Subject Code: G0503/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

DATABASE MANAGEMENT SYSTEMS

(Common to CS and CS&E)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. a) Consider the following relational schema :

Emp (eid : integer, ename :string, age : integer, salary : real)

Works (eid : integer, did : integer, pct_time : integer)

Dept (did : integer, dname : string, budget : real, managerid : integer)

i) Give an example of a foreign key constraint that involves the Dept relation. What are the options for enforcing this constraint when a user attempts to delete a Dep tuple ?

ii) Define the Dept relation in SQL so that every department is guaranteed to have a manager.

iii) Develop an SQL statement to give every employee a 10% raise.

(Explain clearly why you feel your answers are correct)

b) Does the relational model, as seen by an SQL query writer, provide Physical and Logical data independence ? Explain.

2. a) Describe all the set operators of relational algebra with examples. For each operation, what is the cardinality of their input and output tables ?

b) Relational calculus is said to be a declarative language in comparison to algebra, which is a procedural language. Explain the difference(s) with suitable example(s)

3. a) In reference to SQL, give an elegant presentation of Nested Queries with examples.

b) Give an account of Triggers.

4. Give a detailed account of Schema Refinement in Database Design.

5. What are the issues to be addressed in concurrent execution of transactions ? Explain them clearly.

6. Give a detailed account of Recovery from a system crash.

7. With the aid of an algorithm explain ' DELETE' operation on a B+ tree. Illustrate your answer through an example by tracing the algorithm.

8. Write notes on Active Databases, Hash based indexing and ISAM

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Subject Code: G1508/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

GEOMETRIC MODELING

(Common to MD, MED and CAD/CAM)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. a) Discuss the various methods of representing curves
   b) Discuss in detail why parametric representation is preferred for geometric modeling. Also explain limitations of parametric curves in geometric modeling.
   c) Supply the parametric equations of Helix. 12M

2. Derive the necessary equations to fit a hermite cubic spline to conics. 12M

3. Derive the matrix forms for the non-periodic B_spline curves with k=3 and k=4. Does the number of control points affect the results? 12M

4. State the properties of a Bezier curve and explain its limitations. Prove that the Berstein polynomials satisfy the partition of unity property. 6+6M

5. a) Provide two examples to show that wire frame modeling is ambiguous
   b) Develop mathematical equations and matrices for the sweep surface, and for surface obtained by combined sweep and revolution. 12M

6. Discuss the following with necessary equations
   a) Coon's surface 4M
   b) Gaussian curvature 4M
   c) Bilinear surface 4M

7. Derive the algebraic form of a tricubic solid. 12M

8. Explain the following solid modeling schemes in detail
   a) Half space 8M
   b) Cell decomposition 8M

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Subject Code: G2104/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

ADVANCED FLUID MECHANICS

(Common to Thermal Sciences and Energy Systems and TE)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. (a) From the consideration of vorticity and rotation show that in case of ideal fluids the flow is irrotational.
   (b) Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one-third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.

2. a) Obtain the expression for the boundary shear stress in terms of momentum thickness.
   b) Air is flowing over a smooth plate with a velocity of 8m/s. The length of the plate is 1.5m and width 1m. If the laminar boundary exists up to a value of Reynolds number = 5×10^5. Find the maximum distance from the leading edge up to which laminar boundary layer exists. Find the maximum thickness of laminar boundary layer if the velocity profile is given by $\frac{u}{U}=\left(\frac{y}{\delta}\right)-\left(\frac{y}{\delta}\right)^2$ Take ν for air = 0.15 stokes.

3. (a) Derive an expression for the velocity distribution for viscous flow through a circular pipe. Also sketch the distribution of velocity and shear stress across a section of the pipe.
   (b) Two parallel plates are placed horizontally 10 mm apart. The bottom plate is fixed and the top plate is moved at a uniform speed of 0.25 m/s. The fluid between them has a dynamic viscosity μ equal to 1.472 N.s/m2. Determine the pressure gradient which corresponds to the condition of zero discharge between the plates and the shearing stress at each plate.

4. a) Set up the Navier-Stoke's equations and make suitable assumptions to prove that:
   For a hydraulic mass of fluid, the pressure intensity at a depth h below the free surface is equal to the product of specific weight w and the depth h.
   b) For a two dimensional steady flow, the pressure gradient in the direction of flow (dp/dx) is equal to shear gradient (dτ/dy) in the direction normal to the direction of fluid motion.

Subject Code: G2104/R13

5. (a) Derive Karman-Prandtl universal velocity distribution law. In what respect is this equation defective?
   (b) For turbulent flow in a pipe of 25 cm diameter, the centre line velocity is 2.25 m/s and the velocity at a point 8 cm from the centre as measured by a pitot tube is 1.95 m/s. Make calculations for
   (i) friction velocity and wall shearing stress,
   (ii) average velocity and discharge through the pipe,
   (iii) friction factor and
   (iv) pipe roughness.

6. a) Starting with the Navier-Stokes equations of motion for two dimensional incompressible flow, obtain the Prandtl's boundary layer equation.
   b) A plate 0.5 m × 0.2 m has been placed longitudinally in a stream of crude oil which flows with undisturbed velocity of 6 m/s. Given that oil has a specific gravity 0.9 and kinematic viscosity 1 stoke, calculate the boundary layer thickness and shear stress at the middle of plate. Also calculate friction drag on one side of the plate.

7. (a) Show by means of diagrams the nature of propagation of disturbance in compressible flow when Mach number is less than one, is equal to one and is more than one.
   (b) A normal shock wave occurs in air flowing at a Mach number of 1.5. The static pressure and temperature of the air upstream of a shock wave are 1 bar and 300 K. Determine the Mach number, pressure and temperature downstream of the wave. Also estimate the shock strength.

8. a) What are static and stagnation temperatures?
   b) A tank fitted with a convergent nozzle contains air at a temperature of 20ºC. The diameter at the outlet of the nozzle is 25 mm. assuming adiabatic flow; find the mass rate of flow of air through the nozzle to the atmosphere when the pressure in the tank is:
   i) 140 kN/m^2 (abs.),
   ii) 300 kN/m^2. Take for air: R = 287 J/kg K and γ = 1.4.
   Barometric pressure = 100 kN/m^2.

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Subject Code: G2204/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

URBAN TRANSPORTATION PLANNING

(Common to Transportation Engineering and Highway Engineering)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. (a) List out various Urban Transportation Issues? Explain sequential and simultaneous approaches for demand estimation?
   (b) Explain the transportation planning morphology

2. (a) Explain the inventories in transportation planning process?
   (b) Explain advantages and limitations of use of screen lines and cordon lines in surveys conducted for data collection and inventories?

3. (a) List out various types of trip distribution models. Describe the concept of gravity model for trip distribution.
   (b) Solve the problem shown in Figure 1 using Detroit Method of Trip Distribution. Take initial growth factors F 1= 2.1; F 2 = 2.40: F 3 = 2.70

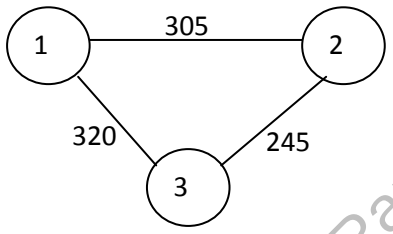

Figure 1

4. (a) Write the various factors to be considered for choice of travel mode? Also describe the basic approaches for model split analysis.
   (b) What do you mean by an urban structure? What are its types and properties?

5. (a) What are the impacts of new development on transportation facilities?
   (b) Write short Four-Step Freight Models?

6. (a) State the formulas used for calculation of coincidence ration for trip length frequency distribution by purpose?
   (b) What are the validation checks applicable for Socioeconomic Data?

7. (a) Explain how the travel forecasts are carried out to evaluate alternative improvements?
   (b) Explain in detail the process of master plan preparation. Highlight the organizational issues in implementation of master plan of a city.

Subject Code: G2204/R13

8. A highway network consisting of 5 nodes and 8 links as shown in figure below. The cost of transportation is also shown. A trip table showing the number of vehicles per hour which wants to go from one node to other is also provided. Assign the trips to the network using the all or nothing assignment. All the links are two way. Find out the total volume on each individual link and total cost of all the trips.

O/D	1	2	3	4	5
1	0	50	60	70	30
2	40	0	30	60	80
3	90	40	0	20	50
4	80	70	90	0	30
5	30	40	50	60	0

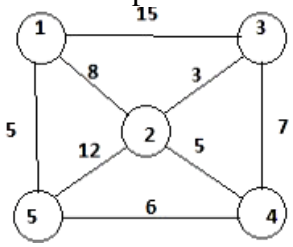

Figure 2

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Subject Code: G4304/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

FLEXIBLE AC TRANSMISSION SYSTEMS

(Common to PE, P&ID, PE&ED, PE&D and EM&D)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. (a) What is the need of interconnection in electrical power systems? Discuss the problems with interconnected power systems?
   (b) Discuss power flow in parallel and meshed systems with different types of compensations.

2. (a) Give a comparison between Voltage Source and Current Source converters.
   (b) What is PWM converter? Explain its operation. Discuss its advantages.

3. (a) Explain the working of single phase full wave bridge VSC?
   (b) Discuss the benefits of using FACTS controllers in power transmission systems.

4. Discuss the various control schemes employed for static var generator for transient stability improvement and power oscillation damping.

5. (a) What is the need of hybrid VAR generators? Explain different types of hybrid VAR generators?
   (b) Explain the objectives of Shunt Compensation. Explain how midpoint voltage regulation can improve power transfer capability.

6. Explain the method of enhancement of transient stability by the SVC and STATCOM?

7. (a) What are the objectives of series Compensation? Explain in detail.
   (b) Explain the basic operating control schemes of GSC, TSSC and TCSC

8. Explain how series compensation improves
   a) Steady state power limit
   b) Voltage stability
   c) Transient stability
   d) Power oscillation damping.

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Subject Code: G4504/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

DIGITAL DATA COMMUNICATIONS

(Common to S&SP, DIP, CE&SP, C&SP, SP&C, DE&CS, E&CE, CS, M&CE, DE&CE)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. a) Explain briefly coherent QPSK transmission and reception and derive an expression for Probability of error.
   b) What is the similarity between BFSK and BPSK?

2. a) The carrier amplitude at the receiver input is 1mv and the psd of the additive White Gaussian noise at the input is 10^{-11} Watt/Hz. Assume that an ideal correlation receiver is used. Calculate the average bit error rate of the receiver.
   b) With neat sketch explain the principle and operation of QAM system

3. a) Explain the features and packet format of TCP
   b) Explain DTE-DCE interface

4. a) Explain I2C protocol
   b) Explain different Transmission Modes

5. a) Explain Character Oriented Protocols
   b) Explain Error Correction using Hamming code with an example

6. a) What is the necessity of switching? Explain VCN Switching with neat sketch
   b) Explain Token Bus, Token Ring networks

7. a) With neat illustration explain CDMA
   b) State advantages of CDMA over TDMA

8. Write short notes on
   a) Router
   b) OFDM
   c) ClockRecovery

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Subject Code:G5505/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

ADVANCED COMPUTER ARCHITECTURE

(Common to DS&CE and ES)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. How do you define computer architecture? What are the various challenges of the computer architecture beyond ISA Design? Explain in detail

2. a. How the computer system performance gain calculated by using Amdahl's Law?
   b. How do you calculate execution time and speed up by using Amdahl's Law?

3. What are the characteristics of RISC processor? Explain five stage pipe lined RISC processor with a suitable diagram.

4. What is instruction level parallelism? What are limitation of ILP? How they will Overcome.

5. What are the various levels of branch and jump prediction to exploit parallelism in Computers? Discuss.

6. Explain RISC processor architecture using functional units in detail.

7. Draw and explain Interconnection structures in a generalized multiprocessor system
   with basic Operational units.

8. What is Fallacy, and Pitfall? Explain them with respect to components of I/O system.

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Subject Code: G5603/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

POWER SYSTEM OPERATION AND CONTROL

(Common to HVE, HVPS, PS, PSC&A, EPE, EPS and APS)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1 (a) Determine the priority list using full load average production cost for the data given below:

Unit No.	Loading Units		Fuel cost parameter			Fuel cost
	Min	Max	a_i	b_i	c_i	
1	100	400	0.006	7	600	1.1
2	50	300	0.010	8	400	1.2
3	150	500	0,008	6	500	1.0

Also obtain optimum unit commitment solution for the power demand of 800 MW.

(b) Discuss about different constraints considered in solving a unit commitment problem.

2 (a) Develop a model of single control area and obtain its block diagram representation. Explain the salient features under static and dynamic conditions.

(b) Determine the primary ALFC loop parameters for a for a control area with following data:

Total generation capacity = 2500 MW

Normal operating load =1500 MW

Inertia constant=5 kW-seconds per kVA; Load damping constant, B=1 %; frequency, f=50 Hz; and Speed regulation, R=2.5 Hz / p.u MW.

3 (a) Obtain an expression for steady state response of a load frequency controller with integral control. How it is different from without integral control.

(b) The single area control system has the following data:

T_P=10 sec; $T_g = T_t$=0; K_P=100 Hz/pu MW; R=3 Hz/pu MW; ΔP_D=0.1 pu MW; K_i=0.1.

Determine the expression for steady state change in frequency deviation and compute the time error caused by a step disturbance of magnitude 0.1 pu (as given above).

4 (a) Two areas of a power system network are interconnected by a tie-line, whose capacity is 250MW, operating at a power angle of 45^o. If each area has a capacity of 2000 MW and the equal speed regulation of 3 Hz/pu MW, determine frequency of oscillation of power for step change in load. Assume that both areas have same inertia constants of H = 4 sec. If a step load change of 100MW occurs in one of the areas determine change in tie-line power.

(b) Write short note on performance Index and optimal parameter adjustment.

Subject Code: G5603/R13

5 (a) Draw the block diagram of load frequency control in two area control system and explain.
(b) Two power systems A and B are interconnected by a tie-line and have power-frequency constants K_A and K_B in MW/Hz. An increase in load of 500 MW on the system A causes a power transfer of 300 MW from B to A. When the tie-line is open the frequency of the system A is 49 Hz and that of B is 50 Hz. Determine the values of K_A and K_B. Derive the formulae used.

6 (a) Discuss about the hard limits and slack variables of a power system network.
(b) Explain about the take-or-pay fuel supply contract.

7 (a) Explain the method of finding composite generation production cost function solution by gradient search technique.
(b) What are the operating advantages and disadvantages of centrally dispatched power pools?

8 (a) Explain the multiple utility interchange contracts with an example.
(b) Explain the economy interchange evaluation between interconnected utilities.

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Subject Code: G6803/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

CMOS ANALOG IC DESIGN

(Common to VLSI & ES, ES & VLSI, VLSID & ES, ES & VLSID, VLSI, VLSID, VLSISD, VLSI&ME)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. a) Explain short-channel effects in a MOSFET.
   b) Derive an expression for Threshold voltage of MOSFET.

2. a) Show that MOSFET acts as a controlled resistor in deep triode region.
   b) Explain second order effects in a MOSFET.

3. a) Draw the circuit diagram of a source degenerated current mirror and derive an expression for its output impedance.
   b) With a derivation perform the analysis of MOS diode.

4. a) Define current sink. Explain how the output resistance of the current sink can be Increased?.
   b) Draw and explain about high swing cascade current mirror circuit.

5. a) Draw the circuit diagram of a differential amplifier and derive an expression for CMRR.
   b) Derive the voltage gain expression of a cascade amplifier and discuss about location of poles and zeros.

6. a) What is a current amplifier and perform the low frequency analysis of a single ended current amplifier.
   b) Draw the circuit and quantitatively explain about class A output amplifier.

7. a) What is an op-amp. Classify and explain the necessary specifications for the design of an op-amp.
   b) Discuss about Miller compensation technique in op-amps.

8. Write short notes on
   a) Discrete Comparator
   b) Characteristics of a Comparator

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Subject Code: G8703/R13

M. Tech –I Semester Regular/ Supply Examinations, February, 2016

STRUCTURAL DYNAMICS

(Common to SE and SD)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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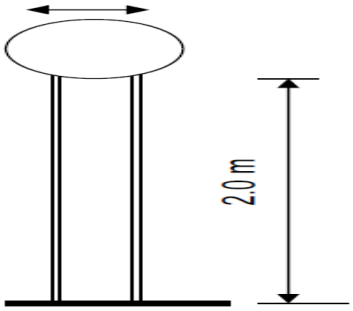
1. Explain the following
   a) Methods of Discretization
   b) Equations of Motion

2. (a) Derive the response of damped free vibration of SDOF system
   (b) A machine assembly weighing 50 kN is fitted on the top of steel tube column as shown in the **Fig**.The assembly is subjected to dynamic force which is expressed as F=1000sin1.5t N.Find static and steady state displacement. The column is of 400 mm external dia.and 10 mm thick wall. Critical damping is 4 %.



3. Explain about
   a) Logarithmic decrement
   b) Dynamic magnification factor

4. a) Explain the Solution of the equation of Motion?
   b) Explain about the Single Degree of Freedom System?

5. Find out the response of the two degree of freedom system with equal mass, ***m*** lumped at both the floors and having columns with equal stiffness ***k*** in both the stories, subjected to the initial condition x, (0) = x_2 (0) and x, (0) = x_2 (0) = 0

6. Derive an expression for the transverse vibration of a uniform beam.Hence find the Natural frequencies and mode shapes of a simply supported beam. Sketch the mode shapes?

7. Explain the Solution of Eigen value problem for natural frequencies and mode shapes with one example?

8. Explain the Analysis of undamped free vibration of beams in flexure.

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