

**FACULTY OF ENGINEERING****B.E. 3/4 (Civil) I-Semester (Main & Backlog) Examination, November / December 2018****Subject : Building Technology & Services****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions from Part-A & any five questions from Part-B.****PART – A (25 Marks)**

- |  |   |
|--|---|
| 1 List out different principles of planning of building?     | 3 |
| 2 Describe the various types of residential buildings?       | 2 |
| 3 What are the qualities of good sound absorption materials? | 3 |
| 4 What is the difference between echo and reverberation?     | 2 |
| 5 What are the various components of elevator?               | 3 |
| 6 Explain how fire starts and spreads.                       | 2 |
| 7 Define green buildings.                                    | 3 |
| 8 What are the benefits of green buildings?                  | 2 |
| 9 Write down the steps to draw a cylinder by using Auto CAD. | 3 |
| 10 What is the difference b/w union and subtract?            | 2 |

**PART – B (50 Marks)**

- |   |    |
|---|----|
| 11 (a) List out the factors to be considered in planning of a building and explain any Three in detail? | 5  |
| (b) Define ventilation? And give some common errors to be find in planning of a building.               | 5  |
| 12 (a) Explain the functional requirements of ventilation?  | 5  |
| (b) According to building bye laws explain different principles of ventilation in buildings?            | 5  |
| 13 Define acoustics? And what are the characteristics of sound.   | 10 |
| 14 Draw a neat sketch of electrical wiring in a one bed room house.                                     | 10 |
| 15 (a) Explain the factors considered for design efficiency in the context of green buildings.          | 5  |
| (b) Explain the key components of LEED rating system?   | 5  |
| 16 Plan a residential building given the sizes of different rooms building faces east                   | 10 |
| Master bed room= $12\text{m}^2$   |    |
| Living room= $16\text{m}^2$   |    |
| Dining area= $6\text{m}^2$  |    |
| Kitchen= $8\text{m}^2$  |    |
| Verandah= $6\text{m}^2$   |    |
| Sketch the plan, section elevation passing through kitchen and verandah.                                |    |
| 17 Write a short on the following   |    |
| a) Fire safety measures in industries   | 5  |
| b) Different views in auto cad 3d   | 5  |

**FACULTY OF ENGINEERING****B.E. 3/4 (EEE/Inst) I – Semester (Main & Backlog) Examination,****November / December 2018****Subject: Digital Electronics and Logic Design****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 Draw a pair, a quad, and an octet on K-map. 2 M
- 2 Draw IEEE/ANSI counterparts of various logic gates used in digital electronics. 3 M
- 3 How do you distinguish between positive and negative logic systems? 2 M
- 4 What are logic gates with open collector or open drain outputs? What are the major advantages and disadvantages of such devices? 3 M
- 5 Find the dual of  $A.B.C.\bar{D} + A.B.\bar{C}.D + \bar{A}.B.C.\bar{D}$ . 2 M
- 6 Compare the standard low-power Schottky TTL and Schottky TTL on the basis of speed power dissipation. 3 M
- 7 Construct a JK flip-flop using a D flip-flop. 3 M
- 8 Explain the differences among a truth table, a state table, a characteristic table, and an excitation table. 3 M
9. Draw the graphic symbol of a  $256 * 1$  RAM. 2 M
10. Differentiate between state diagram and state table. 2 M

**PART – B (5x10 = 50 Marks)**

- 11 a) Reduce the following Boolean expression and draw the logic circuit diagram to implement using OR gates only  
 $A'B(D' + C'D) + B(A' + ACD)$  6 M  
 b) Show that the dual of the excessive OR is its compliment. 4 M
- 12 a) Design a four-bit combinational circuit 2's complementor. (The output generates the 2's complement of the input binary number.) Show that the circuit can be constructed with exclusive-OR gates. 5 M  
 b) Design a combinational circuit that converts a four-bit Gray code (Table 1.6) to a bit four binary number. Implement the circuit with exclusive-OR gates. 5 M
- 13 a) Draw the logic diagram of a 2-to-4-line decoder using (a) NOR gates only and (b) NAND gates only. 5 M  
 b) Implement the following Boolean function with a 4 X 1 multiplexer and external gates. (a)  $F_1(A, B, C, D) = (11, 3, 4, 11, 12, 13, 14, 15)$  5 M

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14. a) A sequential circuit has two JK flip-flops A and B and one input x. The circuit is described by the following flip-flop input equations:

$$J_A = x \quad K_A = B$$

$$J_B = x \quad K_B = A'$$

- i) Derive the state equations  $A(t + 1)$  and  $B(t + 1)$  by substituting the input equations for the J and K variables.  
 ii) Draw the state diagram of the circuit. 6 M

- b) What is the difference between serial and parallel transfer? Explain how to convert serial data to parallel and parallel data to serial. What type of register is needed? 4 M

- 15 Tabulate the PLA programming table for the four Boolean functions listed below. Minimize the numbers of product terms. Draw a PLA circuit to implement the functions.

$$A(x, y, z) = (1, 3, 5, 6)$$

$$B(x, y, z) = (0, 1, 6, 7)$$

$$C(x, y, z) = (3, 5)$$

$$D(x, y, z) = (1, 2, 4, 5, 7).$$

10 M

- 16 a) Using JK flip-flops,

- i) Design a counter with the following repeated binary sequence: 0, 1, 2, 3, 4, 5, 6.  
 ii) Draw the logic diagram of the counter. 6 M

- b) Construct a 16 x 1 multiplexer with two 8 x 1 and one 2 x 1 multiplexers. Use block diagrams. 4 M

- 17 a) Design a counter with T flip-flops that goes through the following binary repeated sequence: 0, 1, 3, 7, 6, 4. Show that when binary states 010 and 101 are considered as don't care conditions, the counter may not operate properly. Find a way to correct the design. 6 M

- b) Show that the characteristic equation for the complement output of a JK flip-flop is  $Q'(t + 1) = J'Q' + KQ$ . 4 M

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**FACULTY OF ENGINEERING****B.E. (ECE) I – Semester (Main & Backlog) Examination, Nov. /Dec. 2018****Subject: Analog Communication****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. Why values of Amplitude Modulation index greater than one are not used in full-carrier AM transmission systems? [3M]
2. How is the Bandwidth of a multiple tone wideband FM obtained? [2M]
3. A broadcast audio transmitter radiates at 10kW power. The modulation percentage is 60. How much of this the carrier power? [3M]
4. In an FM system, if  $m_f$  is doubled by having the modulation frequency, what will be the effect on the maximum deviation? [3M]
5. List out the advantages and disadvantages of TRF receiver. [3M]
6. What are the various sources of noise? [3M]
7. Derive noise figure in terms of equivalent noise temperature. [2M]
8. When a super-heterodyne receiver is tuned to 555 kHz, its local oscillator provides the mixer with an input at 1000kHz. Calculate Image frequency. [3M]
9. What is the difference between natural sampling and flat-top sampling? [2M]
10. How many minimum number of samples are required to exactly describe the following signal  $x(t) = 10 \cos(600ft) + 4 \cos(800ft)$  [2M]

**PART – B (5x10=50 Marks)**

11. (a) A modulating signal of 1kHz peak amplitude of 1V amplitude modulates frequency of 1 MHz. The modulation index of AM signal is 0.5. Write the resultant expression for AM and sketch its frequency spectrum. [5M]  
(b) Draw and explain the phase discrimination of SSB-SC generation. [5M]
12. (a) Draw the block diagram of balance modulator. Explain the generation of DSBSC [5M]  
(b) Explain the operation of Ratio detector used for demodulation of FM signal and state the necessary conditions. [5M]
13. An FM modulator operates at carrier frequency of 500kHz with frequency deviation sensitivity of 1.5 kHz/V. A PM modulator also operated at a carrier frequency of 500 kHz with the phase deviation of 0.75 rad/V. If both FM modulator and PM modulator are modulated by the same modulating signal having peak amplitude of 2V and modulation frequency of 2 kHz, then show that frequency modulation index and phase modulation index have same values. [10M]
14. Explain the terms Tracking, alignment and AFC related to radio transmitters. [10 M]
15. Draw the block diagram of superheterodyne receiver and explain its operation, and what are the factors that influence the sensitivity, selectivity and fidelity of the receiver? [10M]
16. a) Explain about the different types of noises, their origin and also comment on their power spectral densities. [5M]  
b) Derive the expression for the figure of merit of a FM system [5M]
17. a) Define and distinguish between PPM and PAM schemes. Sketch and explain the waveforms for a single-tone sinusoidal input signal. [5M]  
b) Explain the generation PAM with a block diagram. [5M]

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## FACULTY OF ENGINEERING

**B.E. 3/4 (Mech.) I – Semester (Main & Backlog) Examination, Nov./Dec. 2018**

**Subject: Hydraulic Machinery and Systems**

**Time: 3 hours**

**Max. Marks: 75**

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

### PART – A (25 Marks)

1. A jet of water of 50 mm diameter strikes a flat plate normally with a velocity of 10 m/s. The force exerted by the jet on the plate is  
a) 196.35 N   b) 146.35 N   c) 186.35 N   d) 176.35N 3
2. A single acting reciprocating pump is running at 100 r.p.m delivers 12 liters/sec of water. The diameter of the piston is 200 mm and stroke length 300 mm. The percentage of slip is  
a) 23.7 %   b) 23.6 %   c) 23.8 %   d) 23.4 % 3
3. A centrifugal pump delivers 0.019 m<sup>3</sup>/s against a head of 16.76 m with a rotational speed of 1750 rpm. The specific speed of pump is  
a) 1502   b) 1505   c) 1504   d) 1508 3
4. A Pelton wheel develops 500 kW under a net head of 30 m. If the overall efficiency of the turbine is 0.83. The discharge of the turbine in m<sup>3</sup>/s is  
a) 2.50   b) 2.05   c) 1.41   d) 1.04 3
5. The velocity of a 0.08 m<sup>3</sup>/sec jet of water impinging on a fixed flat vertical vane and exerts a force of 4000 N is (m/sec)  
a) 50   b) 0.223   c) 36   d) 60 3
6. The amount of work saved by fitting an air vessel to a double acting reciprocating pump is  
a) 84.8 %   b) 39.2 %   c) 32.9 %   d) 89.2 % 2
7. The delivery valve while starting centrifugal pump is  
a) Fully closed   b) Fully open   c) Half open   d) In any position 2
8. Which of the following turbine is suitable for specific speed ranging from 300 to 1000 and heads below 30 m  
a) Francis   b) Kaplan   c) Propeller   d) Pelton 2
9. The function of hydraulic fluids is  
a) Sealing   b) Cooling   c) Lubrication   d) All the above 2
10. The parameter that effect noise level of hydrostatic pump is  
a) Size of the pump   b) Speed of the pump   c) Entrained air bubbles   d) All the above 2

**PART – B (5x10 = 50 MARKS)**

11. A 75 mm diameter water jet having a velocity of 12 m/s impinges on a plane, smooth plate at an angle of  $60^\circ$  to the normal to the plate. What will be the impact when (i) the plate is stationary and (ii) the plate is moving in the direction of the jet at 6 m/s? Estimate the work done per unit time by the jet on the plate in each case. Take the density of water as  $998 \text{ kg/m}^3$ .
12. A single acting reciprocating pump has a cylinder of a diameter 150 mm and stroke length 300 mm. The length and diameter of suction pipe are 5 m and 100 mm respectively and the centre of the pump is 4 m above the water surface in the sump. The atmospheric pressure head is 10.3 m of water and the pump is running at 40 r.p.m. Determine the pressure head in the cylinder at the beginning of the suction stroke, at the middle of the suction stroke and at the end of the suction stroke.
13. The impeller of a centrifugal pump has an external diameter of 450 mm and internal diameter of 200 mm and it runs at 1440 rpm. Assuming a constant radial flow through the impeller at 2.5 m/s and that the vanes at exit are set back at an angle of  $25^\circ$ . Determine the (i) inlet vane angle, (ii) The angle, absolute velocity of water at exit makes with the tangent and (iii) The work done per N of water.
- 14 Design the Pelton wheel for the following data:  
Head = 72m; Speed of the wheel = 240 r.p.m; Shaft power of the wheel = 115 kW  
Speed ratio = 0.45; Co-efficient of velocity = 0.98; Overall efficiency = 85 %.
- 15 Explain the working principles of Hydraulic lift and hydraulic crane with neat sketches.
- 16 a) What is meant by cavitation in centrifugal pumps? Explain the effects of Cavitation  
b) What is meant by priming of centrifugal pumps? Write a short note on selection of Pumps.
- 17 a) Explain the characteristic curves of Hydraulic turbines.  
b) Explain the unit quantities in turbines.

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**FACULTY OF ENGINEERING**

**B.E. 3/4 (Prod.) I – Semester (Backlog) Examination, Nov/Dec 2018**

**Subject: Machine Tool Engineering**

**Time: 3 Hours**

**Max. Marks: 75**

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

**PART – A (10x2.5 = 25Marks)**

**(Answer all questions)**

1. State four water soluble oils (water emulsions) used in cutting metals.
2. State the properties of CBN tool materials.
3. What is tool life?
4. State single point cutting tool signature.
5. Sketch lathe spinning process.
6. Sketch horizontal boring machine.
7. Sketch gear hobbling process set up.
8. State specification of horizontal milling machine.
9. State what is dressing and truing of grinding wheel?
10. State the composition HSS.

**PART – B (5x10=50 Marks)**

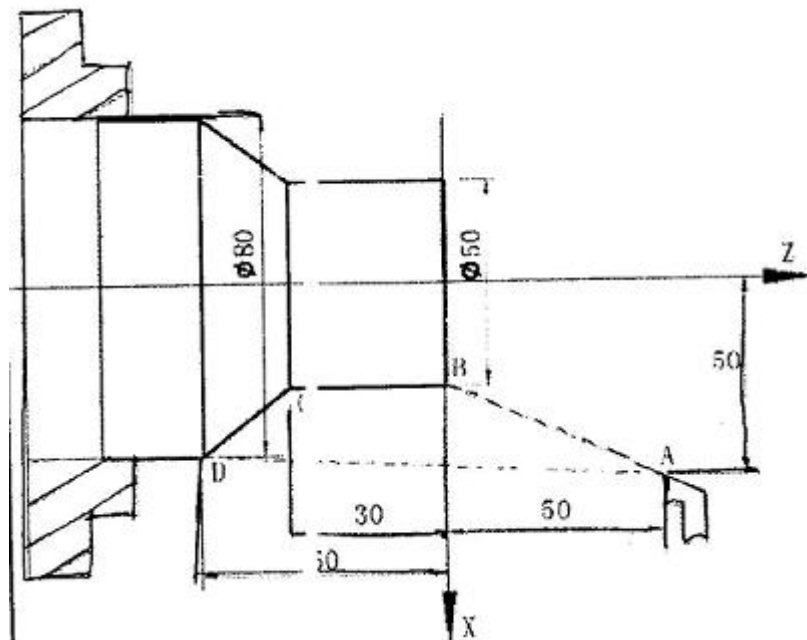
**(Answer any five questions)**

11. a) Sketch and explain resultant cutting force in turning operation.  
b) Explain BUE formation in metal cutting with sketch.
12. a) Explain the tool wear equation with respect to (i) Width land of flank (ii) maximum depth.
13. a) State the different types of lathe chucks.  
b) State different drill tool holding devices.
14. a) Sketch the setup arrangement for milling helical gear.  
b) State nine types of attachments used milling machines.
15. a) Given the figure below with stock size 80 mm diameter 50 mm length. Write a CNC programme to generate the following geometric part shape with dimensions.
14. a) Sketch the setup arrangement for milling helical gear.  
b) State nine types of attachments used milling machines.

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- 15.a) Given the figure below with stock size 80 mm diameter length. Write a CNC programme to generate the following geometric part shape with dimension.



- b) Sketch all the geometries of the grinding wheel.
- 16.a) Explain three types of bonded grinding wheel used in industry.  
b) Explain the OPTIZ coding of part classification using Group Technology
- 17.a) Explain the generative type of CAPP systems with its essential features.  
b) Sketch tool geometry nomenclature according to DIN system.

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**FACULTY OF ENGINEERING**

**B.E. 3/4 (AE) I-Semester (Backlog) Examination, November/December 2018**

**Subject: Automotive Chassis Components**

**Time: 3 Hours**

**Max. Marks: 75**

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

**PART – A (25 Marks)**

- 1 Sketch the layout of the power flow for a front engine and rear wheel drive vehicle and mark the main components.
- 2 Draw the chassis frame of car and mark the main components.
- 3 Write the types of stub axles Draw any one type.
- 4 What is meant by self Alignment of steering wheel?
- 5 List out the types of Rear Axle housings.
- 6 Draw any one type of final drive.
- 7 Mention the types of front wheel drive suspension system.
- 8 Draw any one spring used in Independent type suspension system.
- 9 Differentiate between Drum brakes and disc brakes.
- 10 Draw the braking system used for 2-wheelers.

**PART – B (50 Marks)**

- 11 What are the different sections used in a rigid type front axle of a commercial vehicle? Justify the usage of these sections. 10
- 12 Explain briefly the construction and working principle of Rack and pinion steering system. 10
- 13 Explain with neat sketch of camber, caster, king pin inclination and Toe in far any vehicle. 10
- 14 Explain stabilizer bar used in suspension system with neat sketch. 10
- 15 Explain briefly Torque tube and Hotch kiss drive with the aid of sketches. 10
- 16 Explain the construction and working of multi axle vehicle drive line with a neat sketches. 10
- 17 Discuss the importance of anti lock Braking system (ABS) for modern vehicle briefly. 10

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**FACULTY OF ENGINEERING****B.E. 3/4 (CSE) I-Semester (Backlog) Examination, November / December 2018****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  | Why is software engineering said to be a layered technology?.                                  | 2 |
| 2  | Differentiate between Personal Software Process and Team Software Process.                     | 3 |
| 3  | List the various considerations in project personnel state of planning & managing the project. | 2 |
| 4  | Why is Requirements Elicitation said to be difficult?  | 3 |
| 5  | Define abstraction.  | 2 |
| 6  | Give an example of Swim-lane Diagram.  | 3 |
| 7  | What are the uses of Transform Mapping and Transaction Mapping?                                | 2 |
| 8  | Differentiate between the terms Architectural Style, Architectural Pattern & Frame Work.       | 3 |
| 9  | List out ISO 9126 Quality Factors?   | 2 |
| 10 | How is Debugging different from Testing? What are the goals of debugging?                      | 3 |

**PART-B (50 Marks)**

- |    |   |    |
|----|---|----|
| 11 | a) What is Unified Process? Explain the various phases in it.   | 5  |
|    | b) What is Agility? Explain in detail about any two agile process models.                             | 5  |
| 12 | a) What is Risk? Explain how risk is managed.   | 5  |
|    | b) What are requirements engineering tasks? Explain validating requirements.                          | 5  |
| 13 | a) Discuss Class based modeling with an example.  | 5  |
|    | b) What are the Quality attributes and Quality guidelines of a good design?                           | 5  |
| 14 | a) Explain the difference between cohesion and coupling. Discuss their different types with examples. | 6  |
|    | b) Define Archetypes. Explain how to refine architecture into components?                             | 4  |
| 15 | Explain in detail about various white box testing techniques along with examples.                     | 10 |
| 16 | Explain about   |    |
|    | a) Umbrella activities of Software process framework  | 4  |
|    | b) Quality Function Deployment  | 3  |
|    | c) Context Level DFD  | 3  |
| 17 | Write short notes on:   |    |
|    | a) Data Centered Architecture Style   | 4  |
|    | b) Integration Testing Strategy   | 6  |

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**FACULTY OF ENGINEERING****B.E. 3/4 (IT) I-Semester (Main & Backlog) Examination, Nov. / Dec. 2018****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  | Explain functional and non-functional requirements with an example. | 3 |
| 2  | Write about Practitioner's Myths.                                   | 2 |
| 3  | Define Design Process.  | 2 |
| 4  | What do you mean by "prescriptive process models"?                  | 2 |
| 5  | List the tasks involved in Requirements Engineering.                | 3 |
| 6  | What is software verification? How is it differ from validation?    | 2 |
| 7  | Differentiate testing and debugging.                                | 3 |
| 8  | Explain Debugging Process.  | 2 |
| 9  | Define coupling. List various types of coupling.                    | 3 |
| 10 | List few software risks.  | 3 |

**PART – B (50 Marks)**

- |    |   |   |
|----|---|---|
| 11 | a) Explain about Waterfall model.   | 5 |
|    | b) Explain in detail the spiral model.  | 5 |
| 12 | a) Explain Component Level Design concepts.   | 5 |
|    | b) Explain various Software Architectural Styles.                                     | 5 |
| 13 | a) What is SQA. Explain SQA plan and tasks.   | 5 |
|    | b) Write about strategic approach to Software Testing.                                | 5 |
| 14 | a) Explain Proactive and Reactive Risks.  | 5 |
|    | b) Differentiate between Risk Projection and Risk Refinement.                         | 5 |
| 15 | a) Explain COCOMO in detail.  | 5 |
|    | b) What is Software Risk? What are the Risk identification and management techniques? | 5 |
| 16 | a) What are the elements of software configuration management (SCM)?                  | 5 |
|    | b) What are functional points? What is their use? How are they calculated?            | 5 |
| 17 | Write short notes on :  |   |
|    | a) Requirement analysis   | 3 |
|    | b) White box and black box testing  | 4 |
|    | c) RMMM plan  | 3 |

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**FACULTY OF ENGINEERING****BE V Semester (CBCS) (Civil) (Main) Examination November/December 2018****Subject: Hydraulic Machines****Time: 3 Hours****Max. Marks 70****Note: Answer all questions from Part-A & any five questions from Part-B.****PART – A (20 Marks)**

1. State the differences between the single stage and multi stage pumps.
2. What do you mean by net positive suction head? (NPSH)
3. Discuss the various types of pumps.
4. Explain the various elements associated with hydro electric power stations.
5. Explain the fundamental differences between turbine and pump.
6. What is a draft tube and explain the significance of it.
7. Define manometric and mechanical efficiency of a centrifugal pump
8. A 1:50 spillway model has a discharge of 1.25 m<sup>3</sup>/s, what is the corresponding of prototype discharge?
9. Make a critical comments on Repeating variables in Dimensional analysis and how are they chosen
10. Why do you draw inlet and outlet triangles in Hydraulic machines?

**PART B (50 Marks)**

11. a) Oil (kinematic viscosity)  $\nu_{oil} = 1.0 \times 10^{-5} \text{ m}^2/\text{s}$  flows through a pipe of 0.5 m diameter with a velocity of 10 m/s. Water (kinematic viscosity),  $\nu_{oil} = 0.89 \times 10^{-6} \text{ m}^2/\text{s}$  is flowing through a model pipe of diameter 20 mm. For satisfying the dynamic similarity, estimate the velocity of water (in m/s) (4M)
- b) A prototype gate valve which will control the flow in a pipe system conveying paraffin is to be studied in a model. List the significant variables on which the pressure drop across the valve would depend. Perform dimensional analysis to obtain the relevant non-dimensional groups. A 1/5 scale model is built to determine the pressure drop across the valve with water as the working fluid. (a) For a particular opening, when the velocity of paraffin in the prototype is  $3.0 \text{ m s}^{-1}$  what should be the velocity of water in the model for dynamic similarity? (b) What is the ratio of the quantities of flow in prototype and model? (c) Find the pressure drop in the prototype if it is 60 kPa in the model. (The density and viscosity of paraffin are  $800 \text{ kg m}^{-3}$  and  $0.002 \text{ kg m}^{-1} \text{ s}^{-1}$  respectively. Take the kinematic viscosity of water as  $1.0 \times 10^{-6} \text{ m}^2 \text{ s}^{-1}$ ).(6M)

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: 2 :

12. a) A jet water having a velocity of 30 m/s, strikes a series of radial curved vanes mounted on a wheel which is rotating at 300 rpm. The jet makes an angle of  $30^\circ$  with the tangent to the wheel at the inlet and leaves the wheel with a velocity of 4 m/s at an angle of  $120^\circ$  to the tangent to the wheel at the outlet. Water is flowing from the outlet in the radial direction. The outer and inner radii of the wheel are 0.6 m and 0.3 m respectively. Determine i) The vane angles at the inlet and outlet ii) work done per kg of water iii) Efficiency of wheel. (5M)
- b) A jet water 75 mm in diameter having velocity of 20 m/s strikes a series of flat plates arranged in around the periphery of a wheel such that each plate appears successively before the jet. If the plates are moving at velocity of 5 m/s. Compute the force exerted by the jet on the plate, the work done per second on the plate and the efficiency of the jet. (5)
13. a) A Francis turbine of diameter 3.0 m develops 6750 KW at 300 rpm under a net head of 45 m. A geometrically similar model of scale ratio 1:8 is to be tested at ahead of 9 m. Estimate the size , speed , discharge and power developed by the model. What is the specific speed of the model? (5)
- b) What is Cavitation phenomenon? Discuss how does it occurs and prevention methods. (5)
14. a) A two stage centrifugal pump is required for a fire engine for a discharge of  $3.66 \text{ m}^3$  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 a) the running speed in rpm and b) 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  $30^\circ$  and the radial flow velocity at exit is 0.15 times the tip speed at exit find the diameter of the impellers. (5)
- b) Discuss the characteristic curves for pumps. (5)
15. a) Explain indicator diagrams considering the acceleration and friction. Discuss the uses of the same. (5)
- b) Discuss the importance of air vessels in reciprocating pumps (5)
16. Write short notes on the following
- a) With usual notation Develop equation for specific speed for a turbine. (5)
- b) The following is a formula for determining the maximum flood discharge Q from a catchment of area A:  $Q = \frac{7000A}{\sqrt{A+4}}$  In this Q is in cubic feet per second and A is in square miles. Convert this formula to have in Q in  $\text{m}^3/\text{s}$  and A is in  $\text{K}^{\text{m}^2}$  . (5)
17. a) Discuss the efficiency and design principles of Pelton wheel turbine. (5)
- b) A centrifugal pump working in a dock pump 1565 lt/s against a mean lift of 6.1 m, when the impeller rotates at 200 rpm. The impeller diameter is 1.22 m and the area at outer periphery is  $6450 \text{ Cm}^2$ . If the vanes are set back at angle of  $26^\circ$  at outlet. Determine
- Hydraulic efficiency
  - Power requirement
  - Minimum Starting speed if ratio of Ext/Inter diameter 2. (5)

**FACULTY OF ENGINEERING****B.E. V – Semester (EEE/Inst.) (CBCS)(Main) Examination, Nov./ Dec. 2018****Subject: Linear Control Systems****Time: 3 Hours****Max. Marks: 70****Note: Answer all questions from Part A & any Five questions from Part B.****PART – A (20 Marks)**

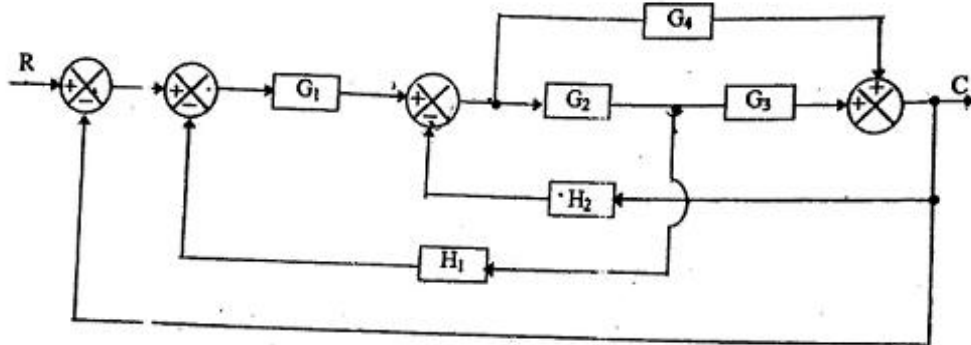
- 1) Draw the Signal flow graph of the equation  $\frac{d^2y}{dt^2} + \frac{2dy}{5dt} + 6y = x$  2
- 2) Distinguish between Open Loop and closed loop control system. 2
- 3) What is the effect on system performance, when a Proportional Controller is introduced in a system? 2
- 4) What is Transient response? 2
- 5) What is Absolute and Relative stability? 2
- 6) How to determine the breakaway and break-in point? 2
- 7) Determine the Gain Margin of the system where  $G(S) = \frac{2}{(S+1)^2}$  2
- 8) Sketch the Polar Plot of the Transfer Function  $G(S) = \frac{1}{S(1+S)^2}$  2
- 9) Define State transition matrix. 2
- 10) Find the controllability of the following system  $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$  2

**PART – B (5x1 = 50 Marks)**

11. a) Determine the Transfer function of AC servomotor. 5
- b) Explain the Principle and Working of Synchro 5
12. Sketch the root locus of the system whose open loop Transfer function  
 Is  $G(S) = \frac{K}{S(S+2)(S+4)}$  Find the value of K, so the Damping ratio of the closed loop system is 0.5. 10

..2

13. Using Block diagram reduction technique find closed loop transfer function of the system whose block diagram is shown in figure. 10



14. A Unity feedback control system is characterized by the following.

Open loop transfer function  $G(S) = \frac{(0.4S + 1)}{S(S + 0.6)}$  Determine its Transient response for unit step and sketches the response. Evaluate the maximum overshoot and the corresponding Peak time. 10

15. a) Sketch the Nyquist Plot for a system with open loop transfer function and determine the range of value of K for which the system is stable.

$$\text{Where } G(s)H(s) = \frac{K(1 + 0.5S)(1 + S)}{(1 + 10S)(S - 1)} \quad 10$$

16. A linear time invariant system is characterized by homogeneous state equation 10

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}, \text{ Compute the solution of the homogeneous equation assuming}$$

the initial state vector  $X_0 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

17. Write a short note on

- a) Time domain specification 5  
 b) Lead Compensator 5

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**FACULTY OF ENGINEERING****B.E. (ECE) V – Semester (CBCS) (Main) Examination, November / December 2018****Subject: Automatic Control 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 are the advantages of closed loop control systems?
2. Derive the transfer function of closed loop control system
3. Given  $r(t)=(1-t^2) u(t)$ . Find the steady state error
4. Define: Rise time, Peak time as in time domain specifications
5. What are controllers? Explain the advantages of PID controller
6. What are the merits of Bode Plots ?
7. State the limitations of Routh-Hurwitz criterion for stability
8. Define: Asymptotes, Centroid WRT Root locus plots
9. Explain the properties of State Transition Matrix
10. Define Controllability and Observability of a system

**PART – B (5x10 = 50 Marks)**

- 11 a) Explain the various components of closed loop control system with a neat block diagram.
- b) Given the characteristic equation as  $2S^3+3S^2+2S+K=0$ . Find the condition for K, for the system to be stable
- 12 a) Explain generalized error coefficients.
- b) Construct the Root Locus for the following open loop transfer Function.

$$G(S) = \frac{K}{S(S+4)(s^2 + S + 20)}$$

- 13 a) Explain the Principle of argument
- b) State and explain the Nyquist stability Criterion
- 14 For the given open loop system, obtain the Bode Plot and determine Gain margin and Phase margin.

$$G(S) = \frac{400(s+2)}{s^2(S+5)(S+10)}$$

- 15 For the lag-compensator, lead -compensator and lag-lead compensator, draw pole-zero plot, bode-plot and the transfer function expressions and explain.



16 a) Explain the Architecture of Digital Control System.

b) Obtain the State- space representation of the following system described by

differential equation:  $\frac{d^3 y}{dt^3} + 3\frac{d^2 y}{dt^2} + 4\frac{dy}{dt} + 4y = u_1(t) + 3u_2(t) + 4u_3(t)$

Output equations:

$$y_1 = 4\frac{dy}{dt} + 3u_1$$

$$y_2 = \frac{d^2 y}{dt^2} + 4u_2 + u_3$$

17. Write short notes on (Any Two)

- a) Frequency - domain specifications
- b) Nyquist plots
- c) Static error coefficients.

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**FACULTY OF ENGINEERING****BE (M/P) V-Semester (CBCS) (Main) Examination, November / December 2018****Subject : Machine Design****Time: 3 HOURS****Max.Marks:70****Note: Answer all questions from Part-A & any five questions from Part-B****Part-A (20 Marks)**

1. Define the terms free length and spring index.
2. What is a concentric spring? Enumerate the advantages
3. Compare the beam strength of spur and helical gears.
4. Sketch the pressure distribution in a journal bearing with thick film lubrication in Axial and Radial directions.
5. Explain the bearing designation 6205.
6. Define the terms "Bearing modulus" and "Sommer fold number".
7. Why the area of the inlet valve port is made larger than the area of the exhaust valve in an I C engine.
8. Name the possible modes of failures to be considered for the design of
  - i) Piston pin
  - ii) crank pin.
9. Mention the criteria for the design of machine frame.
10. Explain the various stresses induced in curved beams.

**PART – B (50 Marks)**

11. A Vertical spring loaded valve is required for a compressed air receiver. The valve is to start opening at a pressure of  $1 \text{ N/mm}^2$  gauge and must be fully open with a lift of 5mm at a pressure of  $1.5 \text{ N/mm}^2$  gauge .The diameter of the port is 30mm, assume the allowable shear stress in steel as 480Mpa and shear modulus as  $80 \text{ KN/mm}^2$  .Design a suitable closely coiled helical spring having squared and grounded ends. Also specify the initial compression and free length of the spring.
12. A worm gear drive transmits 15KW to a machine. The worm speed and the gear speeds are 2000 rpm and 50 rpm respectively. The worm is triple threaded and has a pitch diameter of 65mm. the gear has 120 teeth of 6mm module. The tooth form is  $20^\circ$  full depth in volute and coefficient of friction 0.1.find i) Tangential force acting on the worm ii) Axial thrust on the worm iii) separating force on the worm iv) Efficiency of the worm
13. A full journal bearing of 50mm diameter and 75mm long supports an overhung shaft, running at 1000 rpm. The room temperature is  $28^\circ \text{ C}$  and the bearing temperature is  $80^\circ \text{C}$ .The viscosity of the oil used is  $0.012 \text{ kg/m-sec}$  at the operating temperature of  $125^\circ \text{C}$  .The Diametral clearance is 0.06mm and the bearing has to operate in still Air, without any artificial cooling. Calculate the permissible load on the bearing and the power lost in friction. The heat dissipation coefficient may be assumed as  $280 \text{ W/m}^2/^\circ \text{C}$

14. A rolling contact ball bearing is to be selected to support the overhung crankshaft. The shaft speed is 750 rpm; the bearings are to have 99% reliability corresponding to a life of 26000 hours. The bearing is subjected to an equivalent radial load of 2 kN; consider life adjustment factors for 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
15. Design an overhung crank shaft with two main bearings and a flywheel in between them for an I.C Engine, single cylinder 0.25m X 0.30m. The flywheel weighs 29kN. The maximum pressure is 2.1 MPa. The torsional moment is maximum when the crank is at 35° from the I.D.C. while the pressure is 1.04 MPa. Assume the missing data
16. An electric motor drives a punching machine. A flywheel fitted to the machine has a radius of gyration of 0.6 m and runs at 300 rpm. The machine can punch 600 holes/hr; each punching operation taking 2.0 seconds and requiring 20000 N-m of work. Determine power required to operate the machine and mass of the flywheel, if the speed of the flywheel should not drop below 220 rpm
17. Write short notes on
- End connections for compression helical springs
  - Stresses induced in a flywheel.
  - Properties of lubricants used in bearings.

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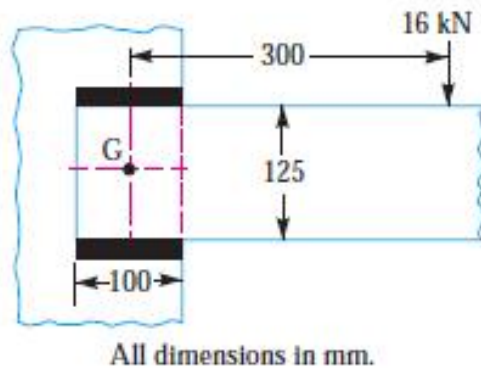
**FACULTY OF ENGINEERING****B.E. V Semester (CBCS)(A.E) (Main) Examination November/December 2018****Sub: DESIGN OF MACHINE COMPONENTS****Time: 3 hours****Max. Marks: 70****Note: Answer all questions from Part A and any five questions from Part B****Part-A (10 x 2 =20 Marks)**

1. Specify the types of engineering design.
2. What factors should be considered in design of machine components?
3. What is meant by Fatigue limit?
4. What is meant by working stress?
5. Distinguish between shaft, axle and spindle from the design point of view.
6. What is the effect of key way cut into the shaft? Also mention the modes of failures in the design of key.
7. What is cotter joint? And specify some applications of cotter joints.
8. How is a screw thread designated?
9. How is the efficiency of riveted joint calculated?
10. What are the advantages and disadvantages of welded joints over riveted joints?

**Part-B (5 x 10 =50 Marks)**

11. A shaft is supported in bearings, the distance between their centres being 1 metre. It carries a pulley in the centre and it weighs 1kN. Find the diameter of the shaft, if the permissible bending stress for the shaft material is 40 MPa.
12. Determine the size of a piston rod subjected to a total load of having cyclic fluctuations from 15 kN in compression to 25 kN in tension. The endurance limit is 360MPa and yield strength is 400MPa. Take impact factor = 1.25, factor of safety = 1.5, surface finish factor = 0.88 and stress concentration factor = 2.25.
13. Design the longitudinal and circumferential joint for a boiler whose diameter is 2.4 metres and is subjected to a pressure of 1 N/mm<sup>2</sup>. The longitudinal joint is a triple riveted butt joint with an efficiency of about 85% and the circumferential joint is a double riveted lap joint with an efficiency of about 70%. The pitch in the outer rows of the rivets is to be double than in the inner rows and the width of the cover plates is unequal. The allowable stresses are:  $t = 77\text{MPa}$ ;  $\dagger = 56\text{MPa}$  and  $c = 120\text{MPa}$ . Assume that the resistance of rivets in double shear is 1.875 times that of single shear. Draw the complete joint.

14. A  $125 \times 95 \times 10$  mm angle is welded to a frame by two 10 mm fillet welds, as shown in figure. A load of 16kN is applied normal to the gravity axis at a distance of 300mm from the centre of gravity of welds. Find maximum shear stress in the welds, assuming each weld to be 100 mm long and parallel to the axis of the angle.



15. A knuckle joint is required to withstand a tensile load of 25kN. Design the joint if the permissible stresses are:  $\tau_t = 56$  MPa;  $\tau_c = 40$  MPa and  $\sigma_c = 70$  MPa.
16. Design a cast iron protective flange coupling to connect two shafts in order to transmit 7.5 kW at 720 r.p.m. The following permissible stresses may be used:  
 Permissible shear stress for shaft, bolt and key material = 33 MPa  
 Permissible crushing stress for bolt and key material = 60 MPa  
 Permissible shear stress for the cast iron = 15 MPa
17. A shaft is supported by two bearings placed 1m apart. A 600mm diameter pulley is mounted at a distance of 300mm to the right of left hand bearing and this drives a pulley directly below it with the help of belt having maximum tension of 2.25 kN. Another pulley 400 mm diameter is placed 200mm to the left of right hand bearing and is driven with the help of electric motor and belt, which is placed horizontally to the right. The angle of contact for both the pulleys is  $180^\circ$  and  $\mu = 0.24$ . Determine the suitable diameter for a solid shaft, allowing working stress of 63 MPa in tension and 42 MPa in shear for the material of shaft. Assume that the torque on one pulley is equal to that on the other pulley.

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## FACULTY OF ENGINEERING

B.E. V-Semester (CBCS) (CSE) (Main) Examination, Nov./Dec. 2018

Subject: Operating Systems

Time: 3 Hours

Max. Marks: 70

Note: Answer all questions from Part – A, &amp; Any five questions from Part – B.

**PART – A (20 Marks)**

1. Differentiate between process and thread. (2)
2. What is critical section problem? (2)
3. State the necessary conditions for the deadlock to occur. (2)
4. What is Belady's anomaly? (2)
5. Distinguish between semaphore and binary semaphore (2)
6. What is Resource Allocation Graph? Give an example (2)
7. What is Thrashing? (2)
8. Discuss the criteria used to evaluate the CPU scheduling algorithms (2)
9. Mention features of Real time Kernels (2)
10. List the design goals of LINUX. (2)

**PART – B (50 Marks)**

11. Consider the following set of processes. The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0.

Process	Burst time	Priority
P0	2	2
P1	1	1
P2	8	4
P3	4	2
P4	5	3

- (i) Draw the Gantt charts that illustrate the following scheduling algorithms: FCFS, SJF, RR (TQ = 2) non preemptive priority ( large number = high priority).
  - (ii) Calculate the turnaround time and waiting time of each of the process for each of the algorithm. (10)
12. (a) Explain briefly about paging and segmentation memory management technique. (5)
  - (b) What is Virtual memory and explain about demand paging. (5)
  13. (a) Write the banker's algorithm for deadlock avoidance (5)
  - (b) Consider the following snapshot of a system: (5)

	Allocation	Max	Available
	ABCD	ABCD	ABCD
P0	2001	4212	3321
P1	3121	5252	
P2	2103	2316	
P3	1312	1424	
P4	1432	3665	

Illustrate that the system is in a safe state by demonstrating an order in which the Processes may complete.

14. 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. (10)  
Calculate the number of page faults that would occur for the following algorithms  
assuming frame size as 4.  
1. FIFO    2. Optimal    3. LRU    4. MRU    5. LFU    6. MFU
15. a) Explain the file allocation methods with suitable examples. (5)  
b) Write about the implementation of the Access Matrix. (5)
16. a) Explain the various security measures to protect files from unauthorized access. (5)  
b) Write about the approaches used to provide User authentication. (5)
17. Write short notes on any two of the following: (10)  
(a) Monitors  
(b) Segmentation.  
(c) Semaphores

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**FACULTY OF ENGINEERING****B.E. (IT) V-Semester (CBCS) (Main) Examination, Nov. / Dec. 2018****Subject : Operating Systems****Time : 3 hours****Max. Marks : 70****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (10x 2 = 20 Marks)**

- 1 Differentiate between single threaded and multithreaded process.
- 2 What is PCB? Draw its structure.
- 3 What is the difference between system programs and system calls?
- 4 Distinguish between pre-emptive and non-preemptive scheduling strategies.
- 5 What is an Access Matrix and why it is used?
- 6 What is encryption?
- 7 Explain about the Directory structure.
- 8 Define Balady's Anomaly.
- 9 How reliability through redundancy is obtained in disks?
- 10 What is thrashing?

**PART – B (5 x 10 = 50 Marks)**

- 11 a) Describe the various activities performed by operating system in connection with process management. 4  
b) Discuss the various status in which a process can exist with the help of a state diagram. 6
- 12 Describe about inter process communication mechanisms in detail with block diagrams. 10
- 13 a) Discuss the various scheduling criteria for CPU. 5  
b) Explain about the various methods for handling deadlocks. 5
- 14 a) What is the significance of page-table? Explain the structure of a page-table. 5  
b) Illustrate how address protection is achieved using base and limit registers. 5
- 15 Discuss the various page replacement algorithms with a suitable example for each. 10
- 16 a) Explain the features necessary to implement real time operating systems. 5  
b) Write a short notes on Unix file system. 5
- 17 Write short notes on the following :  
a) RAID structure 5  
b) Streams 5

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