FACULTY OF ENGINEERING

B.E. 3/4 (Civil) I – Semester (Backlog) Examination, December 2019

Subject: Building Technology & Services

Time: 3 Hours   Max.Marks: 75

Note: Answer all questions from Part – A and any five questions from Part – B.

PART – A (25 Marks)

1	How many windows are required in a room and why?	3
2	Give the classification of buildings as per national building code (NBC)?	2
3	What are the acoustical defects?	3
4	Define aspect?	2
5	What are requirements of good trap?	3
6	What is the difference b/w lift and escalator?	2
7	Explain the necessity of green buildings?	3
8	List out various low energy building materials?	2
9	State a few commands of AutoCAD?	3
10	Explain the procedure to draw a cone of radius 20mm and height 50mm using AutoCAD commands?	2

PART – B (5x10 = 50Marks)

11 a) What are the building bye laws? State the objectives of building byelaws.   5

   b) What is the aspect to be considered while designing corridors?   5

12 a) Differentiate b/w natural and artificial ventilation, and give advantages and disadvantages?   5

   b) What are the general factors affecting acoustics in building?   5

13 Explain reverberation time? And state various factors affecting the reverberation time?   10

14 a) What is the reaction of typical building materials during time?   5

   b) Explain the fire resisting materials?   5

15 a) What is the difference b/w LLED and GRIHA?   5

   b) What are the energy saving features in green buildings?

16 a) What are the Boolean commands?   5

   b) Write short note on rendering commands?   5

17. Write short note on the following

   a) Water quality   5

   b) Importance of fire safety   5

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FACULTY OF ENGINEERING

B.E. 3/4 (EEE/Inst.) I - Semester (Backlog) Examination, December 2019

Subject : Digital Electronics and Logic Design

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

Note: Answer all questions from Part-A. Answer any Five questions from Part-B.

PART – A (25 Marks)

1   Show that $A \oplus B = A\bar{B} + \bar{A}B$ and construct the corresponding logic diagrams.   3
2   What is truth table?   2
3   Differentiate error detecting and error correcting codes.   3
4   Express -73.75 in 12-bit 2's complement form.   2
5   Define code converter.   2
6   Write short notes on TTL subfamilies.   3
7   Represent the truth table and excitation table of SR and JK flip-flops.   3
8   What are the applications of shift registers?   2
9   Differentiate mealy and Moore model.   3
10 What is a sequence generator?   2

PART – B (50 Marks)

11 a) Minimize the following logic function using K-map. And also implement it using logic gates   6
       Y(A, B, C, D) = $\sum$m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)
   b) Reduce the following Boolean expression using K-map
       Y(A, B, C, D) = $A\bar{B}\bar{C} + BCD + BC\bar{D}$ 4

12 a) Explain the operation of 4-bit carry look ahead adder.   7
   b) Implement full adder using two half adders.   3

13 a) Implement 8 : 1 multiplexer.   7
   b) Describe about ECL.   3

14 a) Design a 4-bit synchronous up/down counter.   7
   b) Discuss about the operation of a ripple counter.   3

15 a) Implement the following output function using a suitable PLA.   7
       F(A, B, C, D) = $\sum$m (3, 4, 5, 7, 10, 14, 15)
   b) What is state diagram? Give an example.   3

16 a) Simplify the following function   5
       F(A, B, C, D) = $\sum$m(1, 3, 7, 11, 15) + d(0, 2, 4)
   b) Explain the operation of full subtractor.   5

17 a) Describe about wired AND operation.   5
   b) Implement a ring counter   5

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FACULTY OF ENGINEERING

BE ¾ (ECE) I Semester (Backlog) Examination, December 2019

Subject: Analog Communication

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

Note: Answer all questions from Part-A .Answer any five questions from Part-B

PART-A (25 Marks)

1. Determine the power of DSB-SC Modulation.   [2M]
2. For a given AM signal S(t) =A cos (10000t)+B cos (10800t)+A cos (11600t). The carrier Power is 200W and the efficiency of the transmission is 30%. Determine the Modulation index?   [3M]
3. Explain capture effect.   [2M]
4. Derive an expression for single tone FM wave.   [3M]
5. List the factors that judge the choice of RF amplifier.   [2M]
6. Write Advantages of Super heterodyne receivers over TRF receiver.   [3M]
7. What are the various sources of Noise?   [2M]
8. Define noise equivalent temperature and Noise bandwidth.   [3M]
9. What do you mean by synchronization In PAM system?   [2M]
10. Find Nyquist frequency of signal V(t)= 10 Sa(100t).   [3M]

PART-B (50 Marks)

11. Define the Hilbert transform. Write its applications and explain how in-phase and quadric-phase components of a given signal can be generated using Hilbert transform.   [10M]

12. For an AM DSBSC wave with peak un-modulated carrier voltage V_c=10Vp, a resistance R_L=10ohm and a modulation co-efficient m=1 determine: power of carrier, USB, LSB total power of modulated wave, total side band power, draw the power spectrum.   [10M]

13. a) Explain FM generation using direct method.   [4M]
    b) Explain the working of balanced slope detector used for FM demodulation   [6M]

14. a) State and prove the sampling theorem for the low pass signal.   [5M]
    b) With the help of waveforms, explain the generation and detection of PPM.   [5M]

15. a) Define Signal to noise ratio, Noise figure.   [2M]
    b) Derive the expression for Figure of merit and SNR of Frequency modulation.   [8M]

16. a) Draw the Block diagram of Super-heterodyne receiver designed to receive FM signals and explain its working.   [6M]
    b) Distinguish between high level and low level AM transmitters.   [4M]

17. Write short notes on the following:
    a) Pre-emphasis and De-emphasis.   [4M]
    b) Image rejection ratio.   [3M]
    c) Noise in two port network.   [3M]

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FACULTY OF ENGINEERING
B.E. 3/4(Mech.) I – Semester (Backlog) Examination, December 2019

Subject: Hydraulic Machinery and Systems

Time: 3 Hours   Max. Marks: 75

Note: 1. Answer all questions from PART-A. Answer any five questions from PART- B.
2. Assume necessary data wherever it is required.

PART – A (25 Marks)

1 Force exerted by a jet of water of diameter 7.5 cm on a stationary flat plate, when the jet strikes the plate normally with a velocity of 20 m/sec is _____
   a) 1766 N   b) 2117 N   c) 3717 N   d) 3323N   3

2 The length and diameter of a suction pipe of a single acting reciprocating pump are 5 m and 10 m respectively. The diameter of piston is 15 cm and stroke length is 35 cm and the pump is running at 35 rpm. Pressure head due to acceleration at the beginning of suction stroke is _____
   a) 2.69 m   b) 3.69 m   c) 2.5 m   d) 3.5 m   3

3 A centrifugal pump has 50% manometric efficiency and 60% mechanical efficiency. Its overall efficiency is _____
   a) 30%   b) 83%   c) 38%   d) 12%   3

4 A turbine develops 7457 kW under a head of 25 m while running at 135 rpm. The specific speed of turbine is _____
   a) 208   b) 280   c) 310   d) 300   3

5 A hydraulic press has a ram of 20 cm diameter and plunger of 3 cm diameter. It is used for lifting a weight of 3 tons. Force applied at plunger is_____
   a) 661 N   b) 680 N   c) 710 N   d) 217 N   3

6 For high discharge and low head, the type of pump preferred is _____
   a) Centrifugal pump   b) Reciprocating pump   c) propeller pump   d) Gear pump   2

7   Which of the following pump is used to pump hydraulic fluids?
   a) Gear pump   b) Lobe pump   c) Vane pump   d) All the above 2

8 Cavitation occurs in _____
   a) Pumps   b) Turbines   c) both a and b   d) None of the above 2

9 Force exerted by jet on a stationary vertical plate is _____
   a) av^2 b) $av^2 \sin^2$ c) $av^2 \cos^2$ d) av 2

10 Which of the following turbine is medium head turbine
   a) Pelton turbine b) Kaplan turbine   c) Francis turbine   d) All the above 2

PART – B (50 Marks)

11 A jet of water of diameter 50 mm having a velocity of 20 m/s strikes a curved vane which is moving with a velocity of 10 m/s in the direction of the jet. The jet leaves the vane at an angle of 60^0 to the direction of motion of vane at outlet. Determine
    (i) The force exerted by the jet on the vane in the direction of motion
    (ii) Work done per sec by the jet.

12 The diameters of an impeller of a centrifugal pump at inlet and outlet are 30 cm and 60 cm respectively. The velocity of flow at outlet is 2 m/sec and vanes are set back at an angle of 45^0 at the outlet. Determine the minimum starting speed of the pump if the manometric efficiency is 70%.

13 A Pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 liters/s under a head of 30 meters. The buckets deflect the jet through an angle of 160°. Determine the power given by water to the runner and the hydraulic efficiency of the turbine. Assume co-efficient of velocity as 0.98.

14 A single acting reciprocating pump has a cylinder of a diameter 150 mm and of stroke length 300 mm. The centre of the pump is 4 m above the water surface in the sump and water is delivered by the pump to a tank which is 25 m above the centre of the pump. The pump is running at 40 rpm. If the length and diameter of the suction pipe are 5 m and 10 cm resp. and length and diameter of delivery pipe are 35 m and 100 mm resp. Determine
(i) Pressure head due to acceleration in the cylinder at the beginning and middle of the suction stroke and
(ii) Pressure head in the cylinder at the beginning, in the middle and end of the delivery stroke. Take atmospheric pressure head as 10.3 m of water.

15 Draw a neat sketch of Hydraulic circuit. Explain the functions and characteristics of hydraulic fluids?

16 (a) What is air vessel? Explain the working of single acting reciprocating pump with air vessel?
   (b) Write the effects of cavitation and precautions against cavitation in centrifugal pump.

17 (a) Write the differences between impulse and reaction turbines.
   (b) Derive the expression for specific speed of turbine.

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FACULTY OF ENGINEERING
B.E. 3/4 (Prod.) I – Semester (Backlog) Examination, December 2019
Subject: Machine Tool Engineering

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Sketch flank wear ion single point cutting tool.
2. State machining capabilities of diamond as a tool.
3. State methods of tool wear measurements.
4. State the factors affecting tool life?
5. What is lathe rest, steady rest follower?
6. When and why boring operation is applied or used boring operation.
7. State and sketch T-slot metal cutting by milling.
8. Sketch arrangement set up for milling of helical gear.
9. State grit grade and structure of grinding wheel.
10. State the uses of G and M codes in CNC machine tool programming.

PART – B (50 Marks)

11. (a) Determine the shear plane angle in orthogonal cutting based Merchant's theory of metal cutting.
    (b) Sketch different sources of heat generation and its distribution in single point cutting mechanism.

12. (a) Explain the significance of Taylor's Tool life equation in the role of (i) n, (ii) n & C.
    (b) Explain the for conventional tool life tests and type of parameters evaluated.

13. (a) State all the mandrel types and their purposes used in lathe machine.
    (b) Sketch how threads are machined in lathe machine.

14. (a) Sketch and state 8 types of special types of milling operation.
    (b) Sketch the bevel gear machining set up in milling machine.

15. (a) State and explain the factors used in the selection of grinding wheel.
    (b) Write CNC code for component given below with stock dimensions of dia 55mm length 36mm.
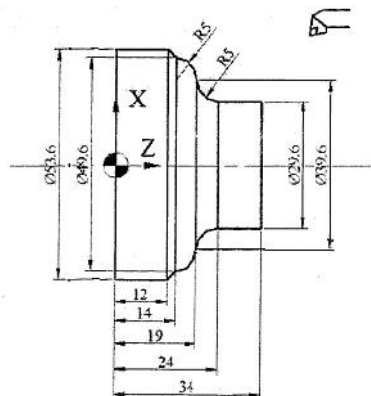
16. (a) Sketch the arrangement setup for milling a spur gear on milling machine.
    (b) Explain MICLASS coding for Part Classification in Group Technology.

17. (a) Explain the Retrival type of CAPP system-essential elements.
    (b) Sketch and explain Lathe spinning process with sketch.

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FACULTY OF ENGINEERING

B.E. 3/4 (AE) I – Semester (Backlog) Examination, December 2019

Subject: Automotive Chassis Components

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Write about the requirements of frame and selection of cross section for the frame members.

2. Sketch the layout of the power flow for a front engine and rear wheel drive vehicle and mark the main components.

3. What are the types of stub axles?

4. What is Slip angle? And list the factors influencing it.

5. State the need of final drive.

6. What are the functional requirements of propeller shaft?

7. Sketch and name the parts of a multi-leaf spring.

8. What is the necessity of 'spring shackle' in a suspension system?

9. What is mean by leading and trailing shoe in braking system?

10. What are the advantages and disadvantages of drum brake?

PART – B (50 Marks)

11. Describe about types of chassis layout with reference to chassis frame, vehicle body and drive with neat sketches.

12. Explain briefly steering geometry with neat sketches.

13. Explain the Davis steering mechanism and Ackerman steering mechanism with neat sketch.

14. (a) Explain Hotchkiss drive with neat diagram.

    (b) Discuss the construction and working of multi-axle with neat sketches.

15. (a) Explain Front independent suspension system for Rear wheel drive vehicles.

    (b) Explain stabilizer bar with neat sketche.

16. (a) Explain the mechanical braking system with its limitations.

    (b) Discuss the servo braking system with neat diagram.

17. Write short notes on:

    (a) Scrub radius.

    (b) Types of rear axles.

    (c) Brake bleeding.

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FACULTY OF ENGINEERING
B.E. 3/4 (CSE) I Semester (Backlog) Examination, December 2019

Subject: Software Engineering

Time: 3 Hours   Max. Marks: 75
Note: Answer all questions from Part A and any five from Part B

PART – A (25Marks)

1. Differentiate between failure curve for hardware and software.   [2M]
2. List and briefly explain any three modeling principles.   [3M]
3. What is a pattern? How is different from a process?   [3M]
4. What is the importance of agile development approach.   [3M]
5. What is a component? How is it different from an object?   [2M]
6. How is debugging different from testing?   [2M]
7. What do you mean by an architectural style? Give an example   [3M]
8. What is importance of validation testing.   [2M]
9. What is significance of basis path testing?   [2M]
10. What is a metric in software? List any three metrics for software testing.   [3M]
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PART – B (5x10=50 Marks)

11. (a) What is Unified Process? Explain the various phases in it?   [5M]
    (b) Discuss Prototyping – Based development Model by bringing out its advantages
        and disadvantages.   [5M]

12. (a) List the various tasks involved in Requirement Engineering. Explain about each
        task in short.   [5M]
    (b) What is the importance of data flow diagrams in design of solutions?[5m]

13. (a) What does Behavioral model indicate? What are the steps that analyst must
        perform to create the model?   [5M]
    (b) Discuss the following design concepts i) modularity ii) refinement iii)Refactoring [5M]

14. (a) Explain the various Architectural Styles in Detail? (or) Explain various
        architectural patterns in detail.   [5M]
    (b) Explain in detail the various design issues associated with User Interface
        Design?   [5M]

15 (a) What do Regression and Smoke Testing try to uncover? Explain?   [4M]
    (b) What is meant by structural complexity of a program? Write a metric for
        measuring the structural complexity of a program?   [6M]

16. (a) What is Cyclomatic Complexity? How to compute it?   [3M]
    (b) What Testing options are available at the Class level?   [3 M]
    (c) Explain about Alpha and Beta Testing?   [4M]

17. (a) Discuss the concept of Spiral Model proposed by Barry Boehm with the help of a
        diagram. List any three strengths and weakness of the model.   [7M]
    (b) List any five Agile Principles and explain them in your own words.   [3M]

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FACULTY OF ENGINEERING
B.E. 3/4 (I.T.) I – Semester (Backlog) Examination, December 2019

Subject: Software Engineering

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

Note: Answer all questions from Part-A & answer any five questions from Part-B.

PART-A (25 Marks)

1. Define Software Engineering? (2)

2. Explain the difference between Personal software process and Team software process. (3)

3. Differentiate between Analysis and Design. (2)

4. Define software Architecture. (2)

5. What is testing and debugging. (2)

6. Define Unit Testing, Alpha Test and Beta Test. (3)

7. Discuss the importance of Product Metric. (3)

8. What is cyclomatic complexity? How do you compute it? (3)

9. List few software risks. (2)

10. What is CMMI? List various levels of CMMI. (3)

PART – B (50 Marks)

11. a) What is process framework? Explain. (5)

     b) Explain in detail the waterfall model. (5)

12. Explain Coupling and Cohesion. List various types of Coupling and Cohesion. (10)

13. a) Explain SQA plan and goals of SQA. (5)

     b) Explain Integration Testing in detail (5)

14. a) What are the elements of software configuration management (SCM)? (5)

     b) Differentiate Black Box and white Box testing. (5)

15. a) What is RMMM. Explain RMMM Plan? (5)

     b) Explain Software Project Estimation. (5)

16. a) Explain RAD model. (5)

     b) What is Component level design? (5)

17. a) Explain Metrics for Testing and Maintenance. (5)

     b) What is Risk? Explain how risk is managed in software development. (5)

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FACULTY OF ENGINEERING

B.E (Civil) V-Semester (CBCS) (Main & Backlog) Examination, Dec 2019

Subject: Hydraulic Machines

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

Note: Answer all questions of Part-A, & answer any five questions from Part-B.

PART – A (10 x 2 = 20 Marks)

1. What are the major modeling pitfalls in Dimensional analysis?
2. A horizontal water jet with a velocity of 10 m/s and cross sectional area of 10 mm^2 strikes a flat plate held normal to the flow direction. The density of water is 1000 kg/m^3. The total force on the plate due to the jet is
   a) 100 N   b) 10 N   c) 1 N   d) 0.1 N
3. The force exerted by a jet impinging normally on a fixed plate is

   a) $\ldots \dfrac{av}{4}$

   b) $\ldots \; av$

   c) $\dfrac{\ldots \, av^2}{4}$

   d) $\ldots \; av^2$

4. Convert 800 dyne into Newton using dimensional formula.
5. Draw the velocity triangles for Pelton wheel turbine.
6. Define various efficient terms associated in turbines. What are their fundamental differences?
7. State the various components of Kaplan turbine.
8. What do you understand by multistage pump and when do you use them?
9. Define manometric, volumetric efficiency and overall efficiency of centrifugal pump.
10. Differentiate between centrifugal and reciprocating pumps.

PART-B (5 x 10 = 50 Marks)

11. a) The head loss due to fluid friction in a pipe depends on diameter D, length L, roughness (k) velocity V, gravity g and fluid density ρ and viscosity μ. Derive the expression in dimensionless form.

    b) 1:6 scale model of a passenger car is to be tested in a wind tunnel. The prototype velocity is 60 Kmph. If the model drag is 350N, what is the drag and power required to overcome the drag in the prototype. The air in the model and prototype can be assumed to same properties.

12. a) An automobile has a characteristic length and area of 3 m and 5.57 m^2 respectively. When tested in sea-level standard air, it has the following measured drag force versus speed table:

V, m/h	9	36	27
Drag, Kg	4	52	113

    The same car travels in Ooty at 29 m/s at an altitude of 3500 m. Using dimensional analysis, estimate

    (a) its drag force and

    (b) the horsepower required to overcome air drag.

b) A jet of water 50 mm in diameter and having a velocity of 25 m/s enters tangentially a stationary curved vane without shock and is deflected through an angle of 45 degrees. Because of the friction over the surface, the exit velocity is 80% of the inlet velocity. Find the magnitude and direction of the resultant force on the vane.

13. a) A hydraulic turbine is to develop 850 KW when running at 100 rpm under ahead of 10 m. workout the maximum flow rate and specific speed for the turbine if the overall efficiency at the best operating point is 92%. In order to predict its performance a 1:10 scale model is tested under a head of m. What would be speed, power output and water consumption of the model it is runs under the conditions similar to prototype?
   b) Explain why draft tube necessary in reaction turbine?

14. a) Draw the neat diagram of centrifugal pump and explain components of centrifugal pump.
   b) A pump operates at a maximum efficiency of 82% and delivers 2.25 m^3/ s under a head of 18 m while running at 4000 rpm speed. Compute the specific speed of the pump. Also determine the discharge, head and power input to pump at a shaft speed of 2500 rpm. State the assumptions made if any.

15. a) Explain the indicator diagrams in reciprocating pumps with neat diagrams.
   b) Discuss the performance characteristics of pumps with neat sketch; bring out essential highlights of the same.

16. a) A two stage centrifugal pump is required for a fire engine for a discharge of 3.66 m^3 per minute at ahead of 75 m. if the overall efficiency of the pump is 75% and specific speed per stage is about 1300 find
   i) the running speed in rpm and
   ii) the power of the driving engine. If the actual manometric head developed is 65% of the theoretical head, there is no slip, the outlet vane angle is 30° and the radial flow velocity at exit is 0.15 times the tipe speed at exit find the diameter of the impellers.
   b) Discuss the importance of air vessels in reciprocating pumps.

17. Write short notes on the following:
   (a) Section specific speed
   (b) Net positive suction head? (NPSH)
   (c) Mixed Tangential and Arial flow turbines.

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FACULTY OF ENGINEERING

B.E (EEE/Inst.) V-Semester (CBCS)(Main & Backlog) Examination, December 2019

Subject : Linear Control Systems

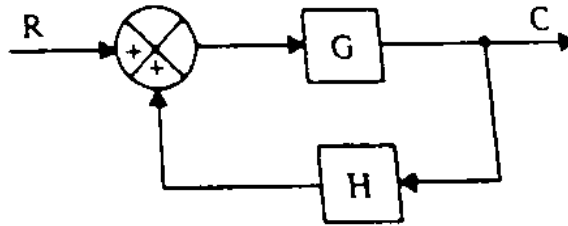**Time: 3 Hours**   **Max. Marks: 70**

Note : Answer all questions from part – A and any five questions from Part-B

PART– A (10 x 2 = 20 Marks)

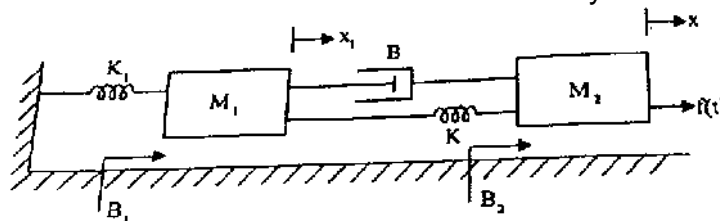1. Obtain the Transfer function of the control system shown in figure.   2

2. How Synchro acts as an error detector?   2

3. Define Steady state error.   2

4. What is the importance of Test signals?   2

5. Examine the stability of the system whose characteristics equation is given by
   $S^5 + S^4 + 2S^3 + 2S^2 + 3S + 5 = 0$ 2

6. What are Asymptotes? How will you find the angle of asymptotes?   2

7. Draw the polar plot for the transfer function G(s) = $\dfrac{1}{s^2\left(1+T_1\right)\left(1+T_2\right)}$ 2

8. What is a Corner Frequency?   2

9. Why compensation is necessary in feedback control system?   2

10. State the condition for stability of a linear system describe by $\dfrac{dx}{dt} = AX + BU$ 2
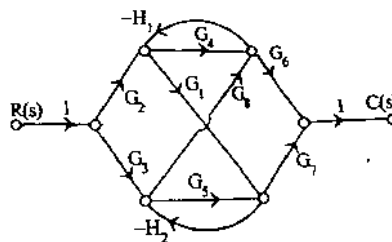
PART – B (50 Marks)

11. a) Determine the Transfer function of the Mechanical system shown in figure   5

   b) Explain the Classification of control systems.   5

12. Find the overall Gain of the system whose signal flow graph is shown in figure.   10

…2

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

14. Sketch the root locus for the unity feedback system whose open loop Transfer function is $G(s) = \dfrac{K}{s\left(S^2 + 4S + 13\right)}$ 10

15. Sketch the Bode plot for the following transfer function and determine Gain and Phase cross over frequencies where $G(s) = \dfrac{10}{S\left(1+0.4s\right)\left(1+0.1S\right)}$ 10

16. State and prove the properties of state transition matrix (STM) and compute STM for the following system $\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -2 & 1 \\ 2 & -3 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 2 \end{bmatrix}u$ 10

17. Write a short notes on
    a) PID Controller. [5]
    b) Lag-Lead Compensator. [5]

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FACULTY OF ENGINEERING

B.E. (ECE) V – Semester (CBCS) (Main & Backlog) Examination, December 2019

Subject: Automatic Control Systems

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

Note : *i)*   *Answer All Questions in **Part – A** and any **five** questions from **Part – B**.*
        ii)   *Answers to the questions of Part – A must be at one place and in the same order as they occur in the questions paper.*
    iii) **Missing data, if any, may suitably be assumed.**

PART – A (10x2 = 20 Marks)

1. Distinguish between time variant and time invariant systems. [2]
2. What is Manson's Gain formula? [2]
3. Sketch the response of 2nd Order under damped ($0 < \zeta < 1$) system for unit step input. [2]
4. Define steady state error and write the expression for it. [2]
5. State Principle of Argument. [2]
6. Explain the need of a Compensator and Classify. [2]
7. With the help of detailed block diagram of explain Digital Control System with signal converters. [2]
8. Write the advantages and disadvantages of Digital control systems. [2]
9. What are the properties of State Transition Matrix? [2]
10. What is Observability? How is the Observability of a system determined? [2]

PART – B (5x10 = 50 Marks)

11 a) What are the rules for Block diagram reduction? [5]

   b) Define Mason's Gain formula and construct the Signal flow graph for the following set of simultaneous equations which describe the system.

$$y_2 = t_{21} y_1 + t_{23} y_3$$
$$y_3 = t_{31} + t_{32} y_2 + t_{33} y_3 \text{ and}$$
$$y_4 = t_{42} y_2 + t_{43} y_3$$
[5]

12 a) Using Routh & Hurwitz stability criterion, design the stability of the system by finding out the value of k for the system represented by the characteristic equation $s^4 + 20ks^3 + 5s^2 + (10+k)s + 15 = 0$ [5]

   b) Explain the basic rules for construction of Root locus. [5]

13 a) Define Nyquist Stability Criteria? [3]

   (b) Sketch the Nyquist Plot for the given transfer function.
     $G(S) H(S) = 1 / (s+P_1).(s+P_2)$, $P_1, P_2 > 0$. Find stability. [7]

14 a) Obtain the expression for C(z) in terms of R(z) for a basic closed loop discrete control system. [4]

   b) For a system having system $G(s) = 1/s+2$ and $H(s) = 1$, find the output value at sampling instants for unit step input r(t). Take sampling interval T = 0.5 sec. [6]

..2

15 a) Obtain the Solution of State space equation. [6]

b) Determine the Controllability of a system with X = AX + BU and

$$A = \begin{bmatrix} -0.5 & 0 \\ 0 & -2 \end{bmatrix}, B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}.$$

[4]

16 a) Define Stability. With an example, explain steps to be followed for Routh Hurwitz stability criterion with special cases. [5]

 (b) State and explain the effects of P, PI and PID controllers on system dynamics. [5]

17 Write Short notes on: [10]

a) Lag compensator and lead compensator.

b) Phase Margin and Gain Margin w.r.t. Bode plot

c) State models of nth order system with 'r' forcing functions.

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FACULTY OF ENGINEERING

B.E. (M/P) V – Semester (CBCS) (Main & Backlog) Examination, December 2019

Subject: Machine Design

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

Note: Answer all questions from Part – A and any five questions from Part – B.

PART – A (10x2 = 20 Marks)

1 Write features on gear drives giving their merits and demerits?

2 What is a herringbone gear? Where they are used?

3 Sketch the construction of leaf spring with neat diagram.

4 Distinguish between full journal bearing and partial journal bearing.

5 Explain the following terms with neat sketches
   a) Solid Length
   b) Free Length

6 What is the use of crankshaft?

7 State the design procedure of the Piston Head?

8 What type of cross section is preferred for a crane hook? And why?

9 Briefly state the functions of Flywheel in punching press in I.C. Engines.

10 State the application (five) of spur gears.

PART – B (5x10 = 50 Marks)

11 A shaft rotating at constant speed is subjected to variable load. The bearings supporting the shaft are subjected to stationary equivalent radial load of 3kN for 10 per cent of time, 2kN for 20 percent of time, 1kN for 30 percent of time and no load for remaining time of cycle. If the total life expected for the bearing is 20 × 106 revolutions at 95 per cent reliability, calculate dynamic load rating of the ball bearing. Take constant, b = 1.17: and k = 3 for ball bearing.

12. A pair of helical gears with 30° helix angle is used to transmit 15kW at 10000r.p.m. of the pinion. The velocity ratio is 4:1. Both the gears are to be made of hardened steel of static strength 100N/mm^2. The gears are 20° stub and the pinion is to have 24 teeth. The face width may be taken as 14 times the module. Find the module and face width from the stand point of strength and check the gears for wear.

13 A semi-elliptical laminated spring has an overall length of 1m and sustains a load of 70 KN at its centre, The spring has three full length leaves and 15 graduated leaves with a central band of 100 mm width. All the leaves are to be stressed to 400 MPa when they fully loaded. The ratio of total spring depth to that of width is E = 210 kN/mm^2. Determine:
   a) The thickness and width of leaves
   b) The initial gap that should be provided between the full length and graduated leave before the band load is applied.
   c) The load exerted on the band after the spring is assembled.

14. Design a helical compression spring for a maximum load of 1000N for a deflection of 25 mm using the value of spring index as 5. The maximum permissible shear stress for spring wire is 420MPa and modulus of rigidity is 84kN/mm^2. Take Wahl's factor,

$$k = \frac{4c - 1}{4c - 4} + \frac{0.615}{c}$$ where C = Spring index.

15 A pair of bevel gears connect two shafts at right angles and transmit 9kW. Determine the required module and gear diameters for the following specifications:

Particulars	Pinion	Gear
Number of teeth	21	60
Material	Semi steel	Grey cast iron
Allowable static stress	85 MPa	55 MPa
Speed	1200r.p.m.	420r.p.m.
Tooth profile	14 ½ ^{0} composite	14 ½ ^{0} composite

16. A bracket of rectangular cross section whose depth is twice the thickness is shown in the figure. It is subjected to a load of 6KN acting at 45° to its horizontal axis. Permissible stress in the material of the bracket is limited to 60MPa. Determine the dimensions of the bracket.
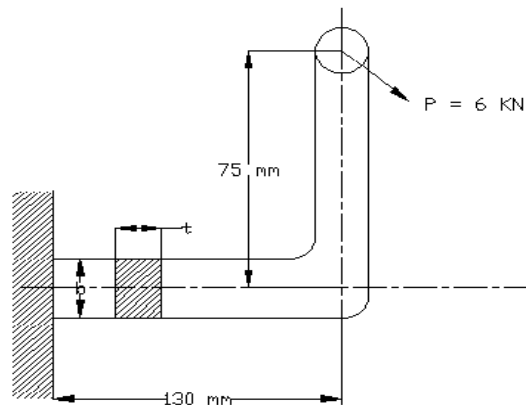
17. Design a connecting rod for an I.C. engine running at 1800r.p.m. and developing a maximum pressure of 3.15N/mm^2 .The diameter of the piston is 100mm: mass of the reciprocating parts per cylinder 2.25kg: length of connecting rod 380mm: stroke of piston 190mm and compression ratio 6:1. Take factor of safety of 6 for the design. Take length to diameter ratio for big end bearing as 1.3 and small end bearing as 2 and corresponding bearing pressure as 10N/mm^2 & 15N/mm^2. The density of material of the rod may be taken as 8000Kg/m^3 and the allowable stress in the bolts as 60N/mm^2 and in cap as 80N/mm^2. The rod is to be of I-section for which you can choose your own proportions.

Draw a neat dimensional sketch showing provision for lubrication. Use rankine formula for which the numerator constant may be taken as 320N/mm^2 and the denominator   constant 1 / 7500.

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FACULTY OF ENGINEERING

B.E. (A.E) V–Semester (CBCS) (Main & Backlog) Examination, December 2019

Subject: Design of Machine Components

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

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (20 Marks)

1. Define the terms (i) Ductility (ii) Hardness.

2. Define factor of safety? What is its importance in design?

3. What is low and high fatigue cycle?

4. State how the stress concentration in a component can be reduced.

5. What is the function of a key? Classify various types of keys.

6. Define equivalent bending moment and equivalent twisting moment?

7. Why gaskets are provided at joints?

8. Explain the purpose of turn buckle.

9. Define the following terms: (i) Pitch (ii) Diagonal pitch of a riveted joint.

10. Distinguish four features between differential and compound screw.

PART – B (50 Marks)

11. An I-section beam of depth 250 mm and M.I. of 8×10^7 mm^4 is supported 4m apart. It is loaded by a weight of 4 KN through a height of 'h' and striking the beam at mid span. Determine the height of fall if allowable stress of beam material = 120 N/mm^2 and E = 210 KN/mm^2.

12. A bolt is subjected to an axial force of 8000N with transverse shear force of 4000N. Find the diameter of the bolt required according to all (1) Rankine Theory, (2) Tresca theory, (3) Von-Misses Stress theory. It is assumed that the permissible tensile stress at elastic limit = 100 N/mm^2 and Poisson's ration = 0.29.

13. A circular bar of 500 mm length is supported freely at its two ends. It is acted upon by a Central concentrated cyclic load having a minimum value of 20kN and a maximum value of 50kN. Determine the diameter of bar according to Soderberg and Goodman theory, take factor of safety as 2, size effect of 0.85, surface finish factor of 0.9. The material properties of bar is given by : Ultimate Strength of 650 MPa, yield strength of 500 MPa and endurance strength of 3520MPa.

14. Design a cotter joint to transmit a load of 2kN. Take allowable stress values in tension and shear as 70 N/mm^2 and 30 N/mm^2 respectively.

15. Design a double riveted butt joint with two cover plates for the longitudinal seam of a boiler shell 1.5 m in diameter subjected to a steam pressure of 0.95 N/mm^2. Assume joint efficiency as 75%, allowable tensile stress in the plate 90 NPa; compressive stress 140 MPa; and shear stress in the rivet 56 MPa.

16. Design a flange coupling to transmit 60kW power at 350 rpm. Allowable shear stress may be taken as 30 N/mm^2. Draw a neat sketch of the assembly.

17. A shaft supported at the ends in ball bearings carries a straight tooth gear and its mid span and is to transmit 7.5kW at 280 r.p.m. The pitch circle diameter of the gear is 150mm. The distances between the center line of bearings and gear are 100 each. If the shaft is made of steel and allowable shear stress is 40MPa, determine the diameter of the shaft. The pressure angle of the gear may be taken as 20^0.

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FACULTY OF ENGINEERING

B.E. (CSE) V - Semester (CBCS) (Main & Backlog) Examination, December 2019

Subject : Operating Systems

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

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (20 Marks)

1 What is meant by Process Control Block?   2

2 Define Deadlock prevention.   2

3 Explain in short Swapping and Contiguous Allocation.   2

4 Consider a logical address space of 8 pages of 1024 words mapped into
   memory of 32 frames.   2

   i. How many bits are there in the logical address?

   ii. How many bits are there in physical address?

5 What is file system mounting?   2

6 Define Latency (Rotational latency) and Transfer time with respect to disk I/O.   2

7 What are various Program threats?   2

8 Enumerate the various principles of protection.   2

9 List the fields in the iNode structure.   2

10 What is the use of plug-and-play manager in WINDOWS-7?   2

PART – B (50 Marks)

11 (a) Consider the following set of processes with the length of the CPU burst time
       given in milliseconds   (6)

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

   The processes are assumed to have arrived in the order p1, p2, p3, p4, p5
   all at time 0.

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

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

   (iii) 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.   (4)

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12 (a) Explain Paging and Segmentation. (5)

(b) Consider a system with 80% hit ratio, 50 nano-seconds time to search the associative registers , 750 nano-seconds time to access memory. (5)
Find the time to access a page
(i) When the page number is in associative memory.
(ii) When the time to access a page when not in associative memory.
(iii) Find the effective memory access time

13 (a) Explain advantages and disadvantages of following file allocation methods:- (5)
(i) Contiguous Allocation
(ii) Linked Allocation
(iii) Indexed Allocation

(b) Explain in detail about disk scheduling algorithm. (5)

14 (a) Illustrate the notion of Access Matrix and its uses with a suitable example. (5)

(b) Describe Encryption using RSA Asymmetric Cryptography. (5)

15 (a) Discuss the synchronization architecture for LINUX's kernel. (5)

(b) Explain the role of Executive in Windows 7. (5)

16 (a) Explain in detail the operating system services. (5)

(b) Explain in detail about file sharing and protection. (5)

17 Write short notes on the following:

(a) Explain the Domain Structure concept and its implementation in UNIX. (5)

(b) Describe briefly the Linux ext3 File System. (5)

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FACULTY OF ENGINEERING

BE V Semester (CBCS)(I.T)(Main & Backlog) Examination, December 2019

Subject: Operating Systems

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

Note: Answer all question from Part-A and any five questions from Part-B

Part – A (2x10=20 Marks)

1   What is a System Call?

2   What is Inter process communication?

3   Give the significance of multi threaded programming.

4   Mention the criteria for scheduling a process.

5   Under which circumstances, a system is said to be safe.

6   Differentiate RPC and RMI

7   Write a short note on file control block

8   Differentiate logical and physical address space

9   What is STREAM?

10 What are the different types of security attacks?

Part – B (5x10 – 50 Marks)

11 a) Explain operating system structure & operations.   5M

   b) Explain how communication takes place in client/server system.   5M

12 a) Describe the characteristics of deadlock   5M

   b) Explain deadlock detection algorithm for single instance of each resource type. 5M

13 a) What is critical-section problem? How is it handled?   5M

   b) Explain any two paging techniques with a suitable example   5M

14 Explain RAID structure.   10M

15 a)What are the goals and principles of protection?   5M

   b)Explain briefly how cryptography can be used as a security tool.   5M

16 a)Explain about tertiary-storage structure.   5M

   b)Briefly about Real time CPU scheduling   5M

17 a) What are the various components of interrupt and dispatch latency   5M

   b) Write the Peterson's solution for 2-process synchronization and explain how it
   satisfies CSP criteria.   5M

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