Code No. 100

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) I – Semester (Main & Backlog) Examination, December 2017

Subject: Fluid Mechanics – II

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 Differentiate between pipe flow and channel flow. [2]

2 What is draw down curve. [2]

3 A rigid pipe conveying water is 4.2 km long. The velocity of flow is 1.75m/s. Calculate the rise in pressure behind a valve at the lower end if it is closed in 15 seconds. Take bulk modulus of water equal to 2150 N/mm^2. [2]

4 What do you mean by scale effect? [2]

5 State the significance of characteristic curves of centrifugal pumps. [2]

6 Define the terms : Energy and momentum correction factors. [3]

7 Write a note on mild sloped channel. [3]

8 What is no slip condition at the boundary? What are the effects of boundary layer? [3]

9 Distinguish between distorted and undistorted models and give examples for each. [3]

10 Define the terms efficiency of pump and minimum starting speed. [3]

PART – B (5x10 = 50 Marks)

11 a) Explain in detail the significance of velocity and pressure distribution in open channel flow. [5]

b) Design a trapezoidal channel of best section of area 25 m^2 with side slopes 1.75 H: 1.0 V. Taking C = 42.5, find the maximum discharge, if the bed slope is 1 in 2500. [5]

12 a) Derive the momentum equation for a jump in horizontal rectangular channel. Also explain what do you understand by energy dissipation in hydraulic jumps. [5]

b) A rectangular channel 6.5 m wide has a uniform depth of flow of 2.5 m and has a bed slope of 1 in 3000. If due to weir constructed at the downstream end of the channel, water surface at a section is raised by 0.85m, determine the water surface slope with respect to horizontal. Assume mannings n = 0.023 [5]

13 a) A 900 mm diameter steel pipe carries water at the rate of 1.5 m^3/s. The pipe wall has a thickness of 1cm. The elastic modulus of steel is 2×10^{11} N/m^2 and the bulk modulus of water is 2.1×10^9 N/m^2. Determine the increase in pressure if the valve at the end of 3.5 km long pipeline is closed in 3.5 seconds. [5]

b) The velocity distribution in the boundary layer is given by:

$$\frac{u}{U} = 2\left(\frac{y}{¢}\right) - \left(\frac{y}{¢}\right)^2$$

Calculate the displacement thickness. [5]

14 Using Dimensional analysis; establish the following equation in respect of hydraulic turbine

$$P = pN^3D^5¤\left[\frac{pND^2}{\mu}, \frac{ND}{\sqrt{g\mu}}, \frac{D}{B}\right]$$

Where P is power, B & D are breadth and dia of runner, N – Speed, g – acceleration due to gravity, p density and ¤ viscosity. [10]

15 a) What is specific speed of a centrifugal pump and obtain the expression for the same. [5]

b) A centrifugal pump has an impeller 45 cms in diameter running at 450 rpm. The discharge at inlet is entirely radial. The velocity of flow at outlet is 1.2m/sec. The vanes are curved backwards at outlet at 30^0 to the wheel tangent. If the discharge of the pump is 0.15 cumec. Calculate the impeller power and the torque on the shaft. [5]

16 a) Explain the outline procedure of Buckingham method of Dimensional analysis. [5]

b) A flat plate 1 m wide and 1.5m long is towed length wise through still air with a velocity of 10 m/s. Assuming the boundary layer to be fully laminar, estimate its thickness at the trailing edge. Mass density and kinematic viscosity of the air are 1.216 kg/m^3 and 0.15 X 10^{-4} m^2 /sec respectively. Also calculate the shear stress at that point. [5]

17 Write short notes Two of the following: [10]

a) Minimum starting speed

b) Water hammer phenomena

c) Most economical channel section.

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Code No. 106

FACULTY OF ENGINEERING

B.E. 3/4 (EEE) I - Semester Examination, December 2017

Subject: Electrical Machinery - II

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. What are the main applications of three phase transformer? 3M
2. Why different phase conversions are required in three phase transformer? 2M
3. Why parallel operation of a transformer is required in PS? 3M
4. When load sharing is required in Power Systems? 2M
5. What is starting torque and maximum torque in Induction Motor? 3M
6. Write the torque equation in 3 phase induction motor? 2M
7. What are the different starting methods of 3 phase induction motors? 3M
8. What is Cogging in induction motors? 2M
9. What happens if single phase occurs when 3 phase induction motor is running? 3M
10. A 3-phase 4-pole induction motor with rotor resistance to be 0.5 ohm is running 1050 rpm. What is the equivalent load resistance? 2M

PART-B (50 Marks)

11. Explain constructional features, principle of operation and Scott connection of 3-phase transformer with necessary diagram. (10M)
12. A 3-phase bank of three single phase transformers are fed from 3-phase 33 kV (line-to-line). It supplies a load of 600kVA at 11 kV (line-to-line). Both supply and load are 3 wire. Calculate the voltage and kVA rating of the single phase transformer for all possible 3-phase transformer connection? (10M)
13. Write short notes on
    (A) Insulation of windings and terminals? (5M)
    (B)Cooling arrangements in transformer? (5 M)
14. A 3-phase induction motor has a starting torque of 100% and maximum torque of 200% of the full –load torque. Find (a) slip at maximum torque, (b) full load slip, (c) rotor current at starting in pu of full-load rotor current? (10M)
15. With neat diagrams explain resistance control and cascading methods for speed control of induction motors? (10M)
16. (A) Explain Unbalanced operation of 3-phase Induction motors. (5M)
    (B).Explain the single phase load on 3-phase transformer. (5M)
17. (A) Explain delta/star transformer. (5M)
    (B) Explain Current loci diagram of induction motors. (5M)

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Code No. 112

FACULTY OF ENGINEERING

BE 3/4 (EIE) I Semester (Main & Backlog) Examination, December, 2017
Subject: Signals and Systems

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

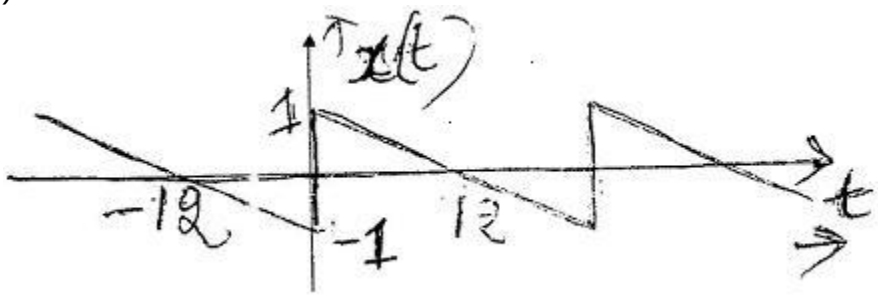
Note : Answer all questions from Part-A & Any Five Questions from Part-B.

PART-A (25 MARKS)

1	Define time invariant system with an example	3
2	Determine the fundamental period of $x(t) = \sin(\pi / 8t^2)$	2
3	Using suitable example define a complete set	2
4	Write the necessary & sufficient condition for existence of Fourier series	3
5	Prove time scaling property of Fourier transform	2
6	State the Parseval theorem	3
7	Define final value & initial value theorem in Laplace Transform	3
8	Determine the laplace transform of $\sin(\omega_o t)u(t)$	2
9	Determine Z transform of $0.3^n u(n)$	3
10	Define ROC in Z transform	2

PART – B (50 MARKS)

11 a)	Find the response of the system described by difference equation. $y(n) = -0.8\, y(n-1)+x(n)$. When the input is unit step, with initial condition $y(-1)=0$, $y(-1)=2/9$	7
b)	Define the standard test signals	3
12	List out the properties of Fourier Transform. Derive any three properties of it.	10
13	Find the fundamental period T, the fundamental frequency and the Fourier series coefficients of the periodic sawtooth signal x(t) shown in Figure. Express x(t) as a Fourier series.	10



14	a)	List out the properties of Laplace Transform. Laplace transform is generalized form of Fourier Transform, Justify.	5
	b)	Find the Inverse Laplace Transform of $G(s) = s/(s+3)(s^2 + 4s + 5)$	5
15	a)	Consider a system described by differential equation $y(n) – 0.5y(n-1) – 0.25y(n-2) = x(n)$, determine y(n) if x(n) using Z-Transform	7
	b)	Mention properties of ROC	3
16	a)	Write short notes on classification of systems.	4
	b)	Determine the Z-Transform of (i) $x(n) = a^n u(n)$ (ii) $x(n) = nu(n)$	6
17		Write short notes on the following:	10
	a)	Sampling theorem	
	b)	Dirichlet Condition	

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Code No. 117

FACULTY OF ENGINEERING

B.E. 3/4 (E.C.E) I – Semester (Main& Backlog) Examination, December 2017

Subject: Computer Organization and Architecture

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 the Block Diagram of 4-bit Combinational Circuit Shifter and write its Function table. (3)
2. Write the Basic Computer instruction formats for the memory, register and I/O reference instructions. (3)
3. Differentiate between Single precision and Double precision IEEE Standard floating point representations. (2)
4. Explain briefly the microinstruction format (2)
5. A Stack is organized in such a way that SP always points at the next empty location on the stack. List the micro – operations for the push and Pop operations. Assume stack grows downwards (3)
6. Mention the ways that computer buses can be used to communicate with memory and I/O (3)
7. Draw the flow chart for destination initiated transfer using handshaking (2)
8. What do you mean by a page fault? Which hardware is responsible for detecting the page fault? (2)
9. A non pipeline takes 50ns to process a task. The same task can be processed in a six segment pipeline with a clock cycle of 10ns. Determine the Speed up ratio of the pipeline for 100 tasks. What is the maximum Speed up that can be achieved? (3)
10. What is meant by " “locality of reference” and how does it help in faster execution of programs? (2)

PART-B (50MARKS)

11 a) Design a 4-bit Combinational Circuit decremented using four full-adder circuits (5)
b) Draw and explain the flow chart for an interrupt cycle. Write the sequence of micro operations for the same (5)

12 a) Using Booth’s multiplication algorithm, multiply (3) x (-4) showing all the steps. (6)
b) Compare and contrast between horizontal and vertical approach of microinstruction (4)

13 a) What is the purpose of micro program sequencer? Explain with block Diagram, how the sequencer present addresses to control memory (5)
b) Explain data manipulation operations of a basic computer (5)

14 a) Draw the block diagram of an asynchronous communication interface and explain its operation (5)
b) Describe in detail how data is transferred using DMA. Draw necessary diagrams to support your explanation (5)

15 a) Why page-table is required in a virtual memory system? Explain different ways of organizing a page – table. (5)
b) What do you mean by memory hierarchy? Describe in detail (5)

16 a) Discuss SMID processor organization (4)
b) Explain 4 possible hardware schemes that can be used in an instruction pipeline in order to minimize the performance degradation caused by instruction branching (6)

17 Write any **TWO** of the following 5 x 2 = 10
a) Stack organized instruction formats
b) Carry look ahead adder
c) Vector processing

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Code No. 117/O

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I – Semester (Old) Examination, December 2017

Subject: Digital Integrated Circuits and Applications.

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. List out the characteristics of an integrated circuit. 2
2. Define the following terms
i) Noise Margin ii) Fan out iii) propagation Delay 3
3. What is CMOS? Draw the logic diagram of CMOS NAND gate. 3
4. Draw the logic diagram of SISO Shift Register. 3
5. Compare between PROM, PAL and PLA. 3
6. Define CMOS Transmission gate and draw its symbol. 2
7. What is decade counter and list out the applications of a counter? 2
8. Differentiate SRAM and DRAM. 3
9. Define Multiplexer and draw the logic symbol of 4 x 1 MUX using relevant IC. 2
10. Write short notes on race around condition. 2

PART-B (50 Marks)

11 a) Explain sinking current and sourcing current of TTL output. Which of the parameters decide the Fan out and how? 6

b) Compare the totem pole and collector outputs of a TTL. 4

12 a) Explain the operation of the CMOS AND OR INVERT gate with neat sketches and draw the functional table. 6

b) Briefly list out the differences between ECL, TTL & CMOS logic family. 4

13. a) Explain in detail about CMOS/TTL interfacing. 5

b) Write short notes on the following terms in detail. 5
a) MROM b) NVRAM c) CCD d) EEPROM

14 Design a 32x1 MUX using four 74x151 MUX and 74x139 decoder. 10

15 a) Design a 4-bit synchronous counter using 74x74 and explain its operation in detail. 6

b) Explain the operation of SIPO shift register with the help of timing diagram. 4

16 Implement the following functions using PAL & PLA. F1=ABC, F2 = $A'B'C'$, F3 = $A'+B'+C'$ and explain its operation. 10

17 a) Explain about parity generator & checker. 5

b) Design a Mod – 10 counter using digital IC & explain its operation along with o/p waveforms. 5

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Code No. 120

FACULTY OF ENGINEERING

B.E. 3/4 (M / P / AE) I – Semester (Main & Backlog) Examination, December 2017

Subject: Dynamics of Machines

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 Derive an expression for the inertia force in the reciprocating parts, neglecting the weight of the connecting rod.

2 Discuss the gyroscopic effect on aeroplanes.

3 Explain the working of a Hartung governor with neat sketch.

4 Differentiate between a flywheel and a governor.

5 Explain the method of balancing of several masses revolving in different planes.

6 Explain the 'direct and reverse crank' method for determining unbalanced forces in radial engines.

7 Distinguish between longitudinal, transverse and torsional vibrations.

8 What is meant by magnification factor?

9 Describe Dunkerley's method to find the natural frequency of a shaft carrying several loads.

10 Describe a three-rotor vibratory system and find the ratio of their amplitudes.

PART – B (5x10 = 50 Marks)

11 A 2.2 tonne racing car has a wheel base of 2.4 m and a track of 1.4 m. The centre of mass of the car lies at 0.5 m above the ground and 1.4 m from the rear axle. Equivalent mass of engine parts is 140 kg with radius of gyration of 150 mm. The back axle ratio is 5. Each wheel have a diameter of 0.8 m and a moment of inertia of 9.7 kg-m^2. Determine the load distribution of the wheels when the car is rounding a curve of 100 m radius of a speed of 72 km/hr to the (i) left, and (ii) right.

12 The turning – moment diagrm for a multi cylinder engine has been drawn to a vertical scale of 1 mm = 650 N-m and a horizontal scale of 1 mm = 4.5^o. The areas above and below the mean torque line are -28, +380, -260, +310, -300, + 242, -380, + 265 and -229 mm^2. The fluctuation of speed is limited to $\pm$ 1.8% of the mean speed which is 400 rpm. The density of the rim material is 7000 kg/m^3 and width of the rim is 4.5 times its thickness. The centrifugal stress (hoop stress) in the material in the rim material is limited to 6 N/mm^2. Neglecting the effect of the boss and arms, determine the diameter and cross section of the flywheel rim.

13 The three cylinders of an air compressor have their axes 120^o to one another, and their connecting rods are coupled to a single crank. The stroke is 120 mm and the length of each connecting rod is 200 mm. The mass of the reciprocating parts per cylinder is

2 kg. Determine the maximum primary and secondary forces acting on the frame of the compressor when running at 25000 rpm. Describe a method by which such forces may be balanced.

14 A coil of spring stiffness 4 N/mm supports vertically a mass of 20 kg at the free end. The motion is resisted by the oil dashpot. It is found that the amplitude at the beginning of the fourth cycle is 0.8 times the amplitude of the previous vibration. Determine the damping force per unit velocity. Also find the ratio of the frequency of damped and undamped vibrations.

15 The mass of a single degree damped vibrating system is 7.5 kg and makes 24 free oscillations in 14 seconds when disturbed from its equilibrium position. The amplitude of vibration reduces to 0.25 of its initial value after five oscillations. Determine:
   i) Stiffness of the spring
   ii) Logarithmic decrement, and
   iii) Damping factor, i.e. the ratio of the system damping to critical damping.

16 A four cylinder engine and flywheel coupled to a propeller are approximated to a 3-rotor system in which the engine is equivalent to a rotor of moment of inertia of 800 kg-m^2, the flywheel to a second rotor of 320 kg-m^2 and the propeller to a third rotor of 20 kg-m^2. The first and second rotors being connected 50 mm diameter and 2 metre long shaft and second and third rotors are being connected by a 25 mm diameter and 2 metre long shaft. Neglecting the inertia of the shaft and taking its modulus of rigidity as 80 GN/m^2, determine
   i) Natural frequencies of torsional oscillations, and
   ii) The position of the nodes.

17 a) What is meant by torsionally equivalent length of a shaft as referred to a stepped shaft? Derive the expression for the equivalent length of a shaft which have several steps.
   b) Define and explain the following terms relating to governors:
      1) Stability
      2) Sensitiveness
      3) Isochronism, and
      4) Hunting.

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Code No. 133

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) I – Semester (Main & Backlog) Examination, December 2017

Subject: Operating Systems

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 What is a virtual machine? Give the advantages and disadvantages of virtual machines? 3

2 Distinguish between a system call and a system program. 3

3 What is Belady's anomaly? Which page replacement algorithm suffers from Belady's anomaly? 2

4 Distinguish between physical and logical formatting of disks. 2

5 What is critical section problem? Give the requirements for the solution of critical section problem. 3

6 List the necessary conditions that lead to a deadlock. 3

7 How the operating systems do authenticates their users? 2

8 What are the three basic functions of the computer hardware clocks and timers? 2

9 List the design goals of Linux. 2

10 What are the different thread states of Windows? 3

PART – B (5x10 = 50 Marks)

11 a) What is an operating system? List the services that an operating system provides to its users? 4

b) Draw the Gantt charts that illustrate the execution of the following five processes using **FCFS** and **Preemptive Priority** (smaller number implies a higher priority) scheduling algorithms. 4

Process	Burst Time	Priority	Arrival Time
P_1	10	3	0
P_2	3	2	2
P_3	1	1	1
P_4	5	4	1
P_5	7	2	1

c) Compute the Turn-around Time and Waiting Time for each process using FCFS and preemptive priority scheduling algorithms. 2

12 a) What is a page table? List and briefly discuss about the most common techniques used for structuring the page table. 7

b) What are the different file allocation methods? Give one OS example for each type of file allocation. 3

13 a) What is Dining – Philosophers problem? Describe the solution of Dining – Philosophers problem using Monitors. 5

b) What is RAG? Explain how RAG can be used to detect deadlocks. 5

14 a) Consider disk queue with I/O requests for the blocks on cylinders: 95, 181, 39, 123, 12, 124, 65, 6 8 and the disk head is initially at 57. Compute the total number of head movement according to SSTF and C-Look disk scheduling algorithm. 6

b) What are the different principles that can be employed to improve the efficiency of I/O? 4

15 a) List and briefly explain about the components of Linux. 4

b) Discuss the architecture of Windows XP. 6

16 a) Enumerate the different RAID levels. Also explain the criteria used for selecting a particular RAID level. 5

b) List and explain the characteristics of various I/O devices. 5

17 Write short notes on any <u>two</u> of the following: 2x5

a) Disk free space management

b) Android OS

c) Linux file system

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Code No. 139

FACULTY OF INFORMATICS

B.E. 3/4 (IT) I-Semester (Main & Backlog) Examination, December 2017

Subject : Operating Systems

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	What is dual mode operation?		2
2	What are the benefits of Multiprocessor systems?		3
3	Define Semaphore and its operations.		2
4	What is a deadlock state? State the conditions that cause deadlock.		3
5	What is an inverted page table?		2
6	Differentiate between a Page Fault and Page Replacement with an example.		3
7	How is Reliability and Performance achieved in RAID?		2
8	What are the different disk space allocation methods for files?		3
9	Give the computer security classification.		3
10	Differentiate between Access Control List and Capability List.		2

PART – B (50 Marks)

11	a)	Define system call. Explain any five process related system calls.	5
	b)	Explain the different Multithreading Models.	5
12	a)	Define a Cooperative Process. What are the three criteria a critical section problem solution needs to satisfy?	4
	b)	Write and explain the Producer Consumer problem solution using semaphore.	6
13	a)	For the given page reference string, calculate the total number of page faults caused by the following Page Replacement Algorithms for given frame size=3. Initially all frames are empty. i) FIFO ii) LRU iii) Optimal Page Replacement Page Reference String : 1, 2, 3, 4, 2, 1, 2, 3, 2, 1, 5, 6, 5, 1, 3, 2.	6
	b)	What are the steps required to service a Page Replacement request?	4
14		A disk drive has 1000 cylinders which are numbered from 0 to 999. Currently the drive is seeking request at 130. Previous request served was at cylinder 50. The pending requests in FIFO order in the queue are : 86,470,913,774,948,509,22,750. Compute the total disk arm movement made to serve all the requests using i) FCFS ii) SSTF/Elevator iii) SCAN iv) LOOK	10
15	a)	Write the RSA public key cryptography algorithm. Explain it with a simple example.	7
	b)	Differentiate between symmetric key and asymmetric key encryption technique.	3

16 a) What are the steps involved in transforming an I/O request to hardware operations? 7

b) Differentiate between paging and segmentation. 3

17 a) Write about Deadlock Prevention. 5

b) Write about Revocation of Access Rights. 5

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