Code No. N0522 **R07** **Set No.1**

IV B.Tech I Semester Supplementary Examinations, February/March, 2012
EMBEDDED SYSTEMS
(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours **Max. Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. a) Explain in brief, the sources that can be used for an embedded systems design. [8]
   b) Explain the components of embedded system hardware. [8]

2. a) Explain the following, relevant to serial data input/output in 8051 microcontroller. Serial data interrupts. Data transmission and Reception. [8]
   b) Describe the operating modes of timer of 8051 microcontroller. [8]

3. a) Discuss about Boolean bit-level operations with relevant examples. [8]
   b) Write notes on microcontroller programming languages. [8]

4. a) Explain how to perform unsigned multiplication using relevant mnemonics. Give an example. [8]
   b) Write an assembly language program to add the byte in external RAM location 02CDh to internal RAM location 19h and put the result in to external RAM locations 00C0h(LSB) and 00C1h(MSB). Give the comment on each line of code. [8]

5. a) Elaborate the procedure required for programming the 8051 microcontroller to transfer the data serially. [8]
   b) Write an algorithm to send data from 8051 microcontroller to the LCD with checking busy flag. [8]

6. a) Explain the terms ‘operating system’ and ‘Real-Time operating system’ with respect to various Features. [8]
   b) Write notes on tasks and task states relevant to RTOS. [8]

7. a) Explain the operating system units in an RTOS kernel. [8]
   b) What does embedded Software development mean? Explain in brief, the different stages in the development and testing of an application. [8]

8. a) Explain the concept of data transfer on the I^2C Bus with suitable timing diagrams. [8]
   b) What is meant by instruction level parallelism? Explain, in brief. [8]

Code No. N0522 **R07** **Set No.2**

IV B.Tech I Semester Supplementary Examinations, February/March, 2012
EMBEDDED SYSTEMS
(Common to Computer Science & Engineering and Information Technology)
Time: 3 hours **Max. Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. a) Define the terms 'System' and an 'Embedded system'. Give the classification of embedded systems. [8]
   b) Explain the importance of the following processors in embedded systems.
   (i) Digital signal processor (ii) ASSP [8]

2. a) Explain in brief, the different operating modes of the UART. [8]
   b) Tabulate the special function registers by making four columns as register, bit, primary function and bit addressable. [8]

3. a) Explain the bit-level logical operations with suitable examples. [8]
   b) Write an assembly language program to double the number in register R2 and put the result in register R3 (high byte) and R4 (low byte). Also write comment on this. [8]

4. a) Explain with suitable example, how to perform bit jumps using relevant mnemonics. [8]
   b) Write an assembly language for the following data.
   Find the address of the first two internal RAM locations between 20h and 60h which contain consecutive numbers. If so, set the carry flag to 1, else clear the flag. Place comments on each line of code. [8]

5. With neat sketch explain the design approach of interfacing with keyboard with Display unit to 8051 microcontroller based embedded system. Write down the necessary source code. [16]

6. a) With an example, explain the concept of deadlock situation during multitasking execution. [8]
   b) Explain Inter Process Communication with an example. [8]

7. a) Explain in brief, the principles of basic embedded system design using RTOS. [8]
   b) Discuss the advantages of time slice scheduling required for an RTOS. [8]

8. a) Differentiate the ARM and SHARC processor architectures with respect to various features. [8]
   b) Write short notes on CAN Bus protocol. [8]

Code No. N0522 **R07** **Set No.3**

IV B.Tech I Semester Supplementary Examinations, February/March, 2012
EMBEDDED SYSTEMS
(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours **Max. Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. a) Define an embedded system architecture and present its impact in an embedded system design. [8]
   b) Draw the layered embedded system model and explain about each layer. [8]

2. a) Explain about IE and IP function registers relevant to 8051 microcontroller interrupts. [8]
   b) Discuss about external interrupts and software generated interrupts in 8051 microcontroller. [8]

3. a) Explain how to understand the assembler program. Discuss about assembler directives. [8]
   b) Explain the following terms, relevant to programming the 8051 microcontroller.
   i) Lines of code ii) Instructions [8]

4. a) Explain about the jump and call program ranges with suitable diagram. [8]
   b) Write an assembly language program to increment the contents of RAM locations 13h, 14h and 15h using indirect addressing. Place comments on each line of code. [8]

5. Write an algorithm and source code to send commands and data from 8051 microcontroller to LCDs with a required time delay. [16]

6. a) Explain the uses of semaphore flag or mutex as resource key. [8]
   b) What are the different scheduling methods used to control Task State Transition? Explain any one method in detail. [8]

7. a) What is meant by Real Time Operating System? List out the different available RTOS. [8]
   b) Explain the tools availability in various RTOS. [8]

8. a) Explain the design approach of an Elevator Controller. [8]
   b) Give the features and a comparison of exemplary high performance ARM family of processors. [8]

Code No. N0522 **R07** **Set No.4**

IV B.Tech I Semester Supplementary Examinations, February/March, 2012
EMBEDDED SYSTEMS
(Common to Computer Science & Engineering and Information Technology)

Time: 3 hours **Max. Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. a) Explain about embedded processor for a complex system. [8]
   b) What are the techniques of power and energy management in an embedded system? Explain them in brief. [8]

2. a) Briefly discuss about serial data transmission modes performed in 8051 microcontroller. [8]
   b) Explain about TCON and TMOD function registers relevant to counters and timers of the 8051 microcontroller. [8]

3. a) List out and explain in brief, Boolean bit-level operations. [8]
   b) Assume that register A has packed BCD. Write an assembly language program to convert packed BCD to two ASCII numbers and place them in R2 and R6. Write comment on this. [8]

4. a) Explain with an example, how to perform decimal arithmetic operation using relevant mnemonics. [8]
   b) Write an assembly language program for the following data given below: The number A6h is placed somewhere in external RAM between locations 0100h and 0200h. Find the address of that location and put that address in R6 (LSB) and R7 (MSB). Give comments on each line of code. [8]

5. With the aid of neat diagram the design approach of interfacing Digital-to-Analog converter to8051 microcontroller based embedded system. Write down the necessary program. [16]

Code No. N0522 **R07** **Set No.4**

6. a) Explain the problem of sharing data by multiple tasks and routines. [8]
   b) What is meant by pipe? How does a pipe differ from a queue? Give an example. [8]

7. a) Explain the hard real-time Scheduling Considerations. [8]
   b) Write notes on memory management organization of RTOS. [8]

8. a) Give the features and a comparison of exemplary high performance ARM family of processors. [8]
   b) With the aid of CAN bus protocol receiver architecture explain any one of the module associated with it. [8]

Code No. M0425 **R07** **Set No.1**

IV B.Tech I Semester Supplementary Examinations, February/March, 2012

SATELLITE COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

*****

1. Discuss the future trends of Satellite Communication. [16]

2. a) Define Azimuth and Elevation angles of satellite. Give the procedure of calculation of antenna look angle. Draw necessary diagrams. [10]
   b) Explain the procedure for graphical method of Antenna look angle. [6]

3. a) Explain about the various effects and their remedies of external satellite environment around satellite antenna. [8]
   b) Draw the block diagram of transponder and explain the function of each element. [8]

4. a) What are the different reasons for the difference in uplink and down link frequencies. [8]
   b) A satellite down link at 12GHz operates with a transmit power of 6W and an antenna gain of 48.2dBW. Calculate EIRP in dBW. [8]

5. a) Explain the concept of spaced spectrum transmission and reception in detail. [10]
   b) Compare the performance of TDMA and FDMA. [6]

6. a) How do you select the site for earth station? [8]
   b) Explain in detail the Low – noise amplifier [8]

7. Explain the main elements of the GSM network. [16]

8. a) What are the basic requirements of satellite navigation system? [4]
   b) Describe the general arrangement of position of locations with GPS. [12]

Code No. M0425 **R07** **Set No.2**

IV B.Tech I Semester Supplementary Examinations, February/March, 2012

SATELLITE COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

*****

1. a) What is a satellite and how does a communication satellite differ from a communication relay. [6]
   b) Discuss the basic concepts of satellite communications. [10]

2. a) What is a Geosynchronous Orbit? Discuss the advantages and disadvantages of these orbits. [8]
   b) What are Orbit Perturbations? Explain the effects of earth's oblateness on orbital inclination of Geosynchronous Satellite. [8]

3. a) Write short notes on " Telemetry, Tracking and Command System". [8]
   b) Explain different types of redundancy connections to complete subsystem reliability of a Satellite system. [8]

4. a) List earth station parameters. Define EIRP, transmit bit and power energy and equivalent noise temperature. [10]
   b) Convert noise figure of 4dB and 4.1dB to equivalent noise temperature. Use 300K for the environmental temperature. [6]

5. a) Write the advantages and disadvantages of CDMA? What are the techniques in CDMA? [6]
   b) Explain the Direct sequence PN generator used in CDMA. [10]

6. a) Explain the small earth station. [10]
   b) Explain the very small Aperture terminals. [6]

7. Explain the connectivity of LEO satellite to MCS via geostationary satellite. [16]

8. Explain the principle of operation of GPS in detail. [16]

Code No. M0425 **R07** **Set No.3**

IV B.Tech. I Semester Supplementary Examinations, February/March, 2012

SATELLITE COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

*****

1. Discuss the frequency allocations for various Satellite services in detail. [16]

2. a) Draw and geometry of a geostationary link showing elevation, azimuth and range. [8]
   b) Prove that the smallest value that the inclination angle can have is equal to the latitude of the launch site in the plane of the orbit. [8]

3. a) What is spin stabilization? Why is it necessary? Explain various effects that are to be avoided and its remedial solution. [8]
   b) What is station keeping? Explain various methods of station keeping. [8]

4. a) Draw the block diagram of Uplink, Down link and Cross link as referred to satellite communication. [8]
   b) What is Transponder? Explain with a neat diagram of simplified single conversion and double conversion transponder. [8]

5. a) Define multiple access techniques and explain briefly? [10]
   b) Differentiate the multiplexing and multiple access techniques? [6]

6. Explain to why it is necessary to have frequency coordination among earth stations themselves and earth station-terrestrial microwave link. Discuss the techniques to achieve them? [16]

7. Explain the following in LEO
   a) Internal growth
   b) Interim operations
   c) Replenishment options
   d) End-to-End system implementations [16]

8. a) What is meant by GPS navigation message? [8]
   b) Write sub frame details of GPS navigation message? [8]

Code No. M0425 **R07** **Set No.4**

IV B.Tech I Semester Supplementary Examinations, February/March, 2012

SATELLITE COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

*****

1. List the various advantages and disadvantages of satellite communication. Explain the various reasons for preferring satellites than optical fibers which are providing very high bandwidth. [16]

2. a) State Keppler's third law with a neat diagram explain Bary center. Define Apogee inclination. [12]
   b) Discuss the factors which determine the choice of orbit for a communication satellite. [4]

3. a) List the various satellite subsystems and state their purpose and principal parameter that characterize them quantitatively. [8]
   b) Write short notes on " Space craft Subsystems". [8]

4. a) Derive the equation for the power received by an earth station from a satellite transmitter. [8]
   b) A satellite located in geosynchronous orbit 38,000Km from an earth station, operates at a frequency of 4 GHz and radiates a power of 5W from an antenna which a gain of 10dB in the direction of the earth station. Find the received power, if the receiving antenna has a gain of 52.3dB. [8]

5. a) Explain the back-off in FDMA. [6]
   b) Explain how Inter modulation frequencies are generated in FDMA? [10]

6. a) What are the characteristics that are most important in satellite antenna? [8]
   b) Find the gain and beam width of an antenna of diameter 2m operation at 14 GHz. Assume an aperture efficiency of 60% [8]

7. a) Explain the frequency band for Leo satellite systems. [8]
   b) Explain the GPS signal levels. [8]

8. Write short notes on:
   a) Differentiated GPS [8]
   b) Satellite signal Acquisition [8]

Code No. M0222 **R07** **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, February/March, 2012

POWER SYSTEM ANALYSIS

(Electrical and Electronics Engineering)

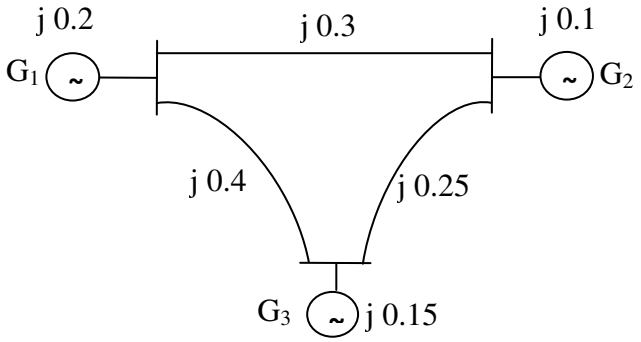
Time: 3 hours **Max. Marks: 80**

Answer any FIVE Questions

All Questions carry equal marks

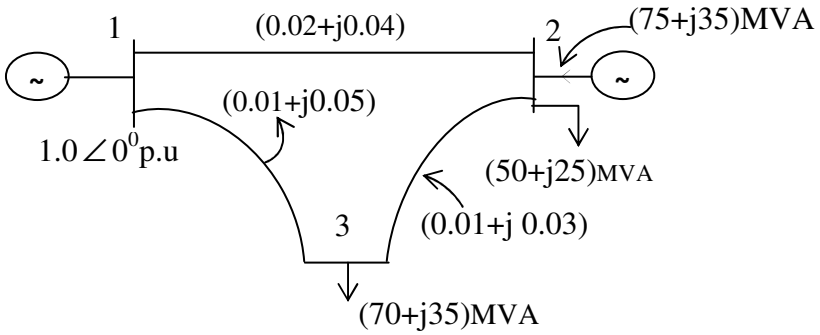
*****

1. Compute the bus admittance matrix for the power system network shown in below figure by (i) direct inspection method and (ii) by using singular transformation.



2. A transmission line exists between buses 1 and 2 with p.u impedance 0.4. Another line of impedance 0.2 p.u is connected in parallel with it making a double circuit line with mutual impedance of 0.1 p.u. Obtain the building algorithm method the impedances of the two circuit system. Derive necessary expressions.

3. The power system network shown in below network. The line impedances in p.u are indicated in the same figure on 100MVA base value and neglecting the line charging admittance. Determine the voltage and phase angles at bus 2 and 3 and also slack bus power at the end of first iteration using gauss seidel method.



4. a) Determine how do you determine the Jacobian elements in N-R rectangular coordinates method.
   b) Draw the flow chart for load flow solution using N – R method when the system contain all types of buses .

5. a) Explain the importance of short circuit currents calculations.
   b) A 3-phase, 50 kW, star connected load is fed by a 210 KVA transformer with voltage rating 11 kV/400v through a feeder. The length of the feeder is 0.75 km and the impedance of feeder is (0.15+j3) ohm/km. If the load P.F is 0.75, calculate p.u impedance of the feeder and the load.

6. a) What are sequence impedances? Obtain expression for sequence impedances in a balanced static 3-phase circuit.
   b) The following sequence currents were recorded in a power system under an unbalance fault condition. $I_{positive} = -j1.6$p.u, $I_{negative} = j\ 0.5$ p.u and $I_{zero} = j\ 1.15$p.u. Identify the type of fault. Assume that the pre fault voltage is 1.0 p.u and the post fault positive sequence voltage is 0.175 p.u . Find the sequence impedances for the system under the above condition .

7. a) Differentiate between steady state stability and transient stability of a power system. Also Discuss the factors that effect (i) steady state stability and (ii) transient stability of the system.
   b) A 4 pole, 50Hz, 22 kV turbo alternator has a rating of 100 MVA, 0.8 p.f lag. The value of inertia of rotor is 800 kg-m^2. Determine M and H.

8. a) Derive swing equation and discuss its application in the study of power system stability.
   b) Explain the various methods of improving transient stability.

Code No. M0222 **R07** **Set No. 2**

IV B.Tech I Semester Supplementary Examinations, February/March, 2012

POWER SYSTEM ANALYSIS

(Electrical and Electronics Engineering)

Time : 3 hours **Max. Marks :80**

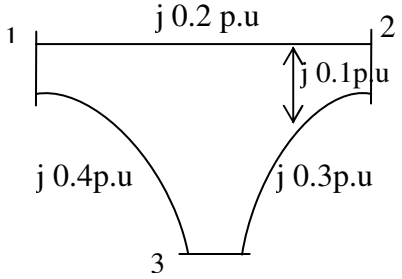
Answer any FIVE Questions

All Questions carry equal marks

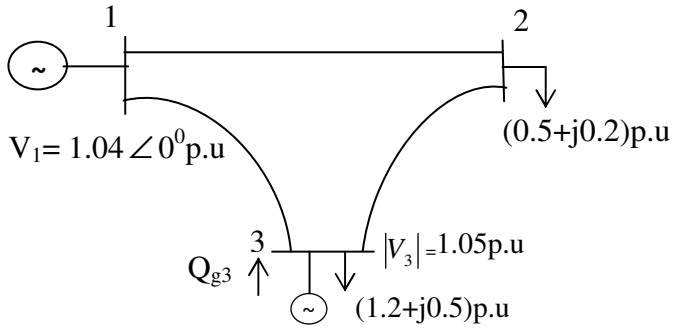
*****

1. A power system consists of 4 buses. Generators are connected at buses 1 and 2 reactances of which are j 0.1 and j 0.25 respectively. The transmission lines are connected between buses 1-2, 1-4, 2-3 and 3-4 and have reactances j 0.3, j 0.4, j 0.6 and j 0.2 respectively. Find the bus admittance matrix (i) by direct inspection, (ii) using bus incidence matrix and admittance matrix.

2. Compute the bus impedance matrix for the system shown in below figure by adding element by element. Take bus -2 as reference bus.



3. The power system network shown in below figure. Each line has a series impedance of (0.01+j0.06) p.u and the total shunt admittance of j 0.04 p.u. The specific quantities of the buses are given in the figure. A controlled reactive power source is available at bus 3, with the constraint $0 \leq Q_{g3} \leq 2.0$ p.u. Using gauss – seidel method, find the voltage at bus '2' and '3' after the first iteration.



4. a) Explain the DC load flow and derive necessary expressions.
   b) Compare the N-R method, decoupled and fast decoupled load flow methods.

5. a) How are reactors are classified? Explain the merits and demerits of different types of series reactors.
   b) Two generators rated at 10MVA, 11KV and 15MVA, 11KV respectively are connected parallel to a bus. The bus bar feed two motors rated 7.5 MVA and 10MVA respectively. The rated voltage of the motors is 9kV. The reactance of each generator is 12% and that of the motor is 15% of their own rating. Assume 50MVA, 10KV base and draw the reactance diagram with necessary values.

6. a) Derive an expression for the fault current of a single line to ground fault as an unloaded generator.
   b) The unbalance voltages across a 3 phase system are $V_a=400\angle 25^0 V$, $V_b=360\angle 90^0 V$, $V_c=450\angle -140^0 V$. Determine the symmetrical components of voltages.

7. a) Derive an expression for the maximum power transfer between two nodes. Show that this power is maximum when $X=\sqrt{3}\,R$, Where X is the reactance and R is the resistance of the system.
   b) A turbo alternator with 4 pole, 50Hz, 80MW, p.f 0.8 lag and moment of inertia 40,000kg-m^2 is interconnected via a short transmission line to another alternator with 2 pole, 50Hz, 100MW 0.8 p.f lag and moment of inertia 10,000 kg-m^2. Determine the inertia constant of single equivalent machine on a base of 100 MVA.

8. Discuss the application of equal area criterion for the system stability study when (i) a sudden increase in load takes place and (ii) a short circuit on one of the parallel feeders takes place which is cleared after certain time.

Code No. M0222 **R07** **Set No. 3**

IV B.Tech. I Semester Supplementary Examinations, February/March, 2012

POWER SYSTEM ANALYSIS

(Electrical and Electronics Engineering)

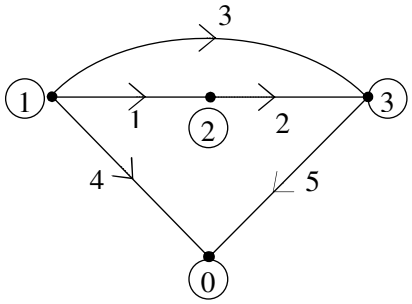
Time: 3 hours **Max. Marks: 80**

Answer any FIVE Questions

All Questions carry equal marks

*****

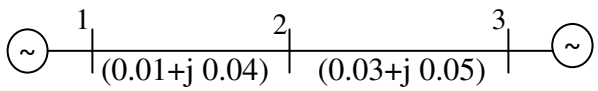
1. Consider the linear graph shown below which represents a 4 bus transmission system with all the shunt admittance lumped together. Each line has a series reactance of j 0.04 and half line charging admittance of j 0.01. Compute the Y_{bus} by singular transformation and also by direct inspection method.



2. Derive the necessary expressions for the building up of Z bus when (i) new element is added (ii) new element is added between two existing buses. Assume mutual coupling between the added element and the elements in the partial network.

3. a) Explain the necessity of power flow studies.
   b) Draw the flow chart for load flow solution using gauss seidel method when PV buses are included.

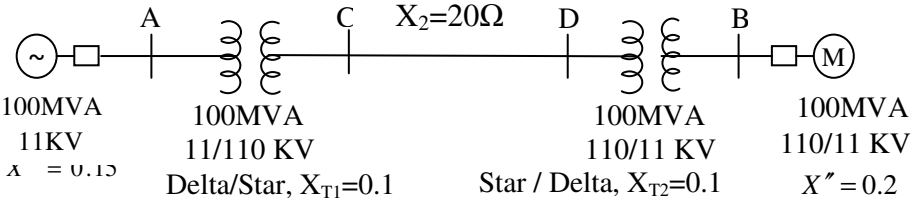
4. a) Derive the expression for Jacobian elements by using Fast decoupled load flow method.
   b) Determine the complex bus bar voltage at bus 2 at the end of first iteration by using decoupled load flow method for the power system shown in below figure.



$V_1 = 1.0 \angle 0^0$ p.u
$P_2 + j\,Q_2 = (-4.2 + j1.5)$ p.u
$V_3 = 1.02$ p.u, $P_3 = 2.0$ p.u

Code No. M0222 **R07** **Set No. 3**

5. Consider the power system network shown in below network



The synchronous generator is operating at its rated MVA at 0.9 p.f lag and at rated voltage. A 3-phase short circuit occurs at bus 'A', calculate p.u value of (i) sub transient fault current (ii) sub transient generator and motor current. Neglect prefault current. Also compute (iii) sub transient generator and motor currents including the effect of prefault currents.

6. a) Explain the sequence networks for synchronous generator.
   b) Two alternators of rating 11KV, 50MVA are operating in parallel and supplying to a substation by a feeder having an impedance of (0.4+j0.7)Ω of positive and negative sequence and (0.7+ j 0.3)Ω of zero sequence. The alternator sequence impedances are j 0.7, j 0.4 and j 0.2 Ω of positive, negative and zero sequence respectively. Both the machines of neutral earthed with a resistance of 0.2 Ω. Determine the fault currents in each line and the potential above earth obtained by the alternator neutrals if an earth fault occurs at phases 'b' and 'c' at the substation.

7. a) Discuss the various methods of improving steady state stability.
   b) A synchronous machine has a synchronous reactance of 1.0 p.u connected to an infinite bus of voltage 1.1 p.u. The terminal voltage of the generator is held constant at 1.0 p.u by an automatic voltage regulator. Determine the dynamic steady state stability limit. If the voltage regulator is done manually, what is the power limit?

8. a) What is equal area criterion? Discuss its application and limitation in the study of power system stability.
   b) A 50Hz, generator supplies 50% maximum power that is capable of delivering to a transmission line to infinite bus. A fault occurs that increases the reactance between generator and infinite bus to 500% of the value before the fault. The maximum power that can be delivered in 70% of the original maximum value after the fault is cleared. Calculate the critical clearing angle of the system.

Code No. M0222 **R07** **Set No. 4**

IV B.Tech I Semester Supplementary Examinations, February/March, 2012

POWER SYSTEM ANALYSIS

(Electrical and Electronics Engineering)

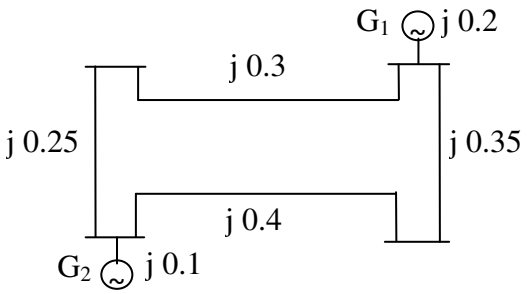
Time: 3 hours **Max. Marks: 80**

Answer any FIVE Questions

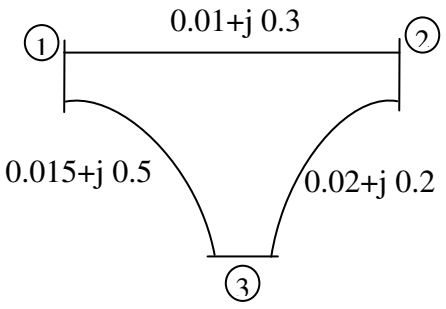
All Questions carry equal marks

*****

1. Form the Y_{Bus} by using singular transformation for the network shown in below figure including the generator buses.

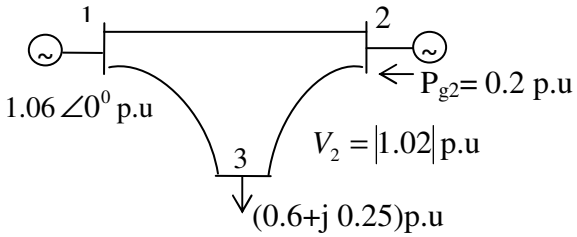


2. Obtain Z_{Bus} by using building algorithm for the following figure



3. a) How the buses are classified in a given power system? Explain.
   b) Write an algorithm for load flow solution using gauss seidel method when PV buses are present.

4. The power system network shown in below figure. Each line has a series impedance of (0.02+j 0.05) p.u and line charging admittance is j 0.02 p.u. The specified quantities of the buses are given in the figure. The maximum and minimum reactive power limits at bus 2 are 0.35 and 0.0 p.u respectively. Determine the set of load flow equations at the end of first iteration by using N-R method.



5. a) What are the merits of per unit system?
   b) A 33KV line has a resistance of 4 Ω and reactance of 16 Ω respectively. The line is connected to a generating station bus bars through a 6000 KVA step up transformer which has a reactance of 6%. The station has two generators rated 10,000 KVA with 10% reactance and 5000 KVA with 5% reactance. Calculate the fault current and short circuit KVA when a3-phase fault occurs at the HV terminals of the transformer and at the load end of the line.

6. a) Where are symmetrical components? Explain.
   b) A generator rated 100 MVA, 20 KV has $x_1 = x_2 = 20\%$ and $x_0 = 5\%$. Its neutral is grounded through a reactor of 0.32 Ω. The generator is operating at rated voltage with load and is disconnected from the system when L.G fault occurs at its terminals. Find the sub transient current in the faulted phase and line to line voltages.

7. a) Explain the following terms
   (i) Steady state stability (ii) transient stability and (iii) dynamic stability
   b) A 3-phase line has the following constants
   A = D = $0.98\ \angle 0.2^0$, B =$80\ \angle 75^0$ ohm, C = $0.0003\angle 90^0$ mho
   (i) Find the steady state stability limit if the end voltages are fixed at 132KV
   (ii) What is Steady State Stability limit if the shunt admittance is neglected? Comment on the results.

8. a) Explain the point by point method of solving the swing equation. Compare this method with the equal area criterion method.
   b) Discuss the application of auto reclosing and fast operating circuit breakers on improvement of stability.