

**FACULTY OF ENGINEERING**

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

Subject : Structural Engineering Design and Detailing – II (Steel)

Time : 3 Hours

Max. Marks: 75

**Note: Answer all questions from Part-A and answer any five questions from Part-B.****PART – A (25 Marks)**

- 1 Write the design consideration of intermediate stiffeners (2)
- 2 Under what conditions web buckling of a plate girder take place? (2)
- 3 What is the purpose of stiffener in plate girder? (2)
- 4 What is the importance of bearing stiffener in plate girder? (2)
- 5 What is the horizontal and longitudinal thrust in EOT and MOT cranes? (2)
- 6 In what respect plate girder differ from a compound beam? (3)
- 7 Explain the various stresses to which bridge bearings are subjected. (3)
- 8 Draw neat sketches of (a) Rocker bearing (b) Rocker and Roller bearing (3)
- 9 Explain why compression flange of gantry girder is strengthened by providing channel section. (3)
- 10 Write the principles of gantry girder design. (3)

**PART- B (50 marks)**

- 11 A simply supported welded plate girder has 22m effective span and it is laterally Supported. The girder is subjected to a working udl of 30KN/m excluding its self-weight. Design the cross section of the girder. Stiffener need not be designed. Curtail the flange plates if possible, adopt Fe410 steel and use limit state method. (15)
- OR**
- 12 A welded plate girder of effective span 20m is subjected to a udl of 25KN/m Including all the loads .The web size is 1800mm x 20mm and flange is 450mm x 30mm thick.Design intermediate stiffener and end bearing stiffener if an end point load of 2000KN act at the support. Adopt Fe410 steel and use limit state method (15)
  - 13 A gantry girder has an effective span of 7m .Design the gantry girder for the following data. Fix the cross section dimension and carry out usual checks. Crane capacity = 300KN ;weight of trolley 40KN ,weight of hook =10KN ,wheel base is 3m, span of crane grinder =16m ,self weight of crane girder 180KN .Minimum hook approach =1.5 m. Adopt Fe410 grade steel and use limit state method. (15)
- OR**
- 14 Design a rocker bearing for the following data: Reaction due to DL+LL+IL=750KN, lateral load due to wind =75KN ,longitudinal force may be taken as per bridge. (15)

- 15 Design a deck type plate girder for a railway bridge for broad main line loading of EUDL of 2200KN/track for BM and shear force .Effective span of girder is 18m. Design the girder for maximum bending moment, carry out usual checks. Draw neat sketches of cross section and longitudinal section of the girder. (20)

**OR**

- 16 Design top chord member for a through type truss girder for a railway bridge for the following data.  
EUDL for moment = 2700KN/track EUDL for shear =2900KN/track  
Total self weight =500 KN/track  
Draw neat sketch of design details, Span of girder is 25m and it has 5 panels (20)

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## FACULTY OF ENGINEERING

**B.E. 4/4 (EEE) I-Semester (Main & Back Log) Examination, December 2017**

**Subject: Power System Operation and Control**

**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. Obtain equivalent circuit of a transformer with a turns ratio  $(1+t) : 1$  for nodal admittance matrix, where 't' is the per unit off nominal tap position 3
2. Mention the advantages of N.R method over G.S method 2
3. Draw the flow chart for the solution of Co – ordination equation 3
4. Write the significance of Penalty factor 2
5. Give an isolated power system load frequency control block diagram and also mention the typical Values of all constants 3
6. Distinguish between flat tie-line and Tie-Line bias frequency control methods 2
7. Define the terms (i) steady state stability limit and (ii) transient state stability limit of power system network. 3
8. Write the applications of equal area criterion 2
9. What do you mean by loading capability of a transmission line? 2
10. Write the principle of operation of UPFC 3

### PART - B (50 Marks)

11. The load flow data of a three bus system given in table -1 and table -2. Determine the voltages at the end of the first iteration using N-R method. 10

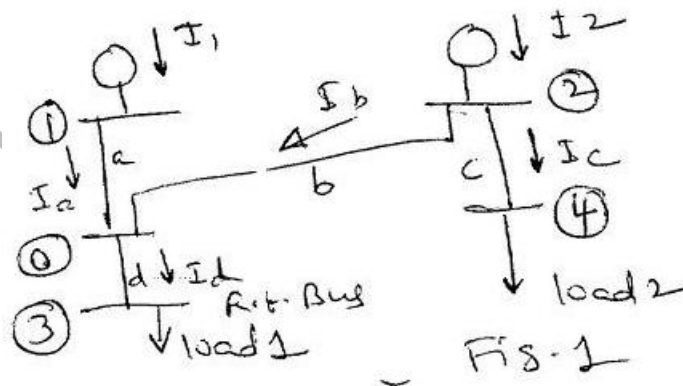
Table-1

Bus Code	Impedance of the line
1-2	$0.06+j0.38$
1-3	$0.04+j0.08$
2-3	$0.05+j0.19$

Table – 2

Bus code	Assumed Voltages	Generation		Load	
		MW	MVAR	MW	MVAR
1	1.06+j0.0	0.0	0.0	0.0	0.0
2	1.0 + j0.0	0.3	0.0	0.0	0.0
3	1.0 + j0.0	0.0	0.0	0.6	0.25

- 12 From the basic concepts obtain the block diagram of two area frequency control power system network. Write all the necessary equations. 10
- 13 a) Fig – 1 shows a system having two plants 1 and 2 connected to buses 1 and 2 respectively. There are two loads and network of four branches. The reference bus with a voltage of  $1.0 L_0^0$  pu shown in the diagram.



The branch currents and impedances are :

$$I_a = 3, j 0.5 \text{ pu}$$

$$I_c = 1 - j 0.36 \text{ pu}$$

$$I_b = 1.6 - j0.4 \text{ pu}$$

$$I_d = 4.6 - j0.9 \text{ pu}$$

$$Z_a = 0.015 + j0.08 \text{ pu}$$

$$Z_c = 0.02 + j0.05 \text{ pu}$$

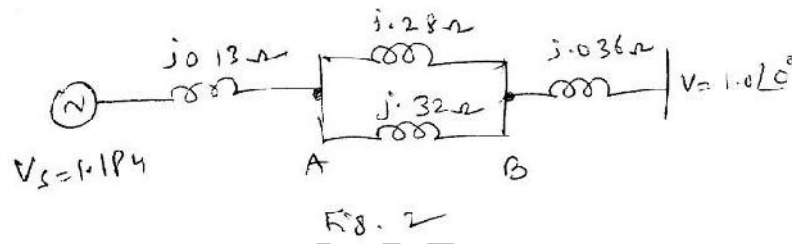
$$Z_h = 0.015 + j0.08 \text{ pu}$$

$$Z_d = 0.02 + j0.05 \text{ pu}$$

Calculate the loss formula Co-efficients of the system in pu and in reciprocal megawatts, if the base is 100 MVA 8

- b) Write an algorithm to solve exact Co-ordinate equations 2

- 14 a) Derive swing equation and write its significance in the operation of a power system network 5
- b) Determine the critical fault clearing angle for the network shown in Fig . 2 when a three phase fault takes place at B and the breakers at A and B operate simultaneously. The generator is delivering 1.0 pu power before the fault takes place. Assume the inertia constant  $H = 4.0$ . 5



- 15 a) Explain how a synchronous generator can produce a variable reactive power 5
- b) Distinguish between STATCOM and TCSC 5
16. a) Develop static load flow equations used in N-R method. 4
- b) The fuel inputs to two plants are given by
- $$F_1 = 0.015 P_1^2 + 16P_1 + 50$$
- $$F_2 = 0.025 P_2^2 + 12P_2 + 30$$
- The loss Co – efficient of the system are given by  $B_{11}=0.005$ ,  $B_{12} = -0.0012$  and  $B_{22}=0.002$ . The load to be met is 200 MW, determine the economic operating schedule and the corresponding cost of generation 6

17 Write Short notes on

- a) Equal area criteria
- b) Automatic voltage regulator

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**FACULTY OF ENGINEERING**  
**B.E. 4/4 (EIE) I Semester (Main & Backlog) Examination, December 2017**  
**Subject: Analytical Instrumentation**

**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. Define absorption. [2]
2. Explain basic components of AI. [3]
3. Define polarograph. [2]
4. Draw the diagram of magnetic deflection mass spectrometer. [3]
5. Draw Michelson's interferometer. [2]
6. Explain how turbidity of water is measured. [2]
7. What are the limitations of Beer Lambert's law? [3]
8. Explain the principle of NMR. [2]
9. Define resolution of mass spectrometer. [3]
10. Name the various types of gas analyzers. [3]

**PART-B (50 Marks)**

11. a. Describe the sources of errors and calibration of spectrophotometer. [5]  
b. Explain Sample Handling Techniques. [5]
12. a. Discuss Selective Ion Electrodes. [6]  
b. Explain principle of  $P^H$  measurement. [4]
13. Explain in detail FTIR spectroscopy. [10]
14. Describe any two gas analyzers used to analyze oxygen. [10]
15. a. Write about air pollution monitoring instruments. [5]  
b. Explain amino acid analyzers. [5]
16. a. Write different types of NMR spectrometers. [5]  
b. Explain any two amplifiers used in spectrophotometers. [5]
17. Write short note on [10]
  - a. Barrier layer cell.
  - b. Flame Ionization detector

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## FACULTY OF ENGINEERING

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

**Subject: Microwave Engineering**

**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  | Define “Dominant mode”. Which is the dominant mode in rectangular waveguide?   | 2 |
| 2  | Define group velocity and phase velocity in a waveguide.   | 3 |
| 3  | Explain the concept of velocity modulation of electrons in a two cavity Klystron.  | 2 |
| 4  | The dominant mode of a wave propagating in rectangular waveguide 2.2 cm x 1 cm and the frequency of operation is 9.4 GHz. Find the guide wavelength. | 3 |
| 5  | State the characteristic features of IMPATT diode.   | 2 |
| 6  | What do you understand by electronic tuning of Reflex Klystron?  | 2 |
| 7  | Why helix is used as a slow wave structure in TWT?   | 2 |
| 8  | What is the dominant mode in circular waveguide?   | 2 |
| 9  | List the properties of S matrix.   | 4 |
| 10 | List the applications of Magic Tee.  | 3 |

### PART – B (5x10 = 50 Marks)

- |       |   |    |
|-------|---|----|
| 11    | Derive the field expressions for $TM_{mn}$ modes in a parallel plate waveguide. What happens when $m=0$ ?   | 10 |
| 12 a) | Find the resonant frequency of cavity resonator of principle mode with dimensions $a=2$ cm, $b=1$ cm, $c=2$ cm length.  | 5  |
| b)    | Why TEM mode cannot propagate in rectangular waveguide?   | 5  |
| 13 a) | Derive the S matrix of Magic Tee.   | 6  |
| b)    | Differentiate between reciprocal and non-reciprocal device.   | 4  |
| 14    | Describe the interaction in Multi Cavity Magnetron. What is $f$ mode? What are the methods of separation of $f$ mode from other modes? Sketch the characteristics of Magnetron.   | 10 |
| 15    | Explain the working of PIN diode and its application in microwave test bench. Write short notes on Varactor diode.  | 10 |
| 16    | A two cavity Klystron operates at 3.0 GHz. With a DC beam voltage of 900 Volts and the cavity gap spacing of 2.0 mm. If the amplitude of the RF voltage is 20 V, calculate the beam coupling coefficient. What is frequency pulling and frequency pushing? How can it be avoided? | 10 |
| 17    | Discuss the merits and demerits of micro-strip lines and slot lines. Explain the working of a 4 port circulator with neat diagrams.   | 10 |

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## FACULTY OF ENGINEERING

**B.E. 4/4 (Prod.) I - Semester (Main & Backlog) Examination, December 2017**  
**Subject : Production Drawing Practice**

Time : 3 Hours

Max. Marks: 75

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

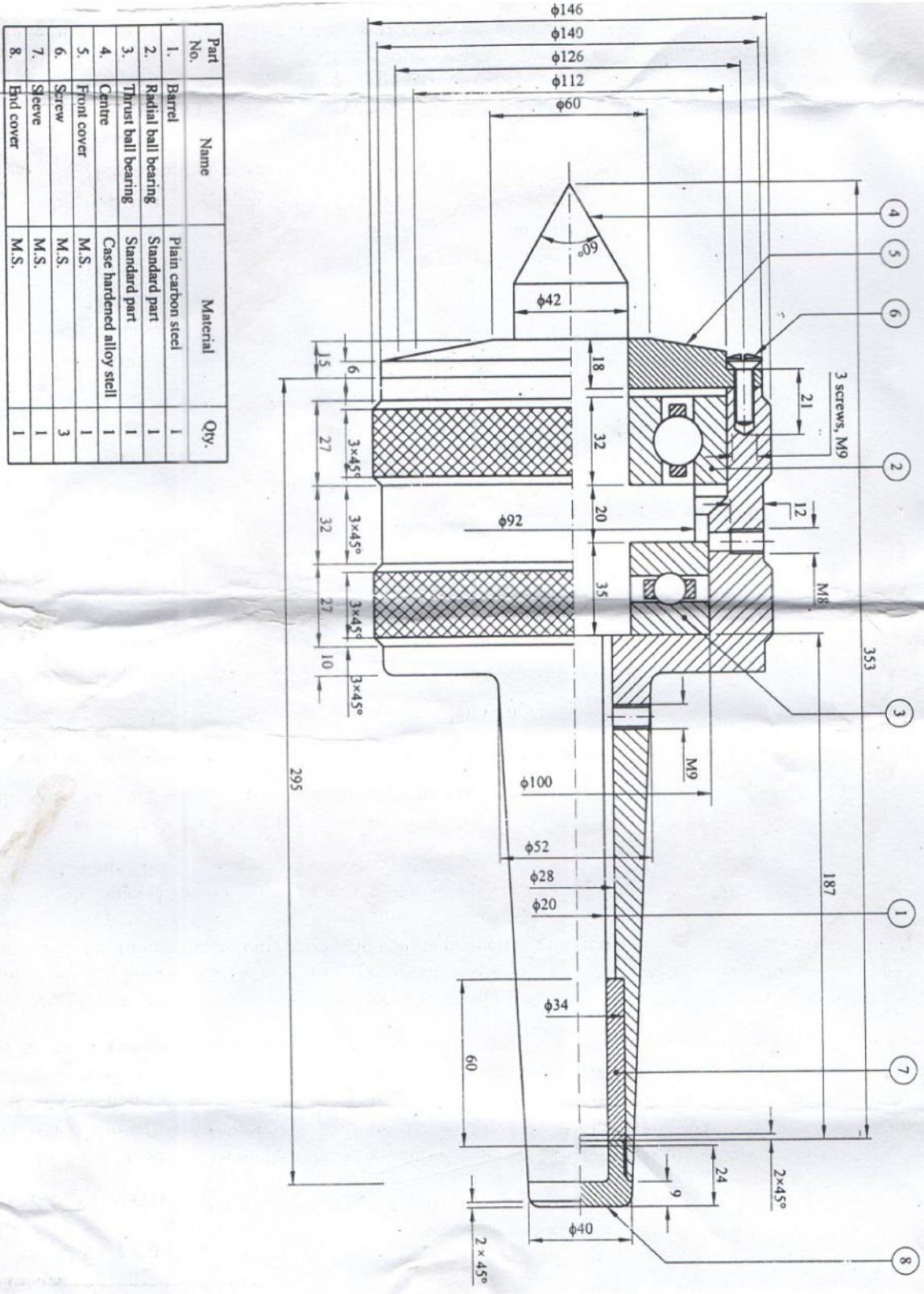
### PART – A (25 Marks)

- 1 Distinguish between production drawing and machine Drawing.
- 2 Explain the clearance fit schematically and with numerical self example.
- 3 What is 'hole basis system' and 'shaft basis system' for fits? Sketch.
- 4 Indicate the recommended tolerance grade for the following manufacturing processes:  
(a) Honing (b) Drilling (c) Turning
- 5 Surface finish of 1.6 microns of a milled surface of sampling length 3mm with a machining allowance of 2mm and direction of lay being perpendicular to tool feed direction. Sketch it symbolically.
- 6 Indicate the roughness symbols and roughness value of  $N_2$ ,  $N_5$ ,  $N_7$ .
- 7 Find the limits of the following shafts 100h6 and 50p7 (Fundamental Deviation for h and p are zero and IT7 respectively).
- 8 Name the type of fit for the following with their application in industry  
(a) H6/g5 (b) H7/r6
- 9 Explain and sketch any three pneumatic actuation symbols.
- 10 Tabulate the contents of process sheet in the shop floor.

### PART – B (50 Marks)

- 11 From the Revolving centre assembly drawing shown in Figure 1
  - (a) Give fits between the following components: Alpha numeric values and resulting tolerance.
    - (i) Barrel (1) and Sleeve (7)
    - (ii) Barrel (1) and Radial ball bearing (2)
    - (iii) Radial ball bearing (2) and Centre (4) (10)
  - (b) Draw the following components drawing and give necessary dimensional and geometric tolerances, surface roughness values and surface treatments.
    - (i) Barrel (1)
    - (ii) Radial Ball Bearing (2)
    - (iii) Centre (4)
    - (iv) End cover (8) (25)
  - (c) Prepare the process sheet for the component centre (4) with detailed tool – work orientation sketches. (15)





Part No.	Name	Material	Qty.
1.	Barrel	Plain carbon steel	1
2.	Radial ball bearing	Standard part	1
3.	Thrust ball bearing	Standard part	1
4.	Centre	Case hardened alloy steel	1
5.	Front cover	M.S.	1
6.	Screw	M.S.	3
7.	Sleeve	M.S.	1
8.	End cover	M.S.	1

Fig. Revolving centre

**FACULTY OF ENGINEERING**

B.E. 4/4 (A.E.) I - Semester (Main &amp; Backlog) Examination, December 2017

Subject : Automotive Pollution and Control

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 Define the following terms:  
(a) Automotive pollution (b) Global warming
- 2 State the need of pollution control.
- 3 How unburned Hydrocarbons are formed in SI engine?
- 4 What are the various chemicals used in orsat apparatus?
- 5 List the various types of smoke meters.
- 6 What is meant by FID? What for it is used ?
- 7 What is the cause of diesel smoke?
- 8 What is the reason behind black smoke formation in CI engines?
- 9 How the humidity effects NO<sub>x</sub> formation – Explain.
- 10 How the noise pollution controlled – Explain.

**PART – B (50 Marks)**

- 11 Explain the various design and operating variables that effect the formation of HC and CO in SI engines.
- 12 Discuss the various effects of regulated and unregulated pollutants on human health and environment.
- 13 With a neat sketch explain the working principle of exhaust gas recirculation. Also draw its emission reduction characteristics.
- 14 Explain in detail about the three way catalytic converter with a neat sketch.
- 15 Explain the construction and working principle of thermal reactor and secondary air injection and also explain how pollutants being removed.
- 16 (a) Explain the working principle of fuel cell with a neat sketch.  
(b) Explain about Bharat and Euro norms of pollution control.
- 17 Write short notes on the following:  
(a) Transient operational effects on pollution  
(b) NDIR  
(c) Chemiluminescent analyzer

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**FACULTY OF INFORMATICS**

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

Subject : Middleware Technologies

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 the term “Middleware”.   | 3 |
| 2 How does the client find its server in RPC?   | 2 |
| 3 What are the basic components of struts framework?  | 3 |
| 4 List the services of EJB container.   | 2 |
| 5 What is validation Framework?   | 2 |
| 6 What are the different state management techniques in servlets and write the context in which each technique is used? | 3 |
| 7 Write steps to establish connection with JDBC.  | 2 |
| 8 What is the difference between stub and skeleton?   | 2 |
| 9 Compare COM and CORBA.  | 3 |
| 10 Briefly explain what Intermediate Language code in .net is.  | 3 |

**PART – B (50 Marks)**

- |   |    |
|---|----|
| 11 a) Explain difference between JSO and Servlet.   | 5  |
| b) Differentiate between RPC and MOM.   | 5  |
| 12 a) What is struts Framework? Explain the flow of execution of struts application.                              | 6  |
| b) Explain the lifecycle of stateful session bean in brief.   | 4  |
| 13 Explain EJB architecture in detail.  | 10 |
| 14 a) List and explain any five CORBA alternatives.   | 5  |
| b) Explain CORBA and Networking model.  | 5  |
| 15 Explain in detail.   | 10 |
| a) COM                      b) DCOM   |    |
| 16 Draw the architecture of .NET and how does CLR execute the .NET source code? Explain the steps involved in it. | 10 |
| 17 Write short notes on the following :   |    |
| a) Roles of EJB   | 3  |
| b) CORBA object model   | 3  |
| c) Marshalling and Demarshalling  | 4  |

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