Practice Question Bank For TE Sem-VI Electronics Engineering

COURSE CODE: ELC601	
COURSE NAME: Basic VLSI Design	
Q.No	Question
1	What are the advantages of CMOS technology compared to BJT Technology
2	Differentiate BJT, NMOS and CMOS Technology
3	Explain Level1 and Level2 MOSFET models in detail
4	Draw vs Characteristics of MOSFET and what is condition of MOSFET to be in the cut-off region, linear region and saturation region
5	Define scaling. Explain Constant Voltage and Constant field scaling with their merits and demerits.
6	Explain Oxide related capacitances for different region of operations of MOSFET.
7	Write a short note on semicustom and Full custom design.
8	Draw CMOS inverter and define Noise Margin, Delay time, Rise time and fall time with suitable waveform
9	Draw and explain VTC of CMOS inverter for different region of operations
10	Draw the Voltage Transfer Characteristics of CMOS Inverter. Derive the Five critical points of VTC
11	Design a Ideal Symmetric CMOS inverter and comment on noise margin.
12	Write a short note on power dissipation of in CMOS Circuits
13	Why NMOS Can Pass strong 0 and PMOS can Pass Strong 1 logic?
14	Design 2input NAND gate using pass transistor logic
15	Design 2 input OR gate following design styles, CMOS static design, Dynamic style
16	Design 2input NOR gate with transmission gate logic.
17	Design 2 input XOR and XNOR gate with pass transistor logic and transmission gate.
18	Implement 4:1 Mux using pass transistor logic and transmission gate logic.
19	Implement the following function using static CMOS, Dynamic CMOS, Pseudo - NMOS logic F=
20	Draw JK Flip Flop using CMOS and explain the working.
21	Draw SR Flip Flop using CMOS and explain the working
22	Design a 4*4 ROM Array which stores the following words: Row(0) — 1110 Row(1) — 1101 Row(2) — 1100 Row(3) — 0110 Implement it using: NOR based ROM and NAND based ROM.
23	Explain the mechanism of Flash Memory. Also explain NOR flash and NAND flash Memory.
24	Draw and explain working of 6T SRAM cell.
25	Explain programming technique of EEPROM.

26	Draw 1T DRAM Cell and explain its write, read and hold operations
27	Draw CLA (carry look ahead adder) carry chain using. Static CMOS Dynamic CMOS Pseudo NMOS
28	Draw and explain Manchester carry chain circuit
29	Draw and explain 4-bit barrel shifter.
30	Compare Ripple carry adder with CLA.
31	Explain Array Multiplier circuit with appropriate diagrams.
32	Write a short note on Barrel Shifter.

COURSE CODE: ELC602	
COURSE NAME: Electromagnetic Engineering	
Q.No	Questions
1	Derive Electric Field Intensity due to infinite line charge.
2	Write a short Note on Gauss's Law.
3	If a potential of $V = x^2yz+Ay^3z$, find a so that the Laplace's equation is satisfied and with the value of A, determine electric field at(2, 1, -1).
4	Write a short note on magnetic scalar and vector potentials.
5	Derive the boundary conditions for normal and tangential components of Electric field.
6	Describe the Faraday's law for time varying fields.
7	Derive the integral form of Maxwell's equations for static fields in free space.
8	Explain ampere's law for time varying fields.
9	Derive the Maxwell's equations for time varying fields in free space.
10	Derive wave equation for homogeneous unbounded source free medium starting from Maxwell's equation.
11	A parallel-plate capacitor with plate area of 5 cm^2 and plate separation of 3 mm has a voltage 50 sin 10^3t V applied to its plates. Calculate the displacement current assuming $\varepsilon = 2\varepsilon_o$.
12	With reference to electromagnetic wave explain linear, circular, and elliptical polarization.
13	Write a short note on applications of microwaves.
14	A distortion less line has $Z_o = 60\Omega$, $\alpha = 20$ mNp/m, $u = 0.6c$, where c is the speed of light in a vacuum. Find R, L, G, C, and λ at 100 MHz.
15	Define the characteristic impedance of a transmission line, derive an expression for characteristic impedance.
16	Obtain the transmission line equations for a two-wire transmission line.
17	Write a short note on smith chart.
18	Explain any three basic antenna parameters.
19	Derive the equation for the radiation resistance of an infinitesimal dipole.
20	Explain the concept of pattern multiplication in an antenna.
21	Write a short note on FRIIS transmission equation.
22	Write a short note on HORN antennas.
23	What are different sources of EMI? Discuss the need for electromagnetic compatibility.
24	Describe the EMI control techniques like grounding and shielding.
25	Write a short note on EMC requirements for electronic systems.

COURSE CODE: ELC603	
COURSE NAME: Computer Communication Networks	
Q.No	Questions
1	Explain the different network topologies with advantages and disadvantages.
2	Describe different Addresses (MAC address, IP address, Port address, Specific address) used in networking with examples .
3	Explain the need and design issues for layered architecture in communication systems. Also explain the functions of layers in OSI reference model.
4	Explain TCP/IP Protocol Suite. Distinguish between OSI model with TCP/IP model.
5	Explain the functions of a)Data Link layer b) Network layer c) Physical layer d)Transport layer.
6	Explain the functions of the following Interconnecting components in networking: Hub, Bridge, Router, Switch, Gateway
7	Compare Synchronous TDM and Statistical TDM .
8	Explain different Multiplexing techniques :FDM & TDM wrt Functionality & applications
9	Compare UTP with STP and List out different categories of UTP
10	Distinguish between following transmission media a)Optical fiber b)Twisted pair cable
11	Describe guided/wired as well as unguided/wireless transmission media and different Transmission impairments Attenuation ,Noise ,Distortion.
12	Describe ADSL with respect to channel configuration ,Modulation technique and Equipment setup
13	Explain LAN protocol architecture in IEEE 802.3 .Draw and explain MAC layer frame format in detail
14	Draw and explain IPV4 header. Compare IPV4 with IPV6
15	Explain Bit stuffing in HDLC Protocol
16	Explain/ Compare Circuit switching ,Datagram Switching and Virtual circuit switching
17	What are causes & effects of Congestion in Transport layer . Explain different congestion control mechanisms
18	Explain HDLC Protocol and different Control field for all frames in HDLC
19	Compare Transport layer protocols TCP and UDP
20	Explain CSMA/CD media access control protocol with flowchart
21	Discuss different Error Control ARQ mechanisms.
22	Draw & explain TCP Header in detail
23	What is Classful addressing ? What are different classes in Internet .
24	Compare Go back N ARQ and Selective reject ARQ .
25	What are different strategies of Routing and Routing algorithms ?
26	Write notes on : Subnetting & Super netting .
27	Write steps of Algorithm for Dijkstra's Routing algorithm and find the shortest path /Least cost path for a given network using this algorithm.
28	Write steps of Algorithm for Bellman Ford Routing algorithm and find the shortest path /Least cost path for a given network using this algorithm.
29	Write short note on following Application layer Protocols : HTTP and FTP
30	Write short note on following Application layer Protocols : SMTP and DNS

COURSE CODE: ELC604	
COURSE NAME: Embedded Systems and Real Time Operating Systems	
Q.No	Questions
1	With reference to Embedded systems, Discuss different characteristics, classification, Applications and Challenges.
2	Give various applications of Embedded Systems. Compare Hard real time and Soft real time Embedded Systems.
3	Describe different Design Metrics and optimization challenges required while designing Embedded Systems.
4	Give the significance/need and Applications of BOR (Brown Out Reset circuit), RTC (Real Time Clock) and WDT (Watchdog Timer) in Embedded Systems.
5	With respect to ARM Cortex M3 Processor, Discuss Memory map and MPU (Memory Protection Unit).
6	Explain Wireless Communication Protocols Zigbee and Bluetooth.
7	List out major features & applications of following Embedded Cores ASIC, SoC, FPGA and CPLD.
8	Explain CAN bus Protocol. How it is suitable for Real Time Embedded Applications.
9	Describe need for Low power design in Embedded systems. Explain Low power features and modes of ARM Cortex M3.
10	Draw FSM model for Automatic Tea/Coffee Vending Machine with different states.
11	List out the functions performed by Operating System. Compare GPOS (General purpose OS) with RTOS(Real Time OS).
12	Elaborate Multitasking in Real time systems. What all activities are involved in context switching?
13	Define task/process in Real time Embedded system. Draw and explain different Task States.
14	Give the Utilization bound for Rate Monotonic Scheduling Algorithm (RMA) and find if the given Task Set is Ti (Pi, ei) RMA schedulable.
15	Three processes with process IDs P1, P2, P3 with estimated completion time 4, 6, 5 milliseconds and priorities 1, 0, 3 (0 highest priority, 3 lowest priority) respectively enters the ready queue together. Calculate the waiting time and Turn Around Time (TAT) for each process and the average waiting time and Turn Around Time (Assuming there is no I/O waiting for the processes) in preemptive priority based scheduling algorithm.
16	Three tasks with task IDs T1, T2, T3 with estimated completion time 10, 5, 7 milliseconds and priority 1, 3, 2 respectively enters the 'Ready' queue together. A new process T4 with estimated time 2 mSec and priority 0 enters the ready queue after 2 mSec. Schedule the tasks using preemptive SJF (Shortest Job First) and priority based scheduling algorithm. Calculate execution time, waiting time and turn around time (TAT), mention which is the best scheduling algorithm for a given problem (0 is the highest priority). What is Inter Process Communication (IPC)? Give an overview of different IPC mechanisms adopted by various operating systems.
17	What is priority inversion? What are the different techniques adopted for handling priority inversion?
18	Explain concept of Semaphores in RTOS. Explain Binary, Counting and Mutex semaphores in RTOS.
19	Explain the different types of preemptive scheduling algorithms. State the merits and de-merits of each.

20	Explain how different Task Management features/functions (e.g Task creation, Task Deletion, Task Priority change etc) are implemented in FREERTOS.
21	Explain Interrupt Management and Time Management features of FreeRTOS.
22	Explain different Hardware & Software Embedded product Testing as well as Debugging tools.
23	Write Short note on Boundary Scan Architecture.
24	Design a Washing Machine Embedded system. Support the design using (a)Requirements (b)Specifications (c)Hardware & Software architecture Testing /Debugging and System Integration (d) Use suitable RTOS functions for Task handling.
25	Design a Smart Card Embedded system. Support the design using (a)Requirements (b)Specifications (c)Hardware & Software architecture Testing /Debugging and System Integration (d) Use suitable RTOS functions for Task handling.

<table>
<tr><td colspan="2">COURSE CODE: ELDO601</td></tr>
<tr><td colspan="2">COURSE NAME: Machine Learning</td></tr>
<tr><td>Q.No</td><td>Questions</td></tr>
<tr><td>1</td><td>Define machine learning. Discuss types of learning with suitable example</td></tr>
<tr><td>2</td><td>What are the issues in machine learning?</td></tr>
<tr><td>3</td><td>Differentiate between binary and multiclass classification with example.</td></tr>
<tr><td>4</td><td>Explain the concepts behind linear regression.</td></tr>
<tr><td>5</td><td>Compare and contrast Linear and Logistic regressions with respect to their mechanisms of
prediction.</td></tr>
<tr><td>6</td><td>List types of machine learning models? Explain any one of the models in detail.</td></tr>
<tr><td>7</td><td>The following table shows the midterm and final exam grades obtained for students in a database course.

<table><tr><td>Midterm exam (x)</td><td>Final exam (y)</td></tr><tr><td>72</td><td>84</td></tr><tr><td>50</td><td>63</td></tr><tr><td>81</td><td>77</td></tr><tr><td>74</td><td>78</td></tr><tr><td>94</td><td>90</td></tr><tr><td>86</td><td>75</td></tr><tr><td>59</td><td>49</td></tr><tr><td>83</td><td>79</td></tr><tr><td>65</td><td>77</td></tr><tr><td>33</td><td>52</td></tr><tr><td>88</td><td>74</td></tr><tr><td>81</td><td>90</td></tr></table>
Use the method of least squares using regression to predict the final grade of a student who received 86 on the midterm exam</td></tr>
<tr><td>8</td><td>How is data learnt by logistic regression? Explain it with example.</td></tr>
<tr><td>9</td><td>What are the steps in machine learning required in Developing a Machine Learning Application?</td></tr>
<tr><td>10</td><td>How to choose Right Algorithm in machine learning?</td></tr>
<tr><td>11</td><td>Explain regression line, scatter plot, error in prediction & best fitting line.</td></tr>
<tr><td>12</td><td>What is multiclass classification? Explain types of multi-class classification techniques in detail.</td></tr>
<tr><td>13</td><td>Compare and contrast classification and regressions with respect to their mechanisms of prediction.</td></tr>
<tr><td>14</td><td>What is linear regression? Find the best fitted line for following</td></tr>
</table>

	example: i | x_i | y_i | $\hat{y}_i$ 1 | 63 | 127 | 120.1 2 | 64 | 121 | 126.3 3 | 66 | 142 | 138.5 4 | 69 | 157 | 157.0 5 | 69 | 162 | 157.0 6 | 71 | 156 | 169.2 7 | 71 | 169 | 169.2 8 | 72 | 165 | 175.4 9 | 73 | 181 | 181.5 10 | 75 | 208 | 193.8
15	Define support vector machine and further explain the maximum margin linear separators concept.
16	Apply K-means algorithm on given data for k=3. Use C1(2), C2(16) and C3(38) as initial cluster centres. Data: 2,4,6,3,31,12,15,16,38,35,14,21,23,25,30
17	Explain in detail PCA for dimension reduction.
18	What is SVM? Explain the following terms: hyperplane, separating hyperplane, margin and support vectors with suitable example.
19	Explain how support vector machine can be used to find optimal hyperplane to classify linearly separable data. Give suitable example.
20	What is kernel? How kernel can be used with SVM to classify non-linearly separable data? Also, list standard kernel functions.
21	Explain K-mean clustering algorithm giving suitable example. Also, explain how K-mean clustering differs from hierarchical clustering.
22	How does machine learning detect credit card fraud?
23	Quadratic programming solution for finding maximum margin separation in SVM
24	Illustrate Support Vector machine with neat, labelled sketch and also show how to derive optimal hyper-plane?
25	Use Principal component analysis (PCA) to arrive the transformed matrix for the given matrix A. $A^T = \begin{matrix} 2 & 1 & 0 & -1 \\ 4 & 3 & 1 & 0.5 \end{matrix}$