Code No. D-3611/CBCS

FACULTY OF ENGINEERING

B.E. (EEE/EIE) V – Semester (CBCS) (Backlog) Examination,
March / April 2022
Subject: Linear Control Systems

Time: 3 Hours **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions. **(10 x 2 = 20 Marks)**

1 What is open loop and closed loop control systems?
2 State the advantages of feedback in control systems.
3 Find the steady state error for unit step, unit acceleration inputs for the given system

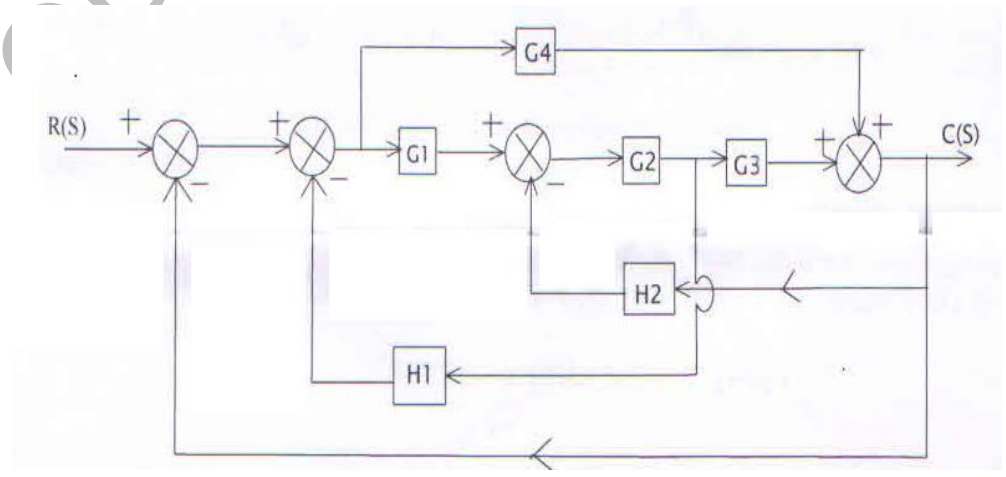
$G(s) = \frac{10}{s(0.1s+1)(0.5s+1)}$.

4 Sketch the response of a second order under damped system.
5 What are the effects of adding poles and zeros on the root loci?
6 Comment on the stability of the system whose characteristic equation is $S^4 + 8s^3 + 18s^2 + 16s + 4 = 0$ using Routh Hurwitz criterion.
7 Define Gain margin and Phase margin.
8 State Nyquist stability criterion.
9 Define controllability and observability.
10 $A = \begin{bmatrix} 0 & 1 \\ 0 & -2 \end{bmatrix}$. Determine state transition matrix.

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 Reduce the block diagram shown in below figure 1 and obtain the overall transfer function.



12 A unity feedback control system has an open loop transfer function, G(s) = $\frac{10}{s(s+2)}$, find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units.

13 Determine the breakaway points, angles of departure and centroid of the root locus for the system G(s) = $\frac{K(s+3)}{s(s+5)(s+6)(s^2+2s+2)}$.

14 Sketch the bode magnitude and phase plot for the transfer function G(s) = $\frac{20(0.1s+1)}{s^2(0.2s+1)(0.02s+1)}$. Determine gain margin and phase margin.

15 a) Find the transfer function of the system given below:

$$\dot{x} = \begin{bmatrix} 1 & -2 \\ -2 & 4 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u$$

b) Explain the properties of state transition matrix.

16 a) Derive transfer function of field-controlled DC servo motor.
b) State the limitations of Routh's Hurwitz criterion for stability.

17 Write short notes on the following:
a) Lag-lead compensator
b) Polar plots
c) PI Controllers.

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Code: D-3625/CBCS

FACULTY OF ENGINEERING

B.E. (ECE) V Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: AUTOMATIC CONTROL SYSTEMS

Time: 3 Hours **Max.Marks:70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions. **(10 x 2 = 20 Marks)**

1. What is closed loop system? Give an example
2. Define Source, Sink, as in SFG
3. Effect of PID controller to control system.
4. Determine the stability of the system represented by the characteristic equation

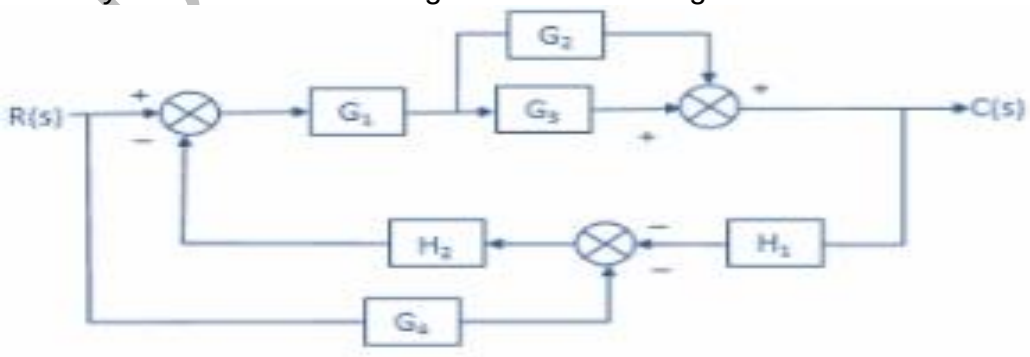
   $(S^5 + S^4 + 2S^3 + 2S^2 + 3S + 5 = 0)$.

5. What are Break-in point and Break-away point in Root-locus plots?
6. What are the advantages of frequency response analysis?
7. Define controllability and observability.
8. How to choose state variables in a system?
9. Explain the need for compensating Networks?
10. Compute e^{At} $A = \begin{bmatrix} 0 & 1 \\ 1 & 2 \end{bmatrix}$

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11. Using block diagram reduction technique, find closed loop transfer function of the system whose block diagram is shown in fig below.



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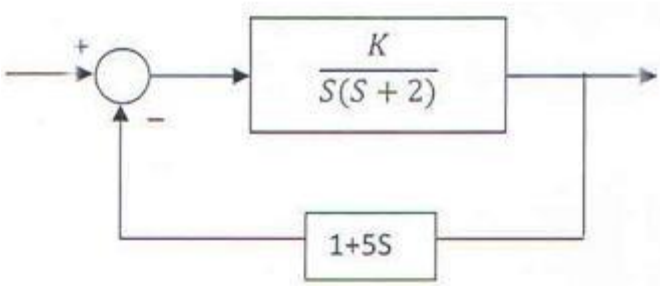
12. a) Determine the K value so that steady error of the following system is 6 when it is excited with a ramp input.



b) Using Routh Criterion, state the stability of the system represented by the characteristic equation: $S^4+8S^3+18S^2+16S+5=0$

13. Draw the root locus of the system having open loop transfer function.

$$G(s) = \frac{k}{s(s+2)(s+4)}$$

Find 'K' when damping ratio E is 0.5 from the plot?

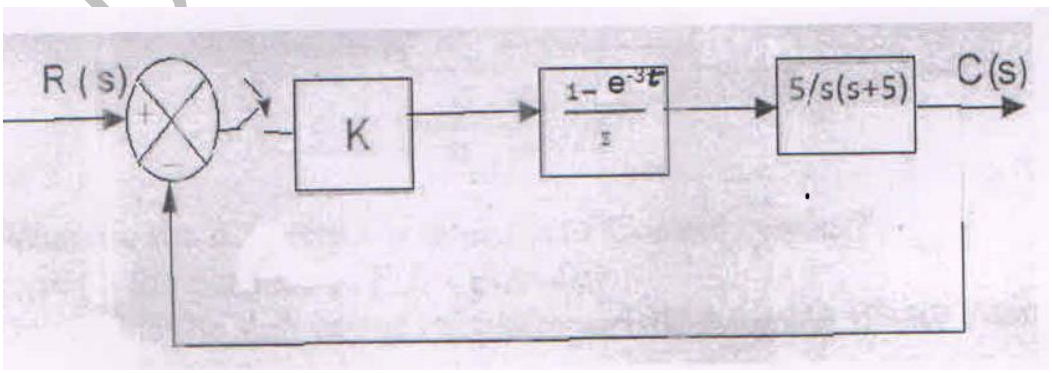
14. Sketch the Bode plot and calculate the gain cross over frequency and phase cross over frequency for the given open loop transfer function:

$$G(s)H(S) = \frac{20(s+4)}{s(s+1)(s+2)}$$

15. Obtain controllable canonical form and diagonal form state models for the system whose transfer function is given below.

$$\dot{x}(t) = \begin{bmatrix} -1 & 1 \\ 0 & -2 \end{bmatrix} x(t) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$

16. Find range of K for which the system to be stable



17. Write short the following
    a) Compensators.
    b) State transition matrix.
    c) Digital control system Architecture.

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Code No. D-3631/CBCS

FACULTY OF ENGINEERING

B.E. (MECH/PROD) V - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Machine Design

Time: 3 hours **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions **(10 x 2 = 20 Marks)**

1 What properties a spring material should have?
2 How to avoid buckling in compression springs?
3 Compare between Involute and Cycloidal gears.
4 Write two preventive measures to avoid gear tooth failure.
5 Differentiate between hydrostatic and hydrodynamic lubrication.
6 Compare journal bearings with antifriction bearings.
7 What is the function of the flywheel and mention two applications?
8 What are the principal parts of an I.C engine.
9 Mention the criteria for the design of machine frame.
10 Explain the design criteria for C-clamps.

PART – B

Note: Answer any five questions **(5 x 10 = 50 Marks)**

11 Design a concentric spring for an air craft engine valve to exert a maximum force of 5000N under a deflection of 40mm. Both the springs have same free length and are subjected to equal maximum shear stress of 850 MPa. The spring index for both the springs is 6.

12 Design worm and gear speed reducer to transmit 22kW at a speed of 1440rpm. The desired velocity ratio is 24:1. An efficiency of at least 85% is desired. Assume that the worm is made of hardened steel and the gear of phosphor bronze.

13 Design a connecting rod for a petrol engine, from the following data:
a) Diameter of the piston = 110mm (b) Mass of the reciprocating parts = 2kg
c) Length of the connecting rod = 325mm (d) Stroke length = 150mm
e) Speed = 1500rpm, with permissible over speed of 2500rpm (f) Compression ratio = 4 (g) maximum explosion pressure = 2.5N/mm^2.

14 Design an overhung crank shaft with two main bearings and a flywheel in between them for an I.C engine, single cylinder 0.25mX0.3m. The flywheel weighs 29KN. The maximum pressure is 2.1MPa. The torsional moment is maximum when it is at 35^0 from the I.D.C while the pressure is 1.04 MPa. Assume the missing data.

15 A crane hook has a round cross-section with diameter 90mm. The bed diameter is 120mm. Determine (a) the load which produces a maximum stress of 120N/mm^2 in the inner fibres; and (b) the load that will produce the corresponding stress in the outer fibres.

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16 A rolling contact ball bearing is to be selected to support the overhung crankshaft. The shaft speed is 750rpm; the bearings are to have 99% reliability corresponding to a life of 26000 hours. The bearing is subjected to an equivalent radial load of 2KN; consider life adjustment factors foe operating condition and material as 0.9 and 0.85 respectively. Find the basic dynamic load rating of the bearing from the manufacturer's catalogue, specified at 90% reliability.

17 Write short notes on:

i) Properties of lubricants used in bearings.

ii) Design of Bevel gears

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Code No. D-3637/CBCS

FACULTY OF ENGINEERING

B.E. (AE) V – Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Design of Machine Components

Time: 3 Hours **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions. **(10 x 2 = 20 Marks)**

1. What factors should be considered when selecting any material for engineering purpose?
2. Name the four principal iron ores with their chemical formulae.
3. What is the effect of surface finish on endurance limit?
4. Explain briefly how the FOS is determined under steady and varying loading by different materials.
5. What are the properties of brittle materials?
6. What are the advantages of Woodruff keys?
7. What type of stresses are induced in shafts?
8. How is a shaft designed when it is subjected to twisting moment only?
9. What are the applications of a cotter joint?
10. List out the different types of rivet heads.

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11. Explain the Trescas theory of maximum shear stress and Saint Venants theory of maximum principal strain.

12. A mild steel shaft of 50 mm diameter is subjected to a bending moment of 2000N.m and a torque T. If the yield point of the steel in tension is 200MPa, find the maximum value of this torque without causing yielding of the shaft according to (a) maximum principal stress and (b) maximum shear stress.

13. A 50 mm diameter shaft is made of carbon steel having ultimate tensile strength of 630MPa. It is subjected to a torque which fluctuates between 2000 N.m to 800 N.m. Using Soderberg method, calculate the FOS. Assume suitable value for any other data needed.

14. A hollow steel shaft transmits 600KW at 500rpm. The maximum shear stress is 62.4 MPa. Find the outside and inside diameter of the shaft, if the outer diameter is twice the inside diameter. Assuming that the maximum torque is 20% greater than the mean torque.

15. Write the design procedure for a knuckle joint.

16. A single riveted lap joint is made in 15mm thick plates with 20 mm diameter rivets. Determine the strength of the joint if the pitch of the rivets is 60mm. Take σ_t =120 MPa, ζ =90 MPa and σ_c =160 MPa.

17. What are the advantages and disadvantages of welded joints over riveted joints?

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Code No.D-3642/CBCS

FACULTY OF ENGINEERING

B.E. (CSE) V - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Operating Systems

Time: 3 hours **Max. Marks: 70**

Note: Missing data, if any, may be suitably assumed.

PART – A

Note: Answer all questions **(10 x 2 = 20 Marks)**

1. Differentiate between process and thread
2. Define Deadlock prevention.
3. State the necessary conditions for the deadlock to occur.
4. Consider a logical address space of 8 pages of 1024 words mapped into memory of 32 frames.
   i. How many bits are there in the logical address?
   ii. How many bits are there in physical address?
5. Distinguish between semaphore and binary semaphore
6. Define Latency (Rotational latency) and Transfer time with respect to disk I/O.
7. What is Thrashing?
8. Enumerate the various principle of protection.
9. Mention features of Real time Kernels
10. What is the use of plug-and-plug manager in WINDOWS-7?

PART – B

Note: Answer any five questions **(5 x 10 = 50 Marks)**

11 a) Consider the following set of processes with the length of the CPU burst time given in milliseconds. The processes are assumed to have arrived in the order p1, p2, p3, p4, p5 all at time 0.

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a non preemptive priority (a smaller priority number implies a higher priority) and RR (quantum=1) scheduling.

(i) What is the turnaround time of each process for each of the scheduling algorithms in part a?

(ii) What is the waiting time of each process for each of the scheduling algorithms in part a?

Which of the schedules in part a results in the minimal average waiting time?

b) Discuss about various classifications of operating systems.

12 a) Explain briefly about paging & segmentation memory management technique.

b) What is Virtual memory and explain about demand paging.

13 a) Explain advantages and disadvantages of following file allocation methods: - (i) Contiguous Allocation (ii) linked Allocation (iii) Indexed Allocation

b) Explain in detail about disk scheduling algorithm.

14 a) Consider the following page-reference string 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6.

b) Calculate the number of page faults that would occur for the following algorithms assuming frame size as 1.FIFO 2. Optimal 3. LRU 4. MRU 5. LFU 6. MFU

15 a) Discuss the synchronization architecture for LINUX's kernel.

b) Explain the role of Executive in Windows 7.

16 a) Explain the various security measures to protect files from unauthorized access.

b) Write about the approaches used to provide User authentication.

17 Write briefly about Linux system – Design principles.

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Code No. D-3651/CBCS

FACULTY OF ENGINEERING

B.E. (IT) V - Semester (CBCS) (Backlog) Examination, March / April 2022

Subject: Operating Systems

Time: 3 Hours **Max. Marks: 70**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions. **(10 x 2 = 20 Marks)**

1 List out various system calls and system programs.
2 What is dual mode operation?
3 Specify Inter process communication mechanisms.
4 Differentiate preemptive and Non-preemptive scheduling algorithms.
5 What is Critical section?
6 Define fragmentation.
7 List out the various types of page table structure.
8 What are main contents of the file control block?
9 Define aging and how this problem can be solved.
10 What is domain of protection?

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 (a) Explain operating system structure.
(b) Write about various multithreading models with neat diagram.

12 (a) Explain about Process states with neat diagram.
(b) Write about various classical synchronization problems.

13 (a) Find the number of page faults in FIFO, LRU, OPTIMAL page replacement algorithms for the following string.
7 0 2 1 3 4 2 1 0 2 1 4 3 2 1 0 0 1 2 1 (no. of frames = 3).
(b) Differentiate between paging and segmentation.

14 (a) Illustrate levels of RAID with neat diagram.
(b) Explain the advantages and disadvantages of contiguous Vs linked file allocation policies.

15 Explain Disk scheduling algorithms in detail with an example.

16 (a) Explain the process of implementation of Access Matrix.
(b) Write about Real time operating systems in detail with VX-works example.

17 Write notes on any two:
(a) Schedulers in process management
(b) Deadlock prevention techniques
(c) Free space management.

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FACULTY OF ENGINEERING

BE III / IV (EEE/EIE) I – Semester (NON-CBCS) (Backlog) Examination, March / April 2022

Subject: Digital Electronic and Logic Design

Time: 3 Hours **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

PART - A

Note: Answer all questions **(25 Marks)**

1. Using algebraic manipulation prove that (x +y) (x + $\bar{y}$) = x
2. What are universal gate and why they are called universal?
3. Compare the features of DTL & CMOS logic families.
4. What is decoder? Give an example
5. Draw the two-bit adder circuit using logic gates.
6. What is magnitude comparator?
7. List three differences between synchronous counters and asynchronous Counter.
8. Mention difference between PAL and PLA.
9. Differentiate between state diagram and Stat table
10. Illustrate the logic diagram of a clocked SR flip flop

PART - B

Note: Answer any five questions **(5 x 10 = 50 Marks)**

11. Minimize the following expression using K map into SOP and POS form. Realize them with NAND gates only and NOR gates only.

    F(A, B, C, D)= Σ m(5,6 9,10,12,3,14,15)+ d(2,4)
12. Using tabular method obtain the minimal expression

    F = Σ m(1,2,3,5,6,7,8,9,12,13,15).

13. a) Estimate the schematic and explain the operation of an ECL inverter. Also explain its characteristics.

    b) Explain about full subtractor and design full subtractor using two half substractor.

14. a) Model a synchronous MOD-5 counter and explain with waveforms.
    a) Design an excess three to BCD code converter.

15. a) Draw the circuit diagram of a JK flip flop and explain the operation with help of truth table.
    b) What are register. Classify different register.

16. a) Construct 8: 1 multiplexer using 4:1 multiplexer and 2:1 multiplexer units.
    b) Construct and explain the working of a 4-bit Up/Down ripple counter

17. Realize the following function using PLA
    F (w, x, y, z) = Π (0, 3, 5, 7, 8,12, 15) + d (2, 6, 9).
    b) Differentiate between Mealy and Moore machines

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Code No. D-3098/NON-CBCS

FACULTY OF ENGINEERING

B.E. III / IV (ECE) I - Semester (NON-CBCS) (Backlog) Examination, March / April 2022

Subject: Analog Communication

Time: 3 Hours **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

PART - A

Note: Answer all questions **(25 Marks)**

1 Write the properties of Hilbert Transform.
2 Define the term modulation index of AM.
3 Define Angle modulation.
4 An 400 Hz, 2V modulating signal in an FM system produces a deviation of 10 kHz. If the modulating voltage is increased to 6V, what is the new deviation?
5 Write advantages of super heterodyne receivers over TRF receiver.
6 Define sensitive and selectivity in radio receivers.
7 Define noise temperature.
8 Define noise figure and noise band width.
9 State and explain sampling theorem.
10 Compare AM and PAM.

PART - B

Note: Answer any five questions **(5 x 10 = 50 Marks)**

11 (a) Explain the scheme for generation and demodulation of VSB modulated wave, with relevant spectrum signals in the demodulation scheme. Give relevant mathematical expression.
(b) Derive an expression for Single tone amplitude modulation, total transmitted power, total modulation Index.

12 (a) With the help of waveforms Explain Foster-Seeley discriminator for FM demodulation.
(b) Differentiate between Narrow band and Wideband FM signals. Discuss the Generation of Narrow band FM signal with a diagram and mathematical analysis.

13 (a) Explain in brief, the factors must be considered while selecting the Intermediate frequency in radio receiver. What is the value of IF chosen in India for radio broadcasting?
(b) Draw the block diagram of super-heterodyne receiver and explain its operation, and what are the factors that influence the sensitivity, selectivity and fidelity of the receiver?

14 (a) Derive the expressions for SNR and figure of merit in FM system.
(b) Define thermal noise & white noise, explain briefly about their origin and comment on their power spectral density with necessary graphs.

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15 (a) Explain generation and detection of PWM signal.
(b) Describe the generation and demodulation of PPM with the help of block diagram.

16 (a) Draw and explain the phase discrimination method of SSB-SC with relevant sketch.
(b) What is the need of the following in a radio receiver, explain giving examples?
(i) AGC (ii) Mixer (iii) Intermediate amplifier.

17 Write notes on the following:
(a) Noise in two-port network
(b) Double spotting
(c) 'Pulse Amplitude Modulation' (PAM).

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Code No. 3118/NON-CBCS

FACULTY OF ENGINEERING

B.E. III / IV (CSE) I - Semester (NON-CBCS) (Backlog) Examination,
March / April 2022

Subject: Software Engineering

Time: 3 Hours **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

PART - A

Note: Answer all questions **(25 Marks)**

1 When do we use the waterfall model?

2 How does Agile Modeling supplement other Agile methodologies?

3 What happens during a code walkthrough?

4 What are the Requirements traceability?

5 Why do we need to perform Domain Analysis?

6 List out the types of Design Classes.

7 Compare Software Design & Software Architecture.

8 What is the purpose of Heterogeneous Architectural Styles?

9 Difference between Testing and Debugging.

10 List out the activities of a Product Measurement Process.

PART – B

Note: Answer any five questions **(5 x 10 = 50 Marks)**

11 (a) What is Prototyping? List the advantages and disadvantages of prototyping.
(b) "Rational Unified Process is not a single concrete prescriptive process, but rather an adaptable process framework". Justify the statement.

12 (a) Discuss about Construction and Testing Principles.
(b) Draft a pseudo Software Requirements Specification (SRS) document considering "PayTM" as a project.

13 (a) Design a use case and activity diagram with swim lane considering "Unified Payments Interface (UPI)" as a project.
(b) Explain about the Dimensions of the Design Model along with its elements.

14 (a) Discuss in detail about the Call and Return Architectural Style.
(b) Explain why User Interface design is considered to be an iterative process.

15 (a) Compare and contrast white box and black box testing with suitable examples.
(b) Explain in detail about computation of Function Points.

16 (a) How can common process framework activities be applicable to all software projects?
(b) Differentiate Business process engineering and Product engineering.

17 (a) How does the Golden Rules of User Interface Design reduce time for computing an operation?
(b) Discuss the importance of regression and smoke testing.

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