

SUBJECT CODE NO:- K-07
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E. (Ins. &Cont./IE) Examination Oct/Nov 2016
Digital Signal & Image Processing
(Revised)

[Time:Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q.No.1 and Q.No.6 are compulsory. Attempt any two questions from each section from remaining.
 - ii) Figures to the right indicate full marks.

Section A

- Q.1 Attempt any five. 10
- a) Define DFT.
 - b) What is Twiddle factor
 - c) Define Raddix-2 algorithm
 - d) What is FFT?
 - e) Define circular convolution
 - f) Define/ state the Goertzel algorithm
 - g) State the specification of filter.
- Q.2 10
- a) Find N-Point DFT of $x(n)$ if $x(n)=0$; otherwise $= 1; 0 \leq n \leq N-1$ 05
 - b) Obtain N-point DFT of exponential sequence.
- Q.3 Given $x(n)=2^n$; $N=8$. Find $x(k)$ using DIT.FFT algorithm. 15
- Q.4 Find out $H(z)$ using impulse invariance method of 5Hz sampling frequency from $H(s)$, given below 15
- $$H(s) = \frac{2}{(s+1)(s+2)}$$
- Q.5 Write short notes on 15
- a) Matched z-transform
 - b) Kaiser window function
 - c) Hilbert transforms

Section B

- Q.6 Attempt any five 10
- a) What is Image processing
 - b) Define Image sampling
 - c) Define Median
 - d) Define Image Enhancement
 - e) What is Image Transformation
 - f) Define Histogram
 - g) Define Pixel
- Q.7 Define & explain Walsh & hadamard Transformation. 15
- Q.8 Explain briefly Image Enactment by spatial Domain method. 15
- Q.9 Define & algorithm of Histogram equalization. 15
- Q.10 Write short notes on 15
- a) Point operations
 - b) Smoothing filters
 - c) DCT

SUBJECT CODE NO:- K-28
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E. (Ins. &Cont./IE) Examination Oct/Nov 2016
Power Devices & Control
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i) Attempt three question from each sections.
- ii).Q. No. 1 from section A & Q No. 6 from section B are compulsory.
- iii) Assume suitable data, if necessary.

Section A

- | | | |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Q.1 | Attempt any five | 10 |
| | <ol style="list-style-type: none">a) Differentiate between converter & Inverter grade SCR.b) Define holding currentc) Define $\frac{dI}{Dt}$ rating of SCRd) What is semi-converter?e) Draw the symbols of MOSFET & IGBTf) Differentiate between DIAC & TRIAC.g) What is forced commutation? What are its types?h) What is firing circuit? What are its typesi) What is power device?j) List out the performance parameters of controlled rectifier? | |
| Q.2 | <ol style="list-style-type: none">a) Draw neat wave forms of turn ON & turn off characteristics of SCR & explain.b) The trigger circuit of SCR has a source voltage of 15V & the load line has a slope of -120 V/A. The minimum gate current to turn on the SLR is 25mA. Compute.<ol style="list-style-type: none">i) Source resistance required in the gate circuitii) The trigger voltage & the trigger current for average gate power dissipation of 0.4 watts. | 08
07 |
| Q.3 | <ol style="list-style-type: none">a) Draw a neat circuit diagram of complementary commutation & explain its operation.b) Draw a neat basic block diagram of firing circuit. Explain its features | 08
07 |
| Q.4 | <ol style="list-style-type: none">a) Explain the working of RC full wave firing circuit. With the help of neat circuit diagram & waveforms.b) Discuss significance of heat transfer process in SCR | 08
07 |
| Q.5 | Write notes on <ol style="list-style-type: none">a) UJT as relaxation oscillatorb) Voltage commutation. | 08
07 |

Section B

- Q.6 Attempt any five 10
- a) What is chopper? What are its types?
 - b) List out advantages of chopper.
 - c) What is cycloconverter?
 - d) What is series Inverter
 - e) What is zero voltage switching?
 - f) List out applications of UPS.
 - g) Differentiate between series & parallel Inverter.
 - h) List out applications Of inverter'
 - i) List out different triggering methods of SCR
 - j) What do you mean by freewheeling diode?
- Q.7 a) Draw a neat circuit & waveforms of full wave controlled rectifier with RL load & explain its working. 08
b) Give the composition between semi converts & full converts. 07
- Q.8 a) A step up chopper has input voltage of 220V & output voltage of 660V. If the conducting time of SCR chopper is 100/ sec. compute pulse width of the output voltage. 08
In case phase width is halved for constant frequency operation, find the average value of the new output voltage.
b) Discuss in detail control techniques used in choppers. 07
- Q.9 a) Explain working of step-down cyclo converts with the help of neat circuit diagram & waveforms. 08
b) Explain in detail static AC & DC circuit breakers. 07
- Q.10 Write notes on:
a) Zero voltage switch 08
b) Speed control of DC motor. 07

SUBJECT CODE NO:- K-58
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E. (Ins. &Cont./IE) Examination Oct/Nov 2016
Power Generation & Control
(Revised)

[Time:Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- i)Q.No.1 & 6 are compulsory.
 - ii) Attempt any two questions in each section from remaining.
 - iii)Give illustrations with answers.

Section- A

- Q.1 Answer the following (Any Five) 10
- i. Enlist varies types of coal used in power plant.
 - ii. What are the constraints of turbine power plant.
 - iii. Why do we prefer nuclear power plant?
 - iv. Enlist principle cycles of power plant.
 - v. Explain Base and peak loads.
 - vi. What do you mean by firing demand?
 - vii. How do you calculate connected load.
 - viii. What is the significance of transmission, feeder & distribution lines?

- Q.2 a) Explain overall working of steam power plant with schematics. 08

- b) Explain power distribution network, so as to distribute power over the consumers. 07

- Q.3 a) Explain the techniques of steam flow measurements with neat schematics. 08

- b) What do you mean by combined operation of power plants? How does the load division between hydro and steam plant is maintained. 07

- Q.4 a) . Explain construction and working of turbine power plant. 08

- b) A power station has a maximum demand of 80×10^3 kw and load curve is defined as 07

Time (Hrs)	0-6	6-8	8-12	12-14	14-18	18-22	22-24
Load (Mw)	40	50	60	50	70	80	40

Determine the load factor of power station. What is the load factor of the stand by equipment rated at 25 MW that takes up all load in excess of 60 MW .

- Q.5 Write short notes: 15

- i. Reaction turbine .
- ii. Nuclear reactor .
- iii. Smoke density measurement.

Section- B

- Q.6 Answer the following (Any Five) 10
- i. What is chromatography?
 - ii. What is make up water.
 - iii. What do you understand feed forward control.
 - iv. What is the economics of pre-heaters.
 - v. What is qualitative and quantitative analysis?
 - vi. What do you understand by valve sizing.
 - vii. What is loops & interlock.
 - viii. Enlist methods of cooling the turbine.
- Q.7 a) Explain NMR spectroscopy with neat schematics. 08
- b) Explain combustion control scheme by excess air with suitable diagram. Compare the advantages over other methods. 07
- Q.8 a) Explain control valve with- 08
- i. Rangeability
 - ii. Leakage
 - iii. Actuators
 - iv. Noise & vibration
 - v. Valve efficiency.
- b) How do you analyze the sample using double beam colorimeter. 07
- Q.9 a) Explain turbine monitoring system. Discuss How do you monitor speed, Alignment, Temperature and friction. 08
- b) How do you control stem pressure in thermal power plant. 07
- Q.10 Write short notes. 15
- i. Turbidity meter
 - ii. Turbine cooling.
 - iii. Drum level control.

SUBJECT CODE NO:- K-88
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E. (Ins. &Cont./IE) Examination Oct/Nov 2016
PLC and DCS
(Revised)

[Time:Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q.No.1 and 6 are compulsory.
 - ii) Answer any two questions from each section from remaining.
 - iii) Assume suitable data.

Section A

- Q.1 Answer the following. 10
- a) What is sequence of events?
 - b) What is control relay?
 - c) What is scan time in PLC?
 - d) What is hard- wired programming?
 - e) What are programmed timer functions?
- Q.2 07
- a) With neat block diagram, explain working of PLC?
 - b) Explain the latching circuit with ladder diagram. 08
- Q.3 08
- a) Draw the ladder diagram for AND, OR, NOT, EX-OR, NAND logic and explain.
 - b) What do you mean by event sequence description? Give example of any process. 07
- Q.4 07
- a) Describe functions of SCADA system and explain its limitations.
 - b) Develop the physical ladder diagram for a motor with the following: 08
No start button, NC stop button, thermal over load limit switch opens on high temperature, green light when running, red light for thermal over load.
- Q.5 Write a short note on 15
- a) Process hard ware
 - b) Narrative statement
 - c) Relay sequencers.

Section B

- Q.6 Answer the following 10
- a) What makes SCADA superior than DAS?
 - b) What is data highway?
 - c) What is setpoint station?
 - d) What is remote terminal sensing unit?
 - e) What is physical layer?
- Q.7 07
- a) Explain intermediate stations of DCS?
 - b) Describe the architecture of Honeywell TDC- 3000 DCS. 08

- Q.8 a) Discuss supervision computer displays. 08
b) What are MAP/TOP protocols? 07
- Q.9 a) Explain DDC in detail and also give its salient features 08
b) Explain in detail PROFIBUS protocol. 07
- Q.10 Write short notes on 15
a) Super vision computer function
b) I/O hardware
c) System integration with PLC

SUBJECT CODE NO:- K-155
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E. (Ins. &Cont./IE) Examination Oct/Nov 2016
Control System Enng. - II
(Revised)

[Time: Three Hours]

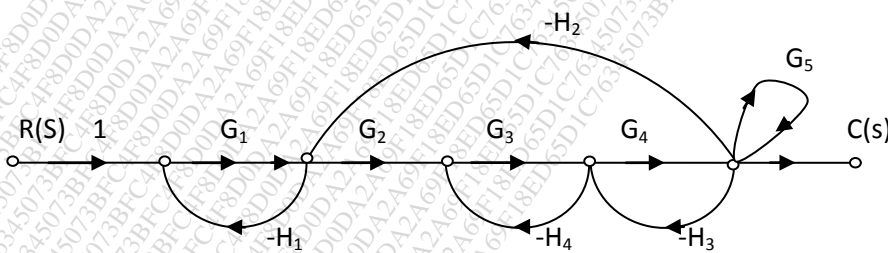
[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q.1 & 6 are compulsory.
 - ii) Attempt any two questions from remaining questions in each section.
 - iii) Figures to right indicate full marks.
 - iv) Assume suitable data if necessary.

Section A

- Q.1 Answer the following in short (any five) 10
- a) Define asymptotic stability of system.
 - b) How order of system can be identified from transfer function of system.
 - c) What is transient response of system?
 - d) Define static velocity error coefficient.
 - e) Give example of first order system.
 - f) What is under damped system?
 - g) What is natural frequency of oscillation?
 - h) Define rise time of second order system.
- Q.2 a) State various rules for block diagram reduction & explain in detail 08
 b) Find $C(s)/R(s)$ by using Mason's gain formula, 07



- Q.3 a) State & explain effect of integral action on systems performance. 07
 b) Derive transfer function of R-C network. 08
- Q.4 a) Derive expression for steady state error and error coefficients. 07
 b) Draw the root locus of system whose open loop transfer function is given as, 08

$$G(s).H(s) = \frac{K(s+4)}{s(s^2+2s+2)}$$
 where $H(s)=1$
 Also comment on stability.
- Q.5 a) Write short note on performance index. 07
 b) An unity feedback system has OLTF, 08

$$G(s) = \frac{25}{s(s+7)}$$

Find

- i) Natural frequency of oscillation.
- ii) Damping ration.
- iii) Damped frequency of oscillation.
- iv) Setting time

Section B

- Q.6 Attempt any five 10
- a) Define lead- lag network.
 - b) Define phase margin.
 - c) Define gain cross over frequency.
 - d) What is polar plot?
 - e) State transfer function of lead-lag compensator.
 - f) Draw electrical lag network.
 - g) Draw polar plot of stable system.
 - h) What is Nyquist plot.
- Q.7 07
- a) Write short note on Nichol's chart.
 - b) Derive the transfer function of lag-lead network 08
- Q.8 08
- a) State & explain procedure to design lag compensator using bode plot.
 - b) Find polar plot of unity feedback system given below:- 07
- i) $G(jw) = \frac{jwT}{jwT+1}$
 - ii) $G(jw) = \frac{1}{jw}$
- Q.9 Draw bode plot of the system whose transfer function is:- 15
- $$G(s) = \frac{100}{s(1+s)(1+0.5s)}$$
- Obtain:-
- 1) GM
 - 2) PM
 - 3) Gain gross over frequency
 - 4) Phase cross over frequency
- Also comment on stability
[note:- system is with unity feedback]
- Q.10 Design the lead compensator of the system whose transfer function is given by, 15
- $$G(s)H(s) = \frac{10}{s(s+1)}, \text{ where } H(s)=1$$
- Such that, it should satisfy following specifications,
- 1) Static velocity error const= 20 sec⁻¹
 - 2) Phase margin = 50°
 - 3) Gain margin ≥ 10 dB

SUBJECT CODE NO:- K-177
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(Inst.&Con./Inst.) Examination Oct/Nov 2016
Control System Engineering-I
(Revised)

[Time:Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Attempt three questions from each section.
 - ii) Question No.1 & Q.No.6 are compulsory.
 - iii) Figures to the right indicate full marks.
 - iv) Assume suitable data, if required.

Section A

- | | | |
|-----|-----------------------------------------------------------------------|----|
| Q.1 | Solve any five: | 10 |
| | a) Define: 1) System 2) Control system | |
| | b) Define: 1) Plant 2) Controller | |
| | c) What is linear control system? | |
| | d) Draw the block diagram of Open Loop control system. | |
| | e) Define: 1) Switch 2) Relay | |
| | f) Compare Relay & Contactor | |
| | g) Give two applications of limit switch. | |
| | h) Give two applications of rotary switch. | |
| Q.2 | a) Explain closed loop control system with the help of block diagram. | 08 |
| | b) List out difference between feedback system & feed forward system. | 07 |
| Q.3 | a) Explain construction & working of permanent magnet stepper motor. | 08 |
| | b) Explain the construction & working of ac servomotor. | 07 |
| Q.4 | a) Write a short note on A.C position control system. | 07 |
| | b) Explain with neat sketch the construction & working of synchro. | 08 |
| Q.5 | Write notes on (any three) | 15 |
| | a) Electromechanical relay | |
| | b) Reed relay | |
| | c) Solid state relay | |
| | d) Selector & Thumbwheel switch | |
| | e) Toggle & Drum switch | |

Section B

- Q.6 Solve any five 10
- a) What is jogging in motor functioning?
 - b) Give importance of electrical wiring diagram.
 - c) What is starter? List types of starter.
 - d) What is concept of motor control centre?
 - e) List hydraulic valves.
 - f) List different hydraulic circuits.
 - g) Give applications of hydraulic system.
 - h) Compare pneumatic & hydraulic system.
- Q.7 08
- a) Explain different types of motor protection.
 - b) What is braking of motors? What are the various methods of braking? Draw electrical wiring diagram for any one type. 07
- Q.8 07
- a) Explain the pneumatic power supply.
 - b) Discuss the direction controlled pneumatic valve. 08
- Q.9 08
- a) Explain with neat sketch the working of bleed & non bleed type of pneumatic relay.
 - b) Discuss the flow control pneumatic valve. 07
- Q.10 07
- a) Explain hydraulic power supply.
 - b) Using standard symbols draw hydraulic circuits for the following. 08
 - i) Meter-in
 - ii) Meter-out

SUBJECT CODE NO:- K-302
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E. (Inst. & Con./ Inst.) Examination Oct/Nov 2016
Signal & Systems
(Revised)

[Time: Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Question No.1 and Q.No.6 are compulsory and attempt any two questions from each section from remaining four questions.
 - ii) Assume suitable data if necessary.

Section A

- Q.1 Attempt any five. 10
- a) What is Region of convergence?
 - b) What is power signal?
 - c) Define causal and non-causal system.
 - d) What is random variable?
 - e) What are mutually exclusive events?
 - f) What is relation between CDF & PDF?
 - g) Define stability of a signal.
 - h) State advantages of signal analysis.
 - i) What are discrete-time systems?
 - j) What are Ct signals? Write equations.
- Q.2 08
- a) For $x(t)=2, -1 \leq t \leq 1$, plot $x(t/2)$, $x(t) \delta(t+2)$, $x(t+1)$
 - b) Find out $x(-n+3)$, $x(n+2)$ for $x(n)=\{2 \ 3 \ 1 \ 1 \ 5\}$ 07
- Q.3 07
- a) Find inverse Laplace transform of $x(s)=(10s^2)/(s^2 - 4s + 4)$
 - b) Prove time shifting and frequency shifting property of Fourier transform. 08
- Q.4 08
- a) State & prove scaling property of Fourier Transform.
 - b) Find Fourier Transform of $x(t)=e^{-at} \sin wt$. 07
- Q.5 Write short notes on: 15
- a) Application of z transform
 - b) Normal Distribution
 - c) Auto & cross-correlation

Section – B

- Q.6 Attempt any five. 10
- a) What is Parseval's relation in terms of Fourier series coefficients?
 - b) What is the relationship between Laplace Transform and Fourier Transform?
 - c) Define mean & variance.
 - d) Define periodic & aperiodic signals.
 - e) What is Dirichlet condition of Fourier Series?
 - f) What is necessity of frequency domain?
 - g) What are types of Fourier Series?
 - h) What is PSD?
 - i) State applications of signals & systems.
 - j) State limitations of LT & ZT.
- Q.7 a) Find out auto-correlation of $x(t) = \cos \omega_0 t$. 07
b) Find out cross-correlation of $x_1(t) = \cos(2\pi t)$, $x_2(t) = \sin(2\pi t)$. 08
- Q.8 a) Find energy spectral density of $x(t) = e^{-4at} u(t)$. 07
b) Probability density function of random variable x is given by 08
 $f(x) = 5x^2$ for $0 \leq x \leq 1$
 $= 0$ elsewhere
Find $E(x)$, $E(3x - 2)$ and $E(x^2)$
- Q.9 a) State & prove Linearity property of z-transform. 07
b) Determine z-transform and associated ROC for $x(n) = \left(\frac{1}{2}\right)^n [u(n) - u(n - 10)]$ 08
- Q.10 Write short notes on- 15
- a) Frequency division multiplexing.
 - b) Pulse amplitude modulation
 - c) CT & DT signals

SUBJECT CODE NO:- K-235
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(Inst.&Con./Inst.) Examination Oct/Nov 2016
Industrial Process Control
(Revised)

[Time: Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Question No.1 and Q.No.6 are compulsory.
 - ii) Answer any two questions from each section.
 - iii) Assume suitable data.

Section A

- Q.1 Answer the any Five 10
- a) Define Process.
 - b) What is proportional band.
 - c) What is differential gap.
 - d) Define coefficient of value.
 - e) What is controlled variable.
 - f) define time constant of a process.
- Q.2 a) Explain working of P+I pneumatic controller and give its advantages and disadvantages. 08
- b) What is a control action? Explain the PID control action in detail. 07
- Q.3 a) Give the selection criteria of a control valve for an application. 08
- b) Enlist the design consideration for an actuator. 07
- Q.4 a) An integral controller is used for speed control with a set point of 12 rpm within a range of 10 to 15 rpm. The controller output is 22% initially. The constant $K_I = -0.15\%$ controller output per second per percentage error. If the speed jumps to 13.5 rpm, calculate the controller output after 2s for a constant ep. 08
- b) With a neat diagram explain working of SMART transmitter. 07
- Q.5 Answer the following : 15
- a) Self regulating process.
 - b) Floating type controller.
 - c) Inherent characteristics of control valve.

Section B

- Q.6 Answer any Five. 10
- a) List field by components.
 - b) Types of Proximity sensors.
 - c) Boiler equipments.
 - d) Types of pumps.
 - e) What is surge in compressor?
 - f) Interaction in process
- Q.7 a) Explain antisurge control of compressors. 07
- b) Explain how feedwater control is done in boiler control? 08
- Q.8 a) What is split-range control? Explain with suitable example.? 08
- b) Explain coupling and decoupling in multivariable processor. 07
- Q.9 a) Explain how temperature control analysis is carried out for common loops. 08
- b) Explain specification standards for hand held terminals. 07
- Q.10 Answer the following. 15
- a) Feed forward control.
 - b) Relative gain array's.
 - c) 3-element control in boiler.

SUBJECT CODE NO:- K-267
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E. (Inst. & Con. /Inst.) Examination Oct/Nov 2016
Process Equipment Design & Operations
(Revised)

[Time: Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- I. Q.No.1 and 6 are compulsory.
 - II. Attempt any two questions in each section.
 - III. Give illustrations supporting the answer.

Section A

- Q.1 Answer the following (Any five) 10
- i) What is convection?
 - ii) How do you determine heat transfer?
 - iii) Enlist various process equipment used.
 - iv) What is the significance of tube bundle?
 - v) What is distillation?
 - vi) What do you mean by recompression?
 - vii) What are the types of reactor?
 - viii) What do you mean by material and energy balance?
- Q.2
- a) What do you understand L.M.T.D. Explain with equation. 08
 - b) What is multiple effects of evaporator. Give its significance. 07
- Q.3
- a) In a double pipe countercurrent flow heat exchanger 10000kg/hr. of an oil having specific heat of 2095 J is cooled from 353°k to 323°k by 8000 kg/hr. of water entering at 298°k- calculate the heat exchanger area for an overall heat transfer coefficient of 300w/m².k since C_p of water is 4180J/kg.k. 08
 - b) How to determine following of distillation. 07
 - I. Tray diameter.
 - II. Weeping of tray.
 - III. Column diameter.
 - IV. Pressure drop at trays.
- Q.4
- a) Explain Rectification and stripping. Give its significance. 08
 - b) Explain construction and working of plate heat exchangers. 07
- Q.5 Write short notes. 15
- i) C.S.T.R.
 - ii) Boiler.
 - iii) Evaporation.

Section B

- Q.6 Answer the following. (Any five). 10
- I. What are various motions of screening?
 - II. What are various methods of drying?
 - III. What are various techniques of size reduction?
 - IV. What is sedimentation?
 - V. What is schedule number & its significance.
 - VI. What are various treatments of pipe?
 - VII. What is crystallization?
 - VIII. What are various minor losses in pipe?
- Q.7 a) What is drying? Explain various drying periods with the help of drying curve. 08
b) Discuss classification & size reduction equipment. 07
- Q.8 a) Explain construction and working of Top suspended basket centrifuge. 08
b) How do leaching is obtained in Boll man's extractor. 07
- Q.9 a) Explain Gyratory crushes with its entire essential. 08
b) Explain following extractors- 07
- i) Rotating disc column.
 - ii) Sieve plate column.
 - iii) Mixer settlers.
- Q.10 Write short notes. 15
- i) Filter press.
 - ii) Tray dryers.
 - iii) Piping & fittings.