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1905E712

Candidate's Seat No :

M.Sc. (Sem.-III) Examination

503 Physics

Time : 3 Hours] May-2017 [Max. Marks : 70

Instructions: (1) Attempt All Questions. Max Marks 70.
(2) All questions carry equal marks.
(3) Symbols and terminology have their usual meanings.
(4) Scientific calculator may be permitted.

1 (a)	Draw circuit of astable multivibrator using IC 555 and explain its working.	[07]
	OR	
1 (a)	Design monostable multivibrator using IC 555 for pulse time of 1 milli second.	[07]
1 (b)	Explain operation of ic 7490 as a decade counter. Draw the waveforms also.	[07]
	OR	
1 (b)	Discuss with relevant waveforms a 4 bit binary up/dn counter.	[07]
2(a)	Draw and explain working of ADC using simple counter. What are drawbacks of the ADC?	[07]
	OR	
2(a)	Draw a diagram of 4 bit DAC and explain its working.	[07]
2(b)	A successive approximation register based 8 bit ADC has full analog range of 0 to 5V. What will be the output if input applied is 3.254 V? What is the resolution of this ADC?	[07]
	OR	
2(b)	Discuss in detail the various types displays used in electronics circuits.	[07]
3 (a)	Draw relevant schematics of a programmable machine and the traditional block diagram of a computer. Discuss each one briefly.	[07]
	OR	
3 (a)	Draw a schematic of computer with the MPU as CPU and discuss Large computers and Micro computers.	[07]
3 (b)	What is an instruction? How many instructions are used in 8085 MPU ? Give classification of the 8085 instructions and class with relevant example	[07]
	OR	
3 (b)	Discuss with relevant schematics the 8085 Hardware Model and the 8085 programming model.	[07]

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4(a)	Draw a schematic of 8085 single board Microcomputer system and discuss the 8085 MPU module, the 8085 machine cycle.	[07]
	OR	
4(a)	Draw a Functional Block diagram of the 8085 MPU and discuss various block of it.	[07]
4(b)	How many buses are there in 8085 MPU? List the difference between each bus and discuss De-multiplexing the bus AD_7-AD_0 with relevant schematic.	
	OR	
4(b)	(i) What is function of a Latch in 8085 MPU? Draw logic diagram and Function Table of 74LS373 D latch. Discuss D Flip-Flops as Latch and Clocked. (ii) Draw relevant schematic to generate Read/Write control signal for memory I/O.	[07]
5	Answer following questions briefly:	[14]
(i)	List the difference between the Decoder and the Encoder	
(ii)	What is use of a buffer in Microprocessor?	
(iii)	List various tri-state devices used in 8085 MPU	
(iv)	Draw a schematic of Microprocessor controlled temperature system.	
(v)	Give format of the flags?	
(vi)	Give the difference between SSI and MSI.	
(vii)	What is an Assembly language?	
(viii)	What is parity?	
(ix)	Draw circuit of 9 bit even parity generator.	
(x)	Draw waveform of mod 5 binary counter.	
(xi)	Draw internal block diagram of IC 7495.	
(xii)	What is time taken of one conversion for a 10 bit Successive Approximation register based ADC if clock used is 1 MHz?	
(xiii)	Energy of which photon is less Red or Yellow?	
(xiv)	What is the output pin in IC 555?	

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1805E671

Candidate's Seat No. ____

M.Sc. (Sem.-III) Examination

502 Physics

May-2017

Time : 3 Hours] [Max. Marks 70

Instructions: (1) Attempt All Questions.
(2) All questions carry equal marks.
(3) Symbols and terminology have their usual meanings.
(4) Scientific calculator may be permitted.

Q1. (a) Apply Runge-Kutta method to find approximate value of y for $x = 1.2$ and 1.4, if $dy/dx = (2xy + e^x)/(x^2 + x e^x)$ given that $y(0)=0$ [7]

OR

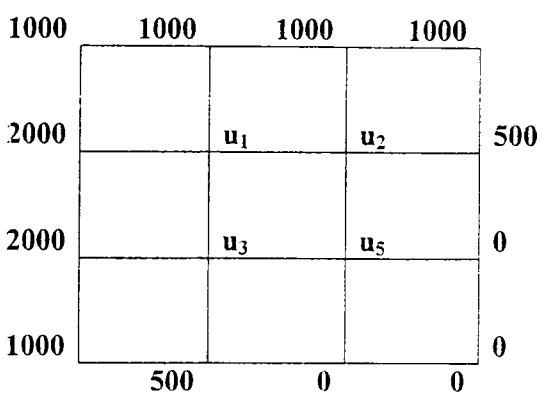
(a) Find by Taylor's series method, the values of y at $x=0.1$ and $x=0.2$ to five places of decimals from $dy/dx = x^2y - 1$, $y(0)=1$. [7]

(b) Describe Euler's method for solving the ordinary differential equation. And also explain Modified Euler's method. [7]

OR

(b) Obtain Picard's second approximate solution of the problem $dy/dx = x^2/(y^2 + 1)$ with $y(0) = 0$. [7]

2. (a) Solve the elliptic equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as shown. [7]



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OR

(a) Explain the numerical method for solving the parabolic equation. [7]

(b) Solve $\nabla^2 u = -10(x^2 + y^2 + z^2)$ over the square with sides x=y=0, x=y=3 with u = 0 on the boundary and mesh length = 1. [7]

OR

(b) Explain the merits & demerits of Adams-Bashforth method of solving the ordinary differential equation. [7]

3 (a) Design a power supply using IC 723 for output voltage of + 3 Volts and maximum current of 100 m A. The dc filtered input voltage is +9 Volts. [7]

OR

3 (a) Draw pin diagram of IC 723 and give its important specifications. [7]

3 (b) Design a low pass filter using IC 741 for fc = 1 KHz and pass band gain of 5. [7]

OR

3 (b) Draw the circuit diagram of second order high pass filter using IC 741 and explain it's working. [7]

4 (a) Draw circuit and explain working of a double tuned transformer coupled amplifier. Also draw its frequency response. [7]

OR

4 (a) Draw pole zero diagram of narrow band tuned amplifier. How does it differ from that of RC coupled amplifier? [7]

4 (b) Draw a pulse and define its rise time, fall time, duration, overshoot and sag. [7]

OR

4 (b) Explain how PLL obtains lock with input signal. Also draw block diagram of PLL. [7]

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5. Answer the following [14]

1. Write a third order partial differential equation.
2. What are the limitations in the Euler's method of finding the solution for ordinary differential equation?
3. Write Taylor's series for Y=f(x) with necessary conditions.
4. What is the classification of partial differential equation
   fxx - 2fxy - 2fyy + fyy = 0
5. What is the classification of partial differential equation
   y^2 fxx – 2y fxy – fyy - fy = 8y
6. Give an example of homogeneous differential equation.
7. Give one real physical example consisting initial and boundary value problem.
8. Draw pin diagram of IC 741.
9. Define lock range of a PLL.
10. give two applications of tuned amplifiers.
11. Define Q factor of a sharply tuned amplifier.
12. Draw frequency response of low pass filter.
13. Explain benefit of stagger tuning.
14. Give names of two regulator ICs.

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2005E757

Candidate's Seat No :

M.Sc. (Sem.-III) Examination

504 Physics

Time : 3 Hours] **May-2017** **[Max. Marks : 70**

Instructions:

1. **Maximum Marks 70**
2. **Attempt all questions.**
3. **Symbols carry their usual meanings.**
4. **Scientific calculators are allowed**

Q.1(A) Draw the equivalent circuit of a section of transmission line. Explain primary and secondary parameters. Based on cascaded T sections, derive expression for characteristic impedance. [7]

OR

Q.1(Ai) A generator of 1V, 1000Hz supplies power to 1000 Km long open wire line terminated in its characteristic impedance (Z_0) and having the following parameters $R = 15\Omega$ $L = 0.004H$, $C = 0.008\mu F$ and $G = 0.5$ μmhos. Calculate the characteristic impedance, propagation constant and the phase velocity [4]

(Aii) Briefly describe method of impedance matching using quarter wave line. [3]

Q.1(B) Define SWR and reflection coefficient. Deduce the relationship between SWR and reflection coefficient. [7]

OR

Q.1(B) What is Smith chart? Name the parameters which can be represented on a Smith chart. Using a suitable example explain the construction of Smith chart. [7]

Q.2(Ai) Briefly describe variation of signal strength with distance in case free space propagation,space wave (tropospheric wave) propagation and sky wave propagation. [3]

(Aii) What is ionogram? How critical frequency of different layers can be estimated from ionogram? [4]

OR

Q.2(A) Describe the mechanism by which the ionosphere affects the wave propagation. Derive expression for critical frequency. [7]

Q.2(B) Describe uplink power budgeting in relation to geostationary satellites and hence derive an expression for carrier to noise density in terms of EIRP. How downlink budgeting is different from uplink budgeting?. [7]

OR

Q.2(B) What is meant by multiple accessing in connection with satellite communication? Name different multiple access methods used in communication systems. Describe in detail time division multiple access system. [7]

Q.3(A) Draw circuit of a JFET Balanced Modulator and show how double sideband suppressed carrier (**DSBSC**) signal is generated here. [7]

OR

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Q.3(A) Describe frequency modulation. Derive the expression of instantaneous voltage for frequency modulated wave. [7]

Q.3(B) Define pulse code modulation? How is signal to quantization noise ratio (S/N_q) related to number of quantized levels (L)?
A telephone signal with a cut off frequency of 4 kHz is digitized into 6 bit samples. Find
(i) Nyquist sampling frequency
(ii) Signal to noise [$(S/N)_q$] ratio. [7]

OR

Q.3(B) Draw circuit of **Foster –Seeley** discriminator and explain how it demodulates FM wave. Draw its response curve. [7]

Q.4 (A) Write a note on Amplitude Shift Keying (ASK). [7]

OR

Q.4 (A) Name two types of carrier recovery circuits. Draw and discuss **Squaring Loop** method for carrier recovery. [7]

Q.4(B) What is meant by bit timing recovery? Discuss Early - Late gate circuit for bit timing recovery. [7]

OR

Q.4(B) Describe Phase Shift Keying **(PSK)**. Discuss how PSK can be generated and detected. [7]

Q.5 Answer the following (each question carry **one mark**) **[14]**

(i) Why SW radio broadcasting is better received during night time?
(ii) Can we use 10 MHz frequency for satellite communication? Justify.
(iii) What is the major disadvantage of using LEO satellites for communication?
(iv) What is meant by attitude of a satellite?
(v) Mention inclination and altitude of Indian Satellite 'INSAT'.
(vi) What are the modes of wave propagation in the following cases
(a) Radar, (b) satellite communication and (c) FM radio broadcasting.
(vii) Communication satellites operating in C band are usually required to keep its assigned place in the geosynchronous orbit with an accuracy of _____.
A). 0.5^0 B). 1.0^0 C). 2.0^0 D). 2.5^0
(viii) Define Pulse Width Modulation (PWM).
(ix) What is minimum shift keying (MSK)?
(x) Write two main requirements for matched filter.
(xi) Probability of Bit error (P_{be}) is lower in Polar waveform. **TRUE or FALSE.**
(xii) Armstrong method is a direct method of FM generation.**TRUE or FALSE.**
(xiii) What is the bandwidth of a frequency modulated wave according to Carson's Rule.
(xiv) Amplitude limiting is present in **Ratio detector**. **TRUE or FALSE.**

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