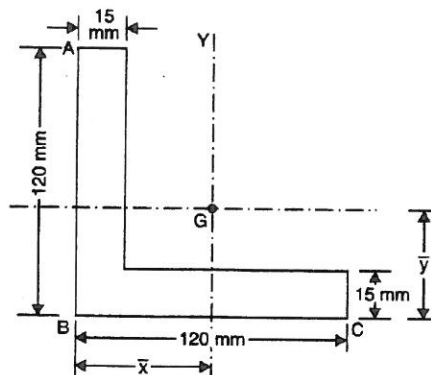
3. a) State and explain the significance of shear center.

- b) Determine shear center of the unsymmetrical section shown in the figure. Take section is of uniform thickness 12 mm.



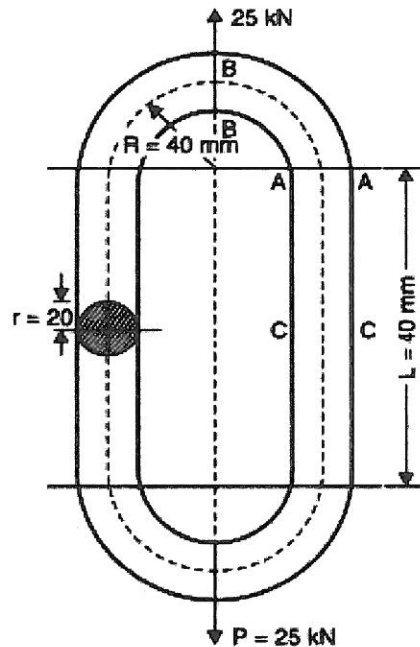
[4+8]

4. A simply supported beam of span 3.6 m carries a load of 600 N at its centre. The section of the beam is an equal angle of size 120 mm x 120 mm x 15 mm as shown in figure. The load line passes through the centroid (G) of the section and is along line YG. Determine i) stresses at points A, B and C of mid section of the beam ii) deflection of beam at mid section and iii) position of neutral axis. Take $E = 2 \times 10^5 \text{ N/mm}^2$.



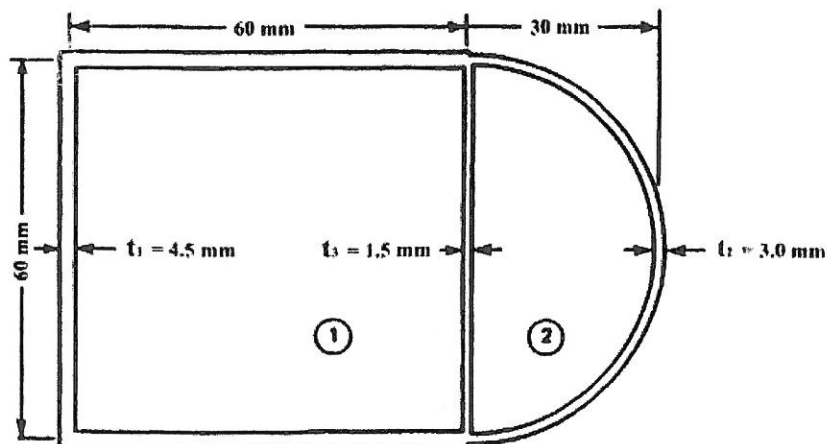
[12]

5. A pull of 25 kN is applied to a simple chain link shown in figure. The mean radius of curvature of the semi-circular ends is 40 mm. The link is of circular in cross-section of radius 20 mm. If the length of straight portion is 40 mm, determine the maximum compressive stress in the link and tensile stress at the same section.



[12]

6. Derive Lamé's equations for the radial and hoop stresses in a thick cylinder of internal radius r_i and external radius r_o subjected to an internal pressure p_i and external pressure p_o . [12]
7. A disc of uniform thickness having inner and outer diameters 100 mm and 400 mm respectively is rotating at 5000 rpm about its axis. The density of the material of the disc is 7800 kg/m^3 and Poisson's ratio is 0.28. Determine the maximum intensities of circumferential and radial stresses. Also plot the variation of circumferential and radial stresses along the radius. [12]
8. A hollow thin walled torsion member has two compartments with cross sectional dimensions as shown in figure. The material is an aluminium alloy for which $G = 26 \text{ GPa}$. Determine the torque and the unit angle of twist if the max shear stress at locations away from the stress concentration is 40 MPa.



[12]

Subject Code: R16MTE102

M.Tech - I Semester Regular Examinations, Dec - 2016

ADVANCED THERMODYNAMICS

(TE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.

All questions carry EQUAL marks

1. (a) Derive Maxwell's Relations and make a brief mention of their use (8M)
(b) Compare availability function of a closed and open system with helm hotz & gibbs function and bring out the similarities and differences between them (8M)
2. (a) Derive Clausius – Clayperon equation and mention its use (8M)
(b) Write the Vanderwall's equation of state and compare with ideal gas equation. Mention the disadvantages of using them at critical point. (8M)
3. A constant volume tank contains 1 Kg mol of methane gas and 3 Kg mol of O_2 at 25° and 1 atm. The contents of the tank are ignited and the methane burns completely. If the final temperature is 1000 K, determine a) Final pressure in the tank b) Heat transfer during this process. (12M)
4. In a Rankine cycle, steam enters the turbine at 3 MPa and $350^\circ C$ and is condensed in the condenser at a pressure of 75 kPa. Heat is supplied to the steam in a furnace maintained at 800 K and waste heat is rejected to the surroundings at 300 K. Determine (a) Exergy destruction associated with each of the four processes and the whole cycle (b) Second law efficiency of this cycle. (12M)
5. (a) State and derive Onsager's reciprocal relation (8M)
(b) Apply Onsager's reciprocal relation to thermoelectric phenomena and write the expression for entropy flux. (4M)
6. (a) Derive an expression for efficiency of a fuel cell (7M)
(b) Explain the working of fuel cell with neat sketch (5M)
7. A 50 Kg block of iron at 500 K is dropped in a lake which is at 285 K. Take C_p of iron as 0.45 (kJ / Kg K) and determine
(a) Change in entropy of iron block and lake water
(b) Entropy generated in the entire process
8. (a) In thermodynamic analysis of air-conditioning process if the water vapour in the moist air is treated as ideal gas, would there be any error in the analysis? Substantiate your answer with valid reason. (6M)
(b) Write short note on Joule-Thomson coefficient value of a refrigerant (6M)



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Subject Code: R16MEC102

M.Tech - I Semester Regular Examinations, Dec - 2016

VLSI TECHNOLOGY AND DESIGN

(Common to DECS and DSCE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.

All questions carry EQUAL marks

1. (a) Explain PMOS Enhancement mode transistor action with a neat diagram.
(b) Explain CMOS fabrication using twin tub process with neat diagrams.
2. (a) What are the various issues in system on chip design and discuss them?.
(b) Explain the architecture and working of SRAM.
- 3 (a) What is testing? Explain the different types of fault models in detail.
(b) Discuss the types of Semicustom ASIC design.
- 4 (a) What is latch-up condition in CMOS circuits? Explain how it can be eliminated.
(b) Explain the limitations of scaling in detail.
- 5 (a) Explain pseudo- NMOS logic, CMOS domino logic, n-p CMOS logic.
(b) Explain two- phase clocking in clocked sequential circuits.
6. (a) What are the various floor planning methods. Explain in brief.
(b) Discuss about high level synthesis.
- 7 . Write a short notes on
(a) VHDL editor / Verilog editor (b) n-well process of BiCMOS (c) Top down design with an example
8. (a) Determine the pull-up to pull-down ratio for an NMOS inverter driven by another NMOS inverter.
(b) Explain power dissipation for CMOS and BiCMOS circuits

Subject Code: R16MSE101

M.Tech - I Semester Regular Examinations, Dec - 2016

ADVANCED MATHEMATICS

(SE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.

All questions carry EQUAL marks

1. (a). Calculate mean , median and mode of the following data relating to weight of 120 articles : [6]

Weight (in grams)	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	14	17	22	26	23	18

- (b). The two regression equations of the variables x and y are $x = 19.13 - 0.87 y$ and $y = 11.64 - 0.50 x$. Find (i). Mean of x's (ii). Mean of y's (iii). The correlation coefficient between x and y. [6]

2. (a). By the method of least squares, find the straight line that best fits the following data :[6]

x :	1	2	3	4	5
y :	14	27	40	55	68

- (b) A sample of 400 items is taken from a normal population whose mean is 4, and whose variance is 4. If the sample mean is 4.45, can the sample be regarded as a truly random sample. [6]

3. A tightly stretched flexible string with fixed end points $x = 0$ and $x = l$. At time $t = 0$, the string is given a shape defined by $F(x) = \mu x(l - x)$ where μ is a constant , and then released. Find the displacement of the string at any point x of the string at any time $t > 0$. [12]

4. A homogeneous rod of conducting material of length 100 cm has its ends kept at zero temperature and the temperature initially is

$$u(x, 0) = \begin{cases} x & 0 \leq x \leq 50 \\ 100 - x & 50 \leq x \leq 100 \end{cases}$$

Find the temperature $u(x, t)$ at any time .

[12]

5. Find the solution of the Parabolic equation $\frac{\partial^2 u}{\partial x^2} = 2 \frac{\partial u}{\partial t}$ when

$$u(x, 0) = u(4, t) = 0 \text{ and } u(x, 0) = x(4 - x) \text{ , taking } h=1, \text{ find the values up to } t = 5$$

[12]

6. (a). Find the positive root of the equation $x^4 - x = 10$ correct to three decimal places by using Newton-Raphson method. [6]

(b). Solve the boundary value problem $y'' - y + x = 0$ ($0 \leq x \leq 1$), $y(0) = y(1) = 0$ by Rayleigh Ritz method. [6]

7. (a). Solve $x^2 \frac{d^2 y}{dx^2} - 2x \frac{dy}{dx} - 4y = x^4$. [6]

(b). A mass, suspended at the end of a light spring having spring constant k , is set into vertical motion. Use Lagrange's equation, to find the equation of motion of the mass. [6]

8. (a). Prove that the shortest distance between two points in a plane is a straight line. [6]

(b) On which curve the functional $\int_0^{\pi/2} [(y')^2 - y^2 + 2xy] dy$ with $y(0) = 0$ and $y(\pi/2) = 0$ be extremized?. [6]



Subject Code: R16MCS101

M.Tech - I Semester Regular Examinations, Dec - 2016
ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS
(CSE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) Explain about Doubly Linked List? Write an algorithm to insert a new node before and after a particular node in Doubly Linked List?
(b) Define Stack? Explain Implementation of Stack using Linked List [6+6]
2. (a) Explain Binary Searching Method with example
(b) Show the outcome of different passes for sorting the following sequence of data using quick sort algorithm Choose the first element as pivot. 9, 12, 4, 16, 7, 10, 13, 40 [6+6]
3. (a) What is Binary Tree and explain tree traversal methods with example
(b) What is Graph? Explain breadth first traversal algorithm with an example [6+6]
4. (a) Explain Stack ADT and Queue ADT with example
(b) What is Collision? Explain reasons for Collision. Explain Open Addressing and Linear Probing with example. [6+6]
5. (a) What is a priority queue? Explain operations performed in priority queue
(b) Construct a binary Heap with the following values: 35,19,84,18,24,26,52,45,33,43 [6+6]
6. (a) What is meant by Binary Search Tree. Construct Binary Search tree with the following values:35,5,43,15,21,98,4,78,27
(b) What is Hash Table and Hash Function. Explain with example. [6+6]
7. (a) Explain AVL Tree and write an algorithm for finding height of AVL Tree with example.
(b) Explain Insertion and deletion operations in AVL Trees [6+6]
8. (a) Explain Red Black and Splay Trees with example
(b) Explain B-Trees and write an algorithm for finding height of B -Tree [6+6]

Subject Code: R16MDE101

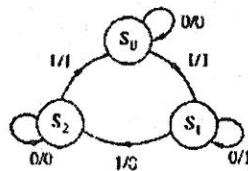
M.Tech - I Semester Regular Examinations, Dec - 2016
DIGITAL SYSTEM DESIGN
(DECS)

Time: 3 hours

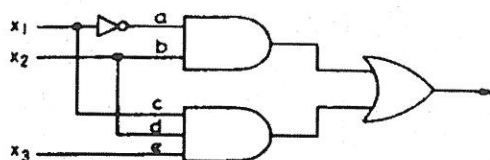
Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

- Minimize the following functions using K-maps. Give your answer in POS form.
 $f = \Sigma (1, 4, 5, 9, 11, 14) + d(0, 2, 7, 8, 13)$ [6M]
 - How is an essential prime cube (EPC) detected in CAMP method? [6M]
- Minimize the function by the IISC algorithm
 $f = 001210 + 001121 + 001200 + 001001 + 001011 + 011122 + 011221$. [6M]
 - Minimize the function using essential prime cube theorem:
 $f = 0200 + 1102 + 2201 + 0011 + 0010$ [6M]
- Convert the state diagram diagram of Fig. below to ASM chart. [6M]



- Implement a BCD-Excess-3 code converted by ROM? [6M]
- A circuit realizes the function $Z = X_1'X_4 + X_2'X_3 + X_1'X_4$? Using the Boolean difference method, find the test vectors for SA0 faults and SA1 faults on all input lines of the circuit. [6M]
 - The function $f = x_1x_2 + x_1x_3'x_4' + x_2x_4$. Find the minimum test set for this network using kohavi algorithm? [6M]
 - Write about circuit test approach? [6M]
 - Write about haming experiments? [6M]
 - Derive by the path sensitization method the test vectors for the SA0 and SA1 faults at output of and gate in the following figure. Assume that faults can occur on line "a", 'b' and 'e'. [12M]



7. (a) List out the applications of CPLD & FPGA? [4M]
(b) Explain DFT schemes? [4M]
(c) Explain built in self test? [4M]
8. (a) Mention the differences between ASIC vs FPGA? [6M]
(b) Explain folding algorithm with an example? [6M]

Subject Code: R16MTE101

M.Tech - I Semester Regular Examinations, Dec - 2016
OPTIMIZATION TECHNIQUES
(TE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) What is optimization? Explain the concept of optimization with some examples.
(b) What is a unimodal function? Explain the unimodal approach of optimizing the one-dimensional non linear problems
2. Minimize $f(x_1, x_2) = x_1^2 - x_1 x_2 + 3 x_2^2$ using steepest descent method. Take starting point (1, 2). Take tolerance $\epsilon = 0.1$
3. Perform two iterations of the Fletcher-Reeves method to
Minimize $f(x_1, x_2) = 6 x_1^2 - 6 x_1 x_2 + 2 x_2^2 - x_1 - 2 x_2$ with the starting point (0, 0)
4. Given the linear programming problem:
Maximize $z = 3x_1 + 5x_2$
Subject to the constraints:
 $3x_1 + 2x_2 \leq 18$
 $x_1 \leq 4$
 $x_2 \leq 6$
 $x_1, x_2 \geq 0$
i) Determine an optimal solution to the LP Problem.
ii) Discuss the effect on the optimality of the solution when the objective function is changed to $z = 3x_1 + x_2$
5. A man is engaged in buying and selling identical items. He operates from a warehouse that can hold 500 items. Each month he can sell any quantity that he chooses up to the stock at the beginning of the month. Each month, he can buy as much as he wishes for delivery at the end of the month so long as his stock does not exceed 500 items. For the next four months, he has the following error-free forecasts of cost sales prices:

Month	i	1	2	3	4
Cost	c_i	27	24	26	27
Sale price	p_i	28	25	25	27

If he currently has a stock of 200 units, what quantities should he sell and buy in next four months? Find the solution using dynamic programming.
6. (a) Explain the steps involved in simulation process.
(b) A tourist car has 25 taxis in operation. He keeps three drivers as reserve to attend the calls in case the scheduled driver reports sick. The probability distribution of sick drivers is as follows:

Number of sick	0	1	2	3	4	5
Probability	0.20	0.25	0.20	0.15	0.12	0.08

Simulate for 12 days and estimate i) The utilization of reserve drivers and ii) Probability that at least one taxi will be off the road due to non-availability of a driver.
Take random numbers as 82 89 78 24 53 61 18 45 04 23 50 77.

7. Use branch and bound technique to solve the following

$$\text{Maximize } Z = 2x_1 + 3x_2$$

Subject to:

$$5x_1 + 7x_2 \leq 35$$

$$4x_1 + 9x_2 \leq 36$$

$$x_1, x_2 \geq 0 \text{ and integers}$$

8. (a) Explain the meaning of the term random variable. Distinguish continuous and discrete random variables.

(b) Calculate the mean, the variance and standard deviation for the random variable sales from the following information provided by a sales manager of a certain business unit for a new product

Monthly sales (in units):	50	100	150	200	250	300
Probability :	0.10	0.30	0.30	0.15	0.10	0.05

Subject Code: R16MDS101

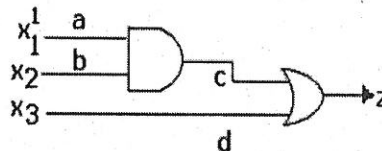
M.Tech - I Semester Regular Examinations, Dec - 2016
DIGITAL SYSTEM DESIGN
(DSCE)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a) Discuss the input and output transformation of finite state machines
(b) Discuss how a finite state machine is minimized using equivalence partitioning.
2. (a) Illustrate the process of finding compatible states using a merger graph?
(b) Explain how a minimal closed cover is searched in a finite state machine?
3. (a) Discuss briefly the role of state graphs in the study of control circuits
(b) Write a short note on i) array multiplier and ii) binary divider circuits
4. (a) Compare and contrast flow charts with SM charts
(b) Implement a dice game controller circuit in VHDL.
5. (a) What is the significance of Kohavi algorithm? Explain how it detects multiple faults in two level networks with a simple example.
(b) Draw a table giving the set of all possible single stuck faults as well as faulty and fault free responses. Also construct the fault cover table for the circuit shown in below.



6. (a) What is Boolean difference method and what is it used for? Explain
(b) Comment upon fault detection in sequential circuits.
7. State the various test pattern generation algorithms. Explain D- Algorithm in detail with an example
8. Write short notes on (a) machine identification
(b) transition check approach

Subject Code: R16MEE101

M.Tech - I Semester Regular Examinations, Dec - 2016
ELECTRICAL MACHINE MODELING AND ANALYSIS
(Common to PEED and PID)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a)What is generalized machine theory? What are restrictions of generalized machine theory.
(b)Draw and describe voltage equations of basic two pole machine. [7 + 5]
2. (a)Explain the generalized mathematical model of the DC Shunt motor.
(b)A separately excited DC motor with the following parameters : [6 + 6]
 $R_a = 0.5\Omega$, $L_a = 0.003\text{H}$ and $K_b = 0.8\text{V/rad/sec}$, is driving a load of $J = 0.0167\text{ Kg-m}^2$,
 $B_1 = 0.01\text{N-m/rad/sec}$ with a load torque of 100 N-m . Its armature is connected to a dc supply voltage of 220 V and given the rated field current. Find the speed of the motor?
3. (a)Discuss about active transformation used in electrical machines.
(b)Draw the circuit model of induction motor. Obtain its two axis model. [5 + 7]
4. (a)Deduce Small signal equations of the induction machine. [6 + 6]
(b)Discuss about synchronously rotating reference frame model for 3-phase induction motor.
5. (a)Explain dynamic simulation of induction machine.
(b)Explain the cross field theory as applied to a single phase induction motors. [6 + 6]
6. (a)Derive mathematical model of PM Synchronous motor.
(b)Obtain the steady state power angle Characteristics of synchronous machine. [6 + 6]
7. From the basic equation, obtain the dynamic model of switched reluctance motor. [12]
8. Write short notes on
(a)SRM modelling.
(b)Average torque and Energy conversion ratio. [6 + 6]

Subject Code: R16MMD101

M.Tech - I Semester Regular Examinations, Dec - 2016
COMPUTATIONAL METHODS IN ENGINEERING
(MD)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions.
All questions carry EQUAL marks

1. (a). Use the Newton's – Raphson method to estimate the root of $f(x)=e^{-x}-x$ employing an initial guess of $x_0=0$. [6]
- (b). Use the Gauss – Seidal method with relaxation ($\lambda=0.95$) to solve the following system to a tolerance of $\epsilon_s = 5\%$. If necessary, rearrange the equations to achieve convergence. [6]

$$\begin{aligned} -3x_1 + x_2 + 12x_3 &= 50 \\ 6x_1 - x_2 - x_3 &= 3 \\ 6x_1 + 9x_2 + x_3 &= 40 \end{aligned}$$
2. (a). Use the shooting method to solve $7\frac{d^2y}{dx^2} - 2\frac{dy}{dx} - y + x = 0$ with boundary condition $y(0) = 5, y(20) = 8$ [6]
- (b). Solve the boundary value problem $\frac{d^2y}{dx^2} - y + x = 0$ ($0 \leq x \leq 1$), $y(0)=y(1)=0$. [6]
3. (a). Solve the following $\frac{\partial^2 u}{\partial x^2} + b\frac{\partial u}{\partial x} = \frac{\partial u}{\partial t}$ boundary conditions : $u(0,t)=0, u(1,t)=0$ [6]
and initial conditions : $u(x,0)=0, 0 \leq x \leq 1$
- (b). A Cube is 7 cm. along each edge. Two opposite faces are held at 100° , the other four faces are held at 0° . Find the interior temperatures at the nodes of a 1cm. network. Use A.D.I. method. [6]
4. (a). Find the correlation coefficient between x and y from the given data : [6]

x :	78	89	97	69	59	79	68	57
y :	125	137	156	112	107	138	123	108

- (b). The following data was calculated from the equation $y = 5 + 4x_1 - 3x_2$ [6]

x_1	x_2	y
0	0	5
2	1	10
2.5	2	9
1	3	0
4	6	3
7	2	27

Use multiple linear regression to fit this data.

5. Solve the following L.P.P. by simplex method.

[12]

Maximize $f(x, y) = 6x + 8y$

Subject to the conditions $5x + 2y \leq 40$

$6x + 6y \leq 60$

$2x + 4y \leq 32$ where $x, y \geq 0$.

6. Using the method of averages, fit a parabola $y = ax^2 + bx + c$ to the following data :

[12]

x :	20	40	60	80	100	120
y :	5.5	9.1	14.9	22.8	33.3	46.0

7. Using Big-M method solve the following L.P.P.

[12]

Maximize $f(x, y) = x + 5y$

Subject to the conditions $3x + 4y \leq 6$

$x + 3y \geq 2$

where $x, y \geq 0$.

8. A membrane for which $c^2 = Tg/w = 3$ is stretched over a square frame that occupies the region $0 \leq x \leq 2$, $0 \leq y \leq 2$ in the xy -plane. It is given an initial displacement described by $u = x(2-x)y(2-y)$ and has an initial velocity of zero. Find how the displacement varies with time.

[12]
