Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

END SEM EXAMINATION JUNE 2023

9/6/2023

Program: Electrical Engineering **Duration: 3 Hr**

Course Code: OE-BTE 604 **Maximum Points: 100**

Course Name: VLSI Circuit **Semester: VI**

Instructions: Elective T.Y. B. Tech (Sem VI)

- Questions one is compulsory.
- Illustrate your answers with neat sketches wherever necessary.
- Figures to the right indicate full marks.
- Assume suitable data if required.
- Preferably, write the answers in sequential order.

Q.No.	Questions	Points	CO	BL	Module No.
1.a	Give the CMOS inverter voltage transfer characteristics and operating regions.	5	1	2	2
b	Discuss transmission gate with any one circuit example.	5	3	2	3
c	For the given expression design a transistor level CMOS circuit and find the equivalent W/L ratio of nMOS and pMOS. $Z = \overline{((D + E + A)(B + C))}$	5	2	4	2
d	Comment on the advantages and disadvantages of H-trees and clock grids. How does the hybrid tree/grid improve on a standard grid?	5	4	3	7
2.a	Explain in brief VLSI design flow.	5	1	2	1
b	Explain in detail CMOS n-well process.	5	1	2	1
c	Design a resistive-load inverter with R = 1 kΩ, such that VOL = 0.6 V. The nMOS driver transistor has the following parameters: VDD = 5 .0 V VT0 = 1 V μn Cox = 22.0 μA/V2 (a) Determine the required aspect ratio, W/L. (b) Determine VIL and VIH. (c) Determine noise margins NML and NMH.	5	2	3	2
d	Sketch the transistor level schematic and layout for CMOS 2-input NAND gate.	5	2	2	2
3.a	Define: VOL, VIL, VIH, VOH, Perturbed Output, Junction Temperature, Power dissipation of Inverter circuit.	5	1	1	2
b	Define: i) Pseudo-nMOS gate, ii) transmission gate. Implement two input multiplexer using CMOS transmission gate.	5	3	1	3
c	Write short note on JK latch circuit.	5	3	1	3
d	Discuss the operation of resistive-load SRAM Cell.	5	2	2	4
4.a	Discuss the operation of three transistors DRAM Cell.	5	2	2	4

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END SEM EXAMINATION JUNE 2023

b	Give the classification of semiconductor memories. Draw typical random access memory array organization.	5	2	4	4
c	Explain design of column decoder.	5	3	3	4
d	Explain in detail global clock generator of clock system.	5	4	3	7
5.a	Write an HDL module that computes a 4-input XOR function. The input is A(3:0) and the output is Y.	5	3	4	6
b	Describe simulation, synthesis and combinational circuit with example.	5	3	2	6
c	Write an 8:1 multiplexer module called mux8 with inputs S2:0, D0, D1, D2, D3, D4, D5, D6, D7, and output Y.	5	3	4	6
d	What is clock skew? What are the sources of clock skew? How it can be overcome?	5	4	2	7
a	Write HDL behavioral descriptions of a module computing a random Boolean function, $Y = \bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C} + A\bar{B}C$. Each module has three inputs, A, B, and C, and one output, Y. Also Write Verilog code for the same.	10	3	3	6
b	Write an HDL module called minority. It receives three inputs, A, B, and C. It produces one output Y that is TRUE if at least two of the inputs are FALSE.	5	3	3	6
c	Describe switching power dissipation.	5	4	2	5
6.a	Explain Short-Circuit Power Dissipation.	5	4	2	5
b	Realize the transistor level circuit for given logic equation using Pseudo nMOS gate. $Y = \overline{(A.B + \bar{C}).D}$.	5	3	3	3
c	Draw and explain the operation of CMOS D latch using pass gate.	5	3	2	4
d	Describe VTC, noise margins and power dissipation of nMOS inverter.	5	1	2	1
7.a	Explain Variable-Threshold CMOS (VTCMOS) Circuits.	5	4	3	5
b	Consider a CMOS inverter circuit with the following parameters: VDD = 1.2V V T0,n = 0.48 V VTO,p = - 0.46 V μnCox = 102 μA/V2 (W/L)n =10 μpCox = 51.6 μA/V2 (W/L)p =19 Calculate the noise margins of the circuit.	10	2	3	2
c	Write the HDL code to add delays to the function $Y = \bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C} + A\bar{B}C$. It assumes inverters have a delay of 1 ns, 3-input AND gates have a delay of 2 ns, and 3-input OR gates have a delay of 4 ns.	5	3	3	6

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End Semester Examination June 2023

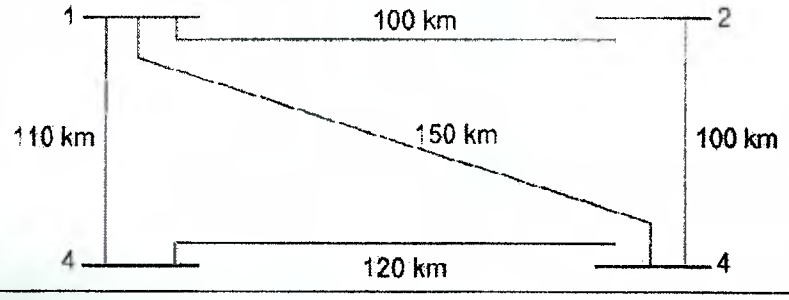
12/6/23

Program: T.Y. B.Tech.(Electrical) Sem VI **Duration: Three Hour**

Course Code: PC-BTE601 **Maximum Points: 100**

Course Name: Power System II **Semester: VI**

Notes:
1 Question No. 1 is compulsory.
2. Solve any four questions from remaining six.
3. Draw neat diagrams wherever necessary.
4. Assume suitable data if necessary.

Q.No.	Questions	Points	CO	BL	Module No.
1.	Answer/Solve any four. a. Explain the need for load flow study in Power System b. Write short notes on Generator Excitation System. c. Describe Equal Area Criterion Method. d. Explain Mid-Point shunt compensation d. Define Characteristic Impedance, Flat or Infinite Lines and Surge Impedance Loading.	 05 05 05 05 05			
2.	a. Write *Algorithm* **OR** *Flow Chart* for Solution of Static Load Flow Equation using Newton Rapson Method. b. 1. Find the bus incidence matrix A for the four-bus system given below. Take ground as a reference. 2. Find the primitive admittance matrix for the system. It is given that all the lines are characterized by a series impedance of 0.1+j0.7 Ohm/km and a shunt admittance of j0.35 × 10–5 Mho/km. Lines are rated at 220 kV. 3. Describe types of buses. 	**10** **02** **05** **03**			

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End Semester Examination June 2023

3.	a. Derive expression for synchronizing coefficient. Comment on stability using synchronizing coefficient. b. Consider a scenario of single machine connected to Infinite Bus. If there is a sudden change in Mechanical Input, apply Equal Area Criterion for deciding explaining Transient Stability.	07+03 10			
4.	a. Analyze the application of AGC in two-area power system. b. Explain the concept of Steady State, Dynamic and Transient in brief.	14 06			
5.	a. Critically analyze the scenario on voltage profile of the transmission line when receiving end is open circuited. b. Discuss Automatic Voltage Regulator in detail.	10 10			
6.	Define FC-TCR. Illustrate with the help of neat diagram along with suitable control characteristics. The control of power flow over HVAC line is difficult, critically comment on it. Suggest the suitable solution using HVDC line to address this problem.	10 10			
7.	Critically analyze Voltage-Power Characteristics of radial line with fixed sending end voltage. Derive Generator and Load Models in the context of Load Frequency Control.	10 10			

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(Govt. Aided Autonomous Institute Affiliated to University of Mumbai)
Bhavan's College Campus, Munshi Nagar, Andheri (W), Mumbai 400058.

Academic Year 2022 – 23 [Second Half]
End – Semester Examination – June 2023

T.Y. 14/6/2023

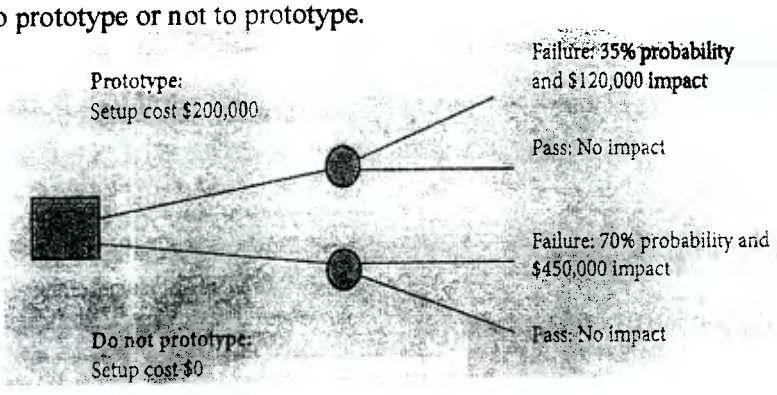
Program: B. Tech Electrical Engineering Sem VI
Course: Open Elective–I [Project Management]
Course Code: OE–BTE601

Semester: VI
Date: 14.06.2023
Total Points: 100

Note: Question No. 1 is compulsory. Answer any **FOUR** questions of the remaining.

CO: Course Outcomes **BL:** Bloom's Taxonomy Level **PI:** Performance Indicator

Q. No.	Question	Points	CO	BL	PI
1.	With reference to the case of ***"Caravan App"***, develop a detailed Project Charter for this Project. [The case text is given on Pg. No. 4]	**20**	**3**	**6**	**3.6.2**
2.	**Answer the following questions. All questions carry equal points.**				
	a. Which are the different steps a PM should follow while doing Training Need Analysis (TNA)?	**05**	**1**	**1**	**2.5.1**
	b. Which are the different approaches that can be used on a project for communicating? Describe the situations where these approaches are suitable alongwith an appropriate example.	**05**	**1**	**2**	**2.6.1**
	c. Which are the different types of risks that may occur on a project?	**05**	**1**	**1**	**2.6.2**
	d. Explain the difference between *quality* and *grade* with an appropriate example. What is *quality management*?	**05**	**1**	**2**	**2.6.3**
3.	*a.* Explain in detail with appropriate examples, McGregor's motivation Theory of *X* and *Y*?	**10**	**2**	**2**	**1.2.1**
	b. Which are the different types of teams the project can have?	**05**	**2**	**1**	**1.2.2**
	c. Jeevan is a Project Manager in a typical matrix organization. He is trying to get cooperation and performance from the team and stakeholders. Which are the different types of powers he can exercise?	**05**	**2**	**2**	**1.2.2**
4.	Ms. Samruddhi is appointed as a Project Manager for *Construction of New Hostel* Project at SPCE, Mumbai.				
	a. What she should do to have *positive involvement* of the all *stakeholders* throughout this project?	**10**	**3**	**1**	**2.8.2**
	b. While she is *planning communications* on her projects, which *methods* should she consider?	**05**	**3**	**2**	**2.8.1**
	c. When she is in the *Manage Communications* process, which reports should she consider for the *performance reporting* of her project?	**05**	**3**	**2**	**2.8.4**

5.	*a.* How Decision Tree helps in risk analysis? Pranav is managing a project of development of a Solar Energy Powered Bicycle. In an effort to determine whether prototyping this product is worthwhile he has come up with the following (see the diagram) impacts of whether this Solar Energy Powered Bicycle works or not. Considering the information provided in this diagram, calculate Expected Monetary Value (EMV) of each option and decide which one is the cheaper option – to prototype or not to prototype.  	10	3	2/3	1.7.1
	b. Explain following terms, with reference to Quality Management on a project: (*i*) Gold Plating, (*ii*) Kaizen, (*iii*) JIT (*iv*) Marginal Analysis (*v*) TQM	10	2	2	1.7.1
6.	*a.* Mr. Soham is a Project Manager at M/s. SSK Enterprises Ltd. (SSKEL), an Electrical & Electronics Accessories Distributor Company. His organization is starting a new project to design and build end-to-end distribution network of Anchor Electrical domestic and industry products in the Thane district. He has figured out following dependencies in this project. • Activity 1 can start immediately and has an estimated duration of 3 weeks. • Activity 2 can start after activity 1 is completed and has an estimated duration of 3 weeks. • Activity 3 can start after activity 1 is completed and has an estimated duration of 6 weeks. • Activity 4 can start after activity 2 is completed and has an estimated duration of 8 weeks. • Activity 5 can start after activity 4 is completed and after activity 3 is completed. This activity takes 4 weeks. *i.* Help Mr. Soham to draw a Network Diagram and determine duration of the critical path. *ii.* Calculate float for activity 2 and 3. *iii.* What is the float of the path with the longest float? *iv.* In the middle of the project an Engineer working on activity 3 leaves the organization and Mr. Soham has to recruit a new Engineer who is less experienced. This activity will now take 10 weeks. How will this affect the project? *v.* After discussion with his team, Soham realizes that a new activity 6 needs to be added to the project. This activity will take 11 weeks to complete and must be completed before activity 5 and after activity 3. Ms. Pragya, MD of M/s. SSKEL is concerned that adding the activity will add 11 weeks to the project. An experienced member, Mr. Shubham from his team suggests that the time will be less than 11 weeks. Who is correct? *vi.* With this change to project, how much longer will the project take?	10	3	3	2.6.3

	b. Ms. Manasi has a project to build new fence to a square shaped plot. Each of the four sides of this fence is to take one day to build, and $1000 has been budgeted per side. The sides are planned to be completed one after the other. Today is end of day 3. Using the following project status chart, calculate PV, EV, AC, BAC, CV, CPI, SV, SPI, EAC, ETC, VAC. Also write what does these terms indicate on a project.	10	3	3	3.5.1

Activity	Day 1	Day 2	Day 3	Day 4	Status End of Day 3
Side 1	S---------F				Complete, spent $1,000
Side 2		S--------PF	----F		Complete, spent $1,200
Side 3			PS--S---PF		50% done, spent $600
Side 4				PS--------PF	Not yet started

Key S = Actual Start, F = Actual Finish, PS = Planned Start, and PF = Planned Finish

7.	*a.* What are the advantages and disadvantages of *centralized contracting* and *decentralized contracting*?	**10**	**2**	**1**	**1.2.2**
	b. What is a WBS? Why is it called as The Foundation of the Project? Why WBS is better than other techniques such as lists in the Project Management? Which are rules to be followed while preparing a WBS? What are the benefits of using WBS in a project?	**10**	**1**	**2**	**2.6.2**

* * * * *

Case Text: *"Caravan App"* for Project Charter

Gayatri and Vrutika were discussing about "***Caravan App***", a peer to peer car sharing marketplace. Gayatri says, "Vrutika, the main idea of this app revolves around the private car-owners renting out their vehicles through this interface. The car owners will have the freedom to set their own prices for each ride."

While sipping her coffee Vrutika agreed saying, "Car-pooling/car sharing is, by now known car renting model where individuals lease cars for brief time periods. This reduces each person's travel cost, such as fuel cost, toll cost and the stress of driving".

Bhagyashri, who just reached the flat from her office, joined the discussion saying, "the trend of moving a larger part of people's lives online has been supplemented by the development of applications to effectively mimic the real world. Therefore, development of an efficient peer to peer car rental system for the usage of every day individuals and professional rental services will be an appealing extension of this revolution that seeks to make mobility cheap, efficient and easy for everyone connected to the internet."

Romilla, who was listening patiently till now couldn't keep quiet any further and added, "In this age of technology, Caravan will help in reducing air pollution, carbon emissions, traffic congestion on the roads and the need of parking spaces." She further shared, "Due to high initial investment, owing a private car is perceived as luxury by many working professionals. Therefore, making car sharing facilities available will not only help the people to exploit the given service but also help the rentee to generate a side income and thus help in boosting the economy. Also, with more people moving up the social ladder, the need to travel in a private vehicle becomes more of a necessity than a luxury."

"Exactly, that's the reason, CEO of Uber once said; *People have more money to spare than time*!" Urjita exclaimed, joining the discussion.

The ***Girls Gang*** was now complete and quite excited with the idea. Gayatri asked, "So how to proceed?" Vrutika replied, "Firstly, I think, we should ensure that the app should be compatible with all the platforms like Android, iOS, Windows and even Linux; and of course, this app should enable passengers to book rides to their local destinations and weekend trips as well".

"And I think we should also provide an option to the users to drive the car by self or hire a driver through the app", added Gayatri. "Yes! Good idea! In that case, we would have to allow drivers to register to through the app; we can ask the interested drivers to provide their photo, government identity cards, driving license, medical certificate, character certificate from Police and other required documents at the time of registration," added Bhagyashri.

"And there should be minimum qualification criteria for the drivers, so that they can read and use smart phones properly" Romila continued the discussion further, "Let's jot down following points, (*a*) the passengers interested to join the ongoing ride, must be able to see the route of the ride, drivers profiles, and other passengers who are sharing a particular ride, (*b*) passengers should be able to book their journeys in advance, (*c*) passengers should be able to pay via UPI or other online payment apps like PayTM, etc. alongwith the cash option, (*d*) we can also think of providing an option of topping up the pre-paid Caravan account to the passengers".

Romila suggested further, "I think Bhagyashri is good at software development, so let her work on software development part of the App; and Urjita can suggest the minimum hardware requirements of the user devices and at the server end!" "Yes, they both are a good team and are the best choice for our technical team!" agreed Gayatri and Vrutika.

"We will need to have broadly 4 to 5 tabs on the main page like, register, browsing, fare calculator, payment and ad-upload and the app design workflow for all the users can be in Unified Modelling Language, (UML)... and it should also consists of the use case diagram, class diagram, sequence diagram, activity diagram, state transition diagram,

dataflow diagrams, etc.", while noting something the note-pad, Bhagyashri whispered, getting engrossed in her thoughts. "Shall we use MySQL database and Java coding for the app?" she asked Urjita.

Urjita replied, "I think yes, that will keep the development cost under control and make our app compatible with even old PCs with 512 MB RAM, with Intel i3 processors running on Windows 7 OS with Xamp server".

Gayatri said, "Girls, you plan further details as early as possible, but make sure that by end of Jan 2023, you complete the pre-sales survey, need assessment, identifications of third party agencies for stakeholder interviews". "And Vrutika, by mid Feb 2023, get the progress reporting formats and any legal compliance required completed", she continued further.

"And see to it that, the identification of risks like the existing competitive apps offering sudden discounts, to make our entry in the market-place difficult, or any resistance from local cabbie drivers, etc. are completed by the end of Feb 2023", Romila suggested to Vrutika. "Also keep in mind that as of now we cannot afford more than Rs. 100,000/- for software/hardware, more than Rs. 200,000/- for any additional manpower requirements", Romila further informed Vrutika.

Vrutika replied, "Yes, that looks sufficient as of now, but we would need minimum Rs. 50,000/- for legal compliances and Rs. 100,000/- for campaigning and advertising". "Okay, then with additional Rs. 50,000/- for contingency, let's finalize the budget of Rs. 500,000/- for this entire effort", suggested Gayatri and continued, "Accordingly, I will approach the Indian Bank for funding us. The loan sanction would not take more than 2 weeks' time." "Okay! Till the time the bank sanctions us the loan, I will fund our efforts from my personal savings", added Romila.

"Yes gals, then we are all set to go!" replied Vrutika.

"Then start the work from tomorrow. I hope you won't mind using your personal laptops initially, and upgrade its configuration as per the need from project funding. Get the initial framework of the app ready maximum by the end of the March 2023 and complete the testing by mid-April 2023", said Gayatri. "Yes. Simultaneously, Bhagyashri, you start the social media campaign for the app from the first week of Jan 2023 and finalize the design of the flyers by the end of the Feb 2023. And Urjita, you please start taking the registration of the car owners aspiring to use this app and drivers to enrol themselves by mid-March 2023 and it should be done by the end of the May 2023", informed Romila.

"I think, simultaneously Bhagyashri and Urjita should also help me in assessing any incidents of data corruption, insufficient analysis of stakeholders, chances hiring of less competent developers, any system design failures, or architecture design issues, or hardware compatibility issues", suggested Vrutika, "and obviously, possible solutions to such issues."

"Yes, you plan it. But Vrutika, keep in mind that unless we are able to show the users, benefits like reduced fuel consumption, reduced travel fatigue and thereby increased productivity, cost saving, the app will not find its major user base", highlighted Gayatri. "Not only that, we'll also need to show the reduced pollution, reduced traffic congestion on roads, to the Traffic Police and Municipal authorities, to win their support and goodwill," added Romila. "And if we can prove the enhanced accessibility and economic opportunities to the low income families, increased convenience, and reduced stress to the users due to shared driving responsibilities, then, we also stand better chances of getting further funding from start-up investors," she continued further.

"OMG, gals, it's almost 11.00 pm. The restaurant nearby will be closing soon. Let's go out and have our dinner first!" Vrutika shouted. "Can we call it as the kick-off party of our project **Caravan -Share My Ride!**" asked Bhagyashri and Urjita.

Credits: This case is based on the Project Charter named "**Caravan -Share My Ride!**" prepared by Ms. Gayatri Devraj, Ms. Vrutika Bavaskar, Ms. Bhagyashri Mahalle, Ms. Romila Basav, Ms. Urjita Mehta, B. Tech. Electrical (2022 Batch)

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End Sem – June 2023 Examinations

14/6/23

Program: C/E/M

Course Code: OE-BTE602

Course Name: Artificial Intelligence

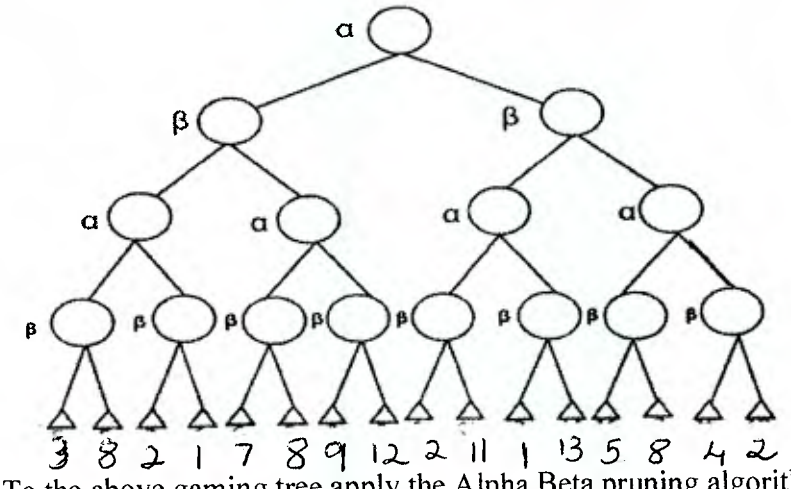
T.Y. B.Tech. Sem VI (C/E/M)

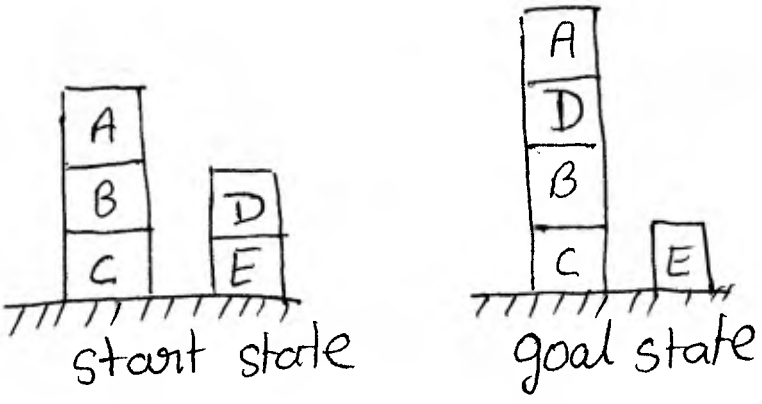
Duration: 3 hours

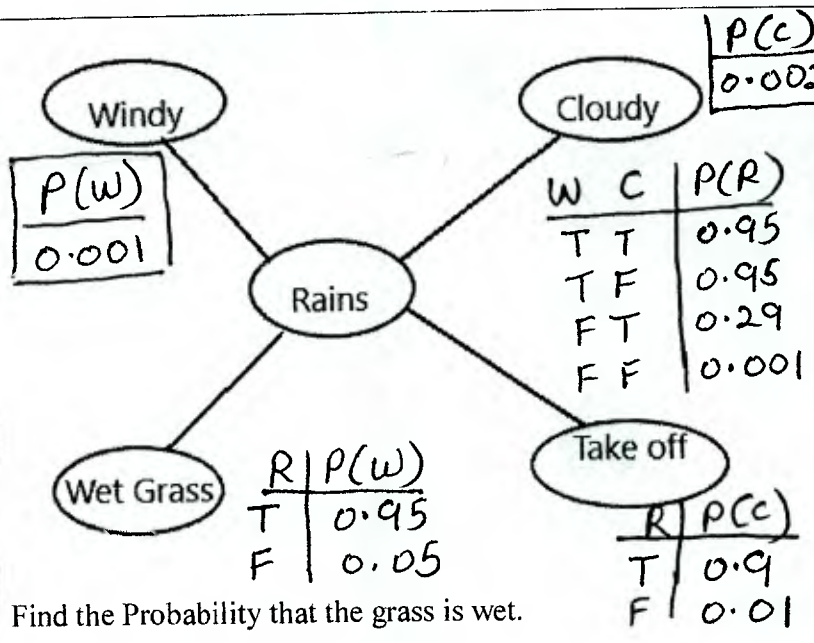
Maximum Points: 100

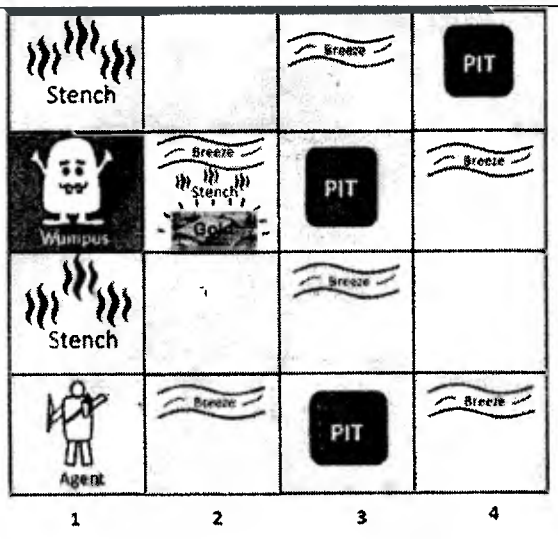
Semester: VI

- Attempt **any 5** out of 7.
- Make suitable assumptions wherever necessary

Q.No.	Questions	Points	CO	BL
1 a.	Differentiate between Human and Machine intelligence. Also discuss any two current trends in AI.	08	1	3
1 b.	Discuss BFS on the basis of following parameters 1. Time complexity 2. Space complexity	04	2	2
1c.	Discuss the following rules of inference 1. Modus Ponens 2. Resolution 3. Universal Instantiation 4. Existential Instantiation	08	2	2
2 a.	Discuss about the Simple reflex agent and Model based reflex agent.	10	1	2
2 b.	 To the above gaming tree apply the Alpha Beta pruning algorithm and hence fine the gaming path.	10	2	3

3.	The start state and goal state are given below.  Implement hill climbing algorithm to reach the goal state using two different heuristic functions given below and hence explain the concept of local maxima. h1 = +1 if block is on correct block/table. = -1 if block is not on correct block/table. h2 = +1 for every block in a correct structure that the block is sitting on. = -1 for every block not in correct structure that the block is sitting on. Move possible is : Move(X,S,D) X-- Block S -- Top of stack/table T -- Top of stack/table	20	2	4
4 a.	Discuss the following giving suitable examples: 1. Fully observable v/s partially observable environment 2. Deterministic v/s stochastic environment 3. Static v/ dynamic environment 4. Discrete v/s continuous environment	10	1	2
4b.	Discuss the different types of learning in AI.	10	3	2
5a.	Discuss the Expert System Architecture.	10	3	2

5b.	 Find the Probability that the grass is wet.	10	3	3
6a.	<table><tr><th>Age</th><th>Competition</th><th>Type</th><th>Profit</th></tr><tr><td>Old</td><td>Yes</td><td>software</td><td>Down</td></tr><tr><td>Old</td><td>No</td><td>software</td><td>Down</td></tr><tr><td>Old</td><td>No</td><td>hardware</td><td>Down</td></tr><tr><td>Mid</td><td>Yes</td><td>software</td><td>Down</td></tr><tr><td>Mid</td><td>Yes</td><td>hardware</td><td>Down</td></tr><tr><td>Mid</td><td>No</td><td>hardware</td><td>Up</td></tr><tr><td>Mid</td><td>No</td><td>software</td><td>Up</td></tr><tr><td>New</td><td>Yes</td><td>software</td><td>Up</td></tr><tr><td>New</td><td>No</td><td>hardware</td><td>Up</td></tr><tr><td>New</td><td>No</td><td>software</td><td>Up</td></tr></table> Built Decision Tree for the above data using ID3 algorithm.	15	3	5
6b.	Give a outline of a typical PDDL description model	05	2	3
7a.	The Law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, and enemy of America, has some missiles, and all of its missiles were sold to it by Colonel West, who is American. **Prove that Colonel West is a Criminal using First Order Logic.**	10	2	3

7b.	 **Prove that the Wumpus is in Room31 using Propositional Logic.**	10	3	3

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END SEM EXAMINATION JUNE 2023

Program: T. Y. B. Tech (Elect) Sem VI 19/6/23
Course Code: MC-BTE 003
Course Name: Environmental Science

Duration: 03 Hour
Maximum Points: 100
Semester: VI

Instructions:

1. Attempt **any FIVE** questions.
2. Draw neat diagrams wherever possible.

Q.No.	Questions	Points	CO	BL	Module No.
Q. 1(a)	State the difference between Biotic and Abiotic Environment. Discuss Yellow Fish Road Project.	05 05	01	L-1	01
Q. 1(b)	Discuss the different constitutional provisions for safeguarding the environment by explaining wildlife protection act, forest act and biodiversity act.	03+ 03+ 04	02	L-1	02
Q. 2(a)	What is an ecosystem and ecology? Hence explain structure and functions of an ecosystem.	02+ 04+ 04	01	L-1	03
Q. 2(b)	What is ecological pyramid? Hence explain the pyramid of number, pyramid of energy and pyramid of biomass.	01+03 +03+ 03			
Q. 3	Explain environmental impact and economic impact of solar, wind, geothermal, tidal and biomass energies.	20	02	L-1	04
Q. 4(a)	Discuss different causes of mechanical hazards and fire hazards and hence explain various safety measures to be taken to avoid mechanical and fire hazards.	05+ 05	02	L-1	05
Q. 4(b)	Explain hazard analysis objectives and its prevention and safety; hence describe ISO 14000 Standard for environmental management and safety management point of view.	05+ 05	02	L-1	05

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END SEM EXAMINATION JUNE 2023

Q. 5(a)	Explain an evolution tool 'GRIHA' (Green Rating for Integrated Habitat Assessment) to help design, build, operate and maintain a resource efficient build environment.	10	03	L-1	6
Q. 5(b)	Explain 5 'R' Philosophy for sustainable development of environment and hence discuss GRIHA Assessment criteria to ensure that the construction project reduces its overall environmental impact.	05+ 05	03	L-1	6
Q. 6(a)	Discuss the objectives and outcomes of Ramsar convention and the convention on biological diversity.	5+ 05	02	L-1	7
Q. 6(b)	Explain the objectives and outcomes of convention to combat desertification and convention on climate change.	05+ 05	02	L-1	7
Q. 7	Write short notes on the following.				
	(a) CITES (The convention on international trade in endangered species of wild flora and fauna).	05+	02		7
	(b) Case study on GRIHA registered building in India.	05+	03	L-1	6
	(c) Ecological succession	05+	02		3
	(d) Air pollution control act.	05	01		1

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END SEMESTER EXAMINATION JUNE 2023 21/6/23

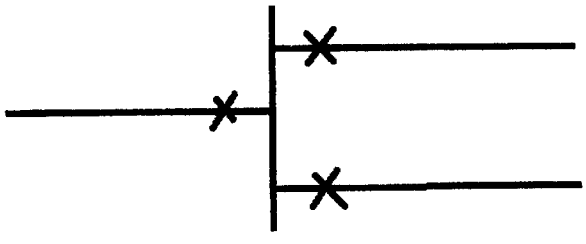
Program: B. Tech. Electrical
Duration: 3 hours
Course Code: PC-BTE 602
Maximum Points:100
Course Name: Switchgear & Protection
Semester:VI

Notes: Question 1 is compulsory. Attempt any 4 from remaining 6.

T. Y. B. Tech (Elect) (Sem VI)

Q. No.	Question	Points	CO	BL	Mo. No.
1	Suggest suitable protective device from the basket of relays for following various situations. **Justify your answer in brief.** [Impedance Relay, Differential Relay, Over-current Relay, Reverse Power Relay, Frequency Relay, Over-voltage Relay, Negative Sequence Relay, Ground wire, Mho Relay, Harmonic restrain relay] 1) 3-phase fault on Bus-bar 2) Unbalance load on Generator 3) Lightning stroke 4) A Grid & a Generator both are sharing some common load. In addition to that, generator is also supplying some local load. Suddenly a fault occurs on the grid side and the grid side circuit breaker trips. Now Generator has to be disconnected from grid. Suggest suitable relay. 5) Transmission line 3 phase fault with heavy arc resistance.	20	3	3,5	1,2, 3,6
2a	Draw and explain functional block diagram of Numerical/Digital Relay Hardware.	10	1	1,2	1
2b	Draw the typical Architecture (topology) of a Wide Area Measurement System. What are the functions of PMU and PDC? Compare WAMS with SCADA system.	10	6	1,2, 4	7
3a	Explain Lightning phenomena in brief. List out the protective devices used against lightning. (only list)	6	3	2,1	6
3b	Compare Impedance Relay with Mho relay on the following criteria 1) Working principle, measurements required 2) Characteristic on R-X plane. 3) Settings required What are the limitations of Impedance relay that are overcome by Mho relay.	14	1,3	4	2

4a	Explain with the waveform, current chopping phenomena in case of breaking low magnitude inductive current by the circuit breaker. Suggest the solution. (Only suggest)	8	4,6	2,3	4
4b	Compare vacuum circuit breaker (VCB) with SF6 circuit breaker based on construction (draw the diagrams), working, voltage rating, and applications.	12	4	4	5
5a	Suggest a suitable protection to be used in case of loss of excitation of a Synchronous Generator? Support your answer with justification.	10	3	3	3
5b	Explain the overvoltage phenomena in case a line to ground fault occurs in a 3 phase system with ungrounded neutral. Suggest the remedy. (Only suggest)	10	5	2,3	6
6a	Discuss various ratings of a Circuit Breaker. Which of the ratings are most important while selecting a circuit breaker?	10	4	1,2	4
6b	An 11 kV, 50 Hz alternator is connected to a system which has inductance and capacitance per phase of 10 mH and 0.01 micro Farad respectively. Determine (i) the maximum voltage across the breaker contacts; (ii) Frequency of transient oscillation; (iii) the average RRRV; and (iv) the maximum RRRV Hint : Instantaneous voltage across circuit breaker during fault is given as $\mathbf{v = Vm\ (1-\cos(t/\sqrt{LC}))}$	10	4	3	4
7a	What is power swing? Why does a distance relay mal-operate on power swing? How does a power swing blocking (PSB) feature can be used to prevent distance relay from tripping under power swing?	10	1,3,6	2,3	2
7b	Suggest suitable protection for the following bus-bar arrangement against the bus-bar fault, such that relay should only trip for the fault on busbar. Redraw the circuit with proper connections and explain the working of relay. Comment on ratings of CTs used for bus-bar protection.	10	3	3	3



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End Semester

23/6/23

Program: Electrical Engineering | **Date: June 2023**
Duration: 3 hrs. | **Course code: PE-BTE602**
Maximum Marks: 100 | **Semester: VI**

Course Name: Control System Design

Note: Q1 is compulsory. Solve any four questions from the remaining six.
Assume data if required. T. Y. B. Tech (Sem VI) (Elect)

Q. No.	Questions	Max Marks	CO No	BL	Module No
1 a	With an example explain how phase plane analysis is used to comment on stability of the system	04	01	03	07
b	Why is the correction factor added to the phase margin required to meet the transient response?	04	02	02	03
c	Why is there more improvement in steady state error if a PI controller is used instead of a lag network?	04	03	02	04
d	Briefly describe the configuration of an observer.	04	04	02	06
e	Discuss separation principle in a system with controller and observer	04	04	02	05
2 a	The unity feedback system with forward transfer function $$G(s) = \frac{k}{(s+1)(s+2)(s+10)}$$ Compensate the system using time domain analysis to improve steady state error by factor of 12 if the system is operating with damping ratio 0.18	10	02	04	02
b	A unity feedback system with forward transfer function $G(s) = \frac{K}{s(s+8)}$ is operating with closed loop step response that has 15% overshoot. Evaluate settling time Design compensator using root locus to decrease the settling	10	02	04	02

	time by three times.				
3 a	For a unity feedback system with $$G(s) = \frac{k}{(s+1)(s+5)}$$ Design a PID controller that will yield peak time of 1.04 sec and damping ratio of 0.8 with zero error for step input. Realize the same using active realization	12	03	04	04
b.	For a unity feedback system with a forward transfer function $$G(s) = \frac{k(s+4)}{s(s+8)(s+10)(s+12)}$$ Use frequency response method to find system gain k, to yield closed loop step response with 20% overshoot.	08	02	04	03
4 a	Why is Lag Lead compensator used? Write design procedure of Lag Lead Compensator in frequency domain	05	02	02	03
b.	Draw realization circuit for PI and PD controllers and write the transfer function for the same.	05	02	02	04
c	The unity feedback system has forward transfer function $G(s) = \frac{K}{s(s+7)}$ is operating with 15% overshoot and 2 second settling time. Using frequency response technique, design compensator to yield $K_v = 50$	10	02	05	3.1.6
5 a	Consider the plant $G(s) = \frac{100}{s(s+3)(s+7)}$ whose state variables are not available. Design an observer to yield transient response described by ξ=0.4 and $w_n = 75$. Place the third pole 10 times farther from the imaginary axis than the dominant poles	10	04	04	06
b	The system equation is given by $$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\\ \dot{x}_3\end{bmatrix} = \begin{bmatrix}0 & 0 & -3\\ 1 & 0 & -12\\ 0 & 1 & -17\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix} + \begin{bmatrix}1\\ 3\\ 7\end{bmatrix}u$$ $$y = [0 \quad 0 \quad 1]\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}$$ For the system the state variable x_1 is measurable whereas state	10	04	04	06

	variables x_2 and x_3 are to be predicted. The observer is used to predict the same and the controller is designed to have 20% overshoot and 1.5 second peak time. Design observer to predict x_2 and x_3 .				
6 a	Explain various types of system non-linearity and their effect on system performance.	05	01	02	07
b	Define singular point. Determine singular point/points for the system equation $\dot{x} = -9x + x^3$ Comment about the stability	05	01	02	07
c.	For the following system 1. Evaluate transfer function 2. Write state space equations in controllable canonical and observable canonical forms 3. Check if the system is controllable or not $[\dot{x}] = \begin{bmatrix} -4 & -1.5 \\ 4 & 0 \end{bmatrix} x + \begin{bmatrix} 2 \\ 0 \end{bmatrix} u$ $y = [1,5 \quad 0.625] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$	05	04	02	05
d	The system transfer function is given by $G(s) = \frac{s+4}{(s+1)^2(s+2)(s+5)}$ Write state space equations in Jordan form	05	04	02	05
7 a	The plant transfer function is given by $G(s) = \frac{20(s+2)}{s(s+4)(s+6)}$ The controller has to yield 10% overshoot and settling time of 2 sec. Place the third pole 10 times as far from the imaginary axis as the dominant pole pair. Design controller using 1. Controllable canonical form 2. Ackerman's Formula	15	04	04	06
b	What are the time domain and frequency domain design specifications? Describe the effect of gain and compensator pole zero placement on transient response.	05	01	02	01

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END SEMESTER EXAMINATION
JUNE-2023

23/6/2023

Max. Marks: 100 Duration: **03 Hours**
Class: **T.Y.B.TECH** (Elect) Semester: **VI** Program: **Electrical**
Name of the Course: **Renewable Energy Sources and Grid Integration**
Course Code: **PE-BTE-603**

Instructions:

- Question No.1 is compulsory and solve any four from remaining questions.
- Answers to all sub questions should be grouped together
- Figures to the right indicates full mark
- **Assume suitable data if required and justify the same.**

Qu. No	Description of question	Max. Marks	CO
Q.1	Solve any four.		
a.	Draw the shaft torque (Nm) versus shaft speed (rpm) characteristics at a range of wind speeds, for a particular wind turbine.	05	01
b.	Compare the different charge controllers used in solar PV system.	05	03
c.	Define the term power quality? Discuss the various sources for the power quality problem.	05	03
d.	What is the Principle of Cogeneration?	05	01
e.	Discuss the environmental and social impact of large scale dam hydro-electric project.	05	04
Q.2 a.	Discuss the power control mechanism in wind turbines. Compare the pitch control and stall control of WECS. Draw the output power of turbine as a function of wind speed for both pitch control and stall control.	10	02
b.	Wind turbine units are rated at 2-MW in a rated wind of 13 m/s. The stage efficiencies are C_p=0.32, n_{gb}=0.94, n_g=0.96. What is the necessary swept area? If the rotor is two blade propeller (horizontal axis), what is the diameter. (ρ=1.29 kg/m^3)	06	03

c.	Discuss the salient features of constant speed operation of WECS.	04	02
Q.3 a.	Explain the need for Statistical Representation of Wind Speed and discuss it.	10	01
b.	What is Tip Speed Ratio (TSR)? Discuss the relation between the TSR and power coefficient (C_p)?	10	01
Q.4 a.	What is MPP? Draw the I-V and P-V characteristics of the solar panel. With suitable characteristics, explain the effects of cell temperature, solar insolation and load on maximum power point.	10	03
b.	Discuss the incremental conductance algorithm used in MPPT for solar power generation.	10	03
Q.5 a.	A PV module of new solar cell technology is to be designed to charge a battery of 12 V. The Voc of the cell of under STC is 0.90 and the voltage constant at which solar cell develops maximum voltage is 0.9. The cell's voltage decreases by 1.1 mV every degree centigrade rise in temperature. How many cells should be connected in series in this PV module, if cell temperature under operation is 75°C.	06	01
b.	Draw the diagram and discuss the hybrid PV system (DG set with solar PV system). Compare the series and parallel configurations.	06	03
c.	Discuss the following commonly used set points in charge controllers with suitable block diagram. a) Voltage Regulation (VR) Set Point b) Voltage Regulation Hysteresis (VRH) c) Low Voltage Disconnect (LVD) d) Low Voltage Disconnect Hysteresis (LVDH)	08	03
Q.6 a.	What is tidal energy? Explain the single basin and double basin concept of tidal power generation.	08	01
b.	Define State of charge and depth of discharge of the battery.	04	02
c.	Discuss the float method to calculate the flow in hydroelectric power generation.	08	02
Q.7 a.	Draw the diagram and explain the open cycle OTEC plant and closed cycle OTEC plant.	10	01
b.	What are the types of geothermal resources? Discuss the hydrothermal resources.	10	01