



SUMMER– 2017 EXAMINATION

Model Answer

Subject Code: 17544

Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical spelling errors should not be given more Importance, not applicable for subject English and Communication Skills.
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.



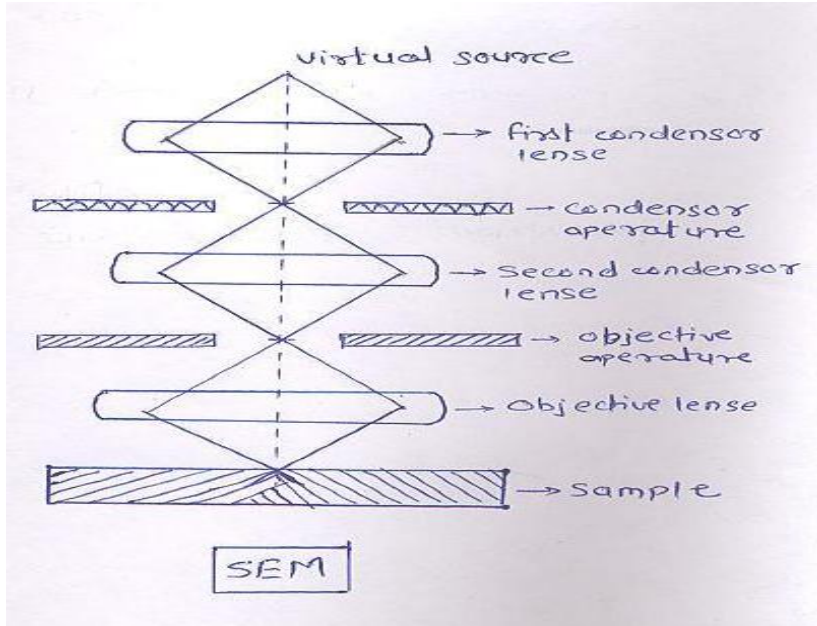
Q. No.	Sub Q. N.	Answer	Marking Scheme
Q.1.A		Attempt any <u>THREE</u>	12
	a)	<p>List down application(any2) and technical specification(any2) for colorimeter equipment</p> <p>Ans</p> <p>Application of colorimeter:-</p> <p>01. Chemistry section deals with the analysis of blood, urine, cerebrospinal fluid (csf) and other fluids determine the quantity of various important substances they contain.</p> <p>02. Hematology section deals with the determination of the number and characteristics of the can statements of the constituents of the blood particularly the blood cells.</p> <p>03. Microbiology section is which studies are performed on various body tissues and fluids to determine the presence of pathological miro-organisms.</p> <p align="center">OR any other relevant applications</p> <p>Technical specification of colorimeter:-</p> <p>01. Power :- 230volts A.C., 50Hz</p> <p>02. Visual region of the electromagnetic spectrum :- 400-700 nm</p> <p>03. Error :- of 1% to 5% are quite common.</p> <p>04. Resolution :- 1% T, 0.01 Abs, 0.1 to concentration</p> <p>05 Bandwidth :- typically 40nm.</p> <p>06 .Light source :- tungsten filament</p> <p>07. Output :- Analogue, 10mv per digit</p>	<p>4</p> <p>2</p> <p>2</p>
	b)	<p>Explain the working of ultra centrifuge with suitable diagram</p> <p>Ans</p> <p>The diagram illustrates the optical system of an ultra-centrifuge. A motor is connected to a transistors unit, which is linked to a collimating disc. Light from a source passes through a collimating disc, a mirror, a lens, a cylindrical lens, and a viewing mirror, eventually reaching a photographic plate. The centrifuge rotor is labeled as a prism chamber rotor.</p>	<p>4</p> <p>2</p>



		<p>The ultra centrifuge are operating at a forces 6 lak cm/ square and with a temperature control with in approximately 0.1 degree Celsius. Mainly it consist of rotor and an optical system for recording the distribution of sample in the ultracentrifuge cell. The rotor is kept in on evacuated on pulled chamber. The tip of the rotor contains a thermister for measuring the temperature. The thermister makes electrical contact with the control circuit by means of pull of mercury. The rotor chamber contains an upper condensing lenses. The lower lens allows the passage of the light so that sample is illuminated. The upper lens and camera lens focus the light on the film.</p> <p>Mainly three types of optical system are available for ultra sound</p> <p>i) Ultraviolet light absorption system</p> <p>ii) Chill range optical system</p> <p>iii) Relay high interference system</p> <p>In ultraviolet system light of suitable wavelength is passed through the moving analytical cell containing the solution under analysis. The intensity of transmitted light is recorded on the photographic paper.</p>	2
c	<p>State the factors affecting pH measurement</p> <p>Ans (any 4 factors)</p> <p>Factors affecting pH are</p> <ol style="list-style-type: none">1. Temperature2. Calibration of pH meter3. Improper use of storage of pH measuring electrodes.4. Measurement meter is a seldom source at problem for pH measurement. The measurement is also depends upon either meter is auto buffer, calculated slope % efficiency5. pH also depends upon what types of buffer soln. Used.	4	
d	<p>List different components of microscope and describe any two components of it</p> <p>Ans (any four points)</p> <p>The main body of an microscope consist of following components</p> <ol style="list-style-type: none">01. Vertical coloumn.02. Elctron gun assembly03. Condenser aperture and coil.04. Primary viewing screen05. Condenser lens coil06. specimen chamber07. Objective lens coil.	4	
			2



		<p>08. Projector aperture. 09. Intermediate viewing screen 10. projector-diffraction lens coil 3. 11. Final viewing serene. 12. photographic chamber.</p> <p>(any 2 components)</p> <p>01. Electron gun :- The function of the electron gun is to generate electrons to form the electron beam and direct it down the microscope column through the condenser lens. The electron gun consist of cathode and anode. These electrodes are maintained at 50 kilovatts potential difference with the anode at ground potential.</p> <p>02. Condenser lens :- In microscope the condenser lens controls the concentration or intensity of the electron beam on the specimen. It consist of an ironclad coil with a gap at about the middle of the central opening. Diameter of these lens is 0.025inch.</p> <p>03. Objective lens :- The objective lens is very much similar in appearance and construction to the condenser lens. The objective lens forms an intermediate image, which can be viewed on the intermediate viewing screen, at a magnification of about eighty diameters. The image is focused by adjusted the objective current.</p> <p>04. Projector Diffraction lens :- During microscopy only the projector coil section is energized. This lens supports the intermediate-viewing screen, also carries the 0.05 in diameter projector aperture. The magnification obtained by the projector lens depends on the current through the projector coil.</p>	2
B		Attempt any <u>one</u>	6
	a	<p>Draw and explain the working principle of SEM(scanning electron microscope)</p> <p>Ans</p> <p>With the help of SEM we can get three dimensional image of a cell.</p> <p>In SEM, the electron beam does not pass through the SEM instead of this the surface of the cell is coated with heavy metal and beam and electrons is used to scan across the specimen. Electrons that are scattered are collected to generate a 3 dimensional image as the electron beam moves across the cell because the resolution of the scanning electron microscopy is only about 10 mm is used</p>	3





	b	<p>Write two applications of each of the following</p> <p>1 Incinerator</p> <p>2Autoclave</p> <p>3Hot air oven</p> <p>Ans</p> <p>1 Incinerator</p> <ol style="list-style-type: none">1. Dispose of Medical wastes2. Dispose of damaged organs3.Dispose of Burning of Placenta4. Dispose of Disposable needle syringes5. Dispose of Surgical pads6. Dispose of Hand glows which are used in hospital7.To burn hygienic waste generated daily may be also saline bottles,dressing cottons & dangerous body parts.damage blood bags. <p>2Autoclave</p> <ol style="list-style-type: none">1.Autoclaves are widely used to cure composites and in the vulcanization of rubber.2. Autoclaves are used for pre-disposal treatment and sterilization of waste materials.3. Autoclaves are used to sterilize the equipment's in the hospitals.4. Autoclaves are also used for sterilization of materials like gowns, dressing, gloves, ect <p>3Hot air oven</p> <ol style="list-style-type: none">1. Hot air ovens are electrical devices used in sterilization. It uses dry heat to sterilize articles.2. These are widely used to sterilize articles that can with stand high temperatures3 These are widely used to sterilize articles that can not get burnt like glass wares and powders.	<p>6</p> <p>2</p> <p>2</p> <p>2</p>
Q 2		Attempt any four	16
	a	Define 1 Chromatography 2 Electrophoresis	4



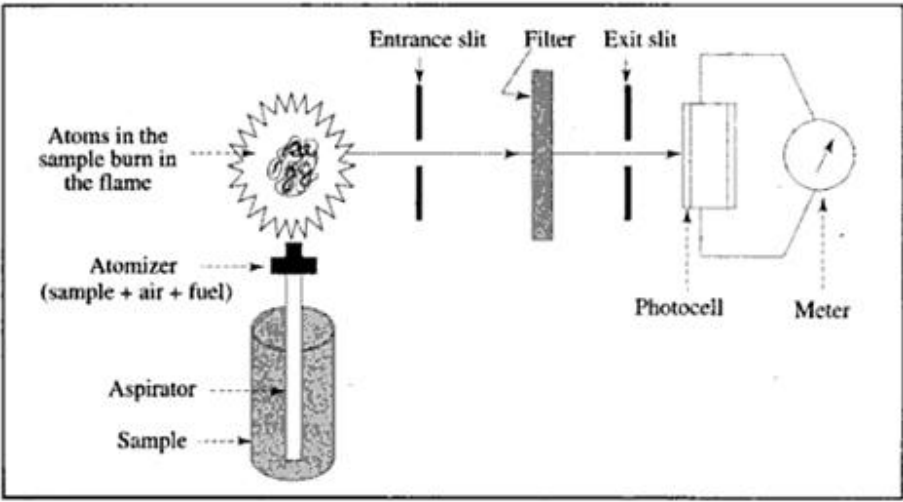
		<p>Ans</p> <p>1) Chromatography: Chromatography is a physical method of the separation of the components of mixture by distribution between two phase of which one is stationary which is having large surface area and other is fluid phase that percolate through the stationary phase</p> <p>2) Electrophoresis: is the motion of dispersed particles relative to a fluid under the influence of a spatially uniform electric field.</p> <p style="text-align: center;">OR</p> <p>The migration of charged colloidal particles or molecules through asolution under the influence of an applied electric field usually provided by immersed electrodes.</p> <p>A method of separating substances, especially proteins, and analyzingmolecular structure based on the rate of movement of eachcomponent in a colloidal suspension while under the influence of an electric field.</p>	<p style="text-align: right;">2</p> <p style="text-align: right;">2</p>
<p>b</p>		<p>Draw the block diagram of dark field blood cell counter and explain function of each block</p> <div data-bbox="435 1144 1198 1474" data-label="Diagram"></div> <p>The diluted blood flows through a thin cuvette. The cuvette is illuminated by a cone shaped light beam obtained from a lamp through ring aperture and Optical system. The cuvette is imaged on the cathode of a phototube by means of lens & an aperture. Normally no light. reaches the phototube until a blood cell passes through the cuvette and reflects a flash of light on the phototube.</p>	<p style="text-align: right;">4</p> <p style="text-align: right;">2</p> <p style="text-align: right;">2</p>



C	List four sterilize equipments Ans 1. Autoclave. 2. Hot air oven. 3. Ultrasonic cleaner. 4. Water bath.	4 4
d	List any four analytical equipments and write two applications of freezer Ans any four analytical equipments 1) Colorimeter 2) Autoanalyser 3) Freezer 4) Blood gas analyzer 5) Spectrophotometer 6) Flamephotometer 7) Bloodcell counter 8) Gas chromatography Applications of Freezer: 1. For maintaining temperature of medicine. 2. For maintaining blood samples.	4 2 2

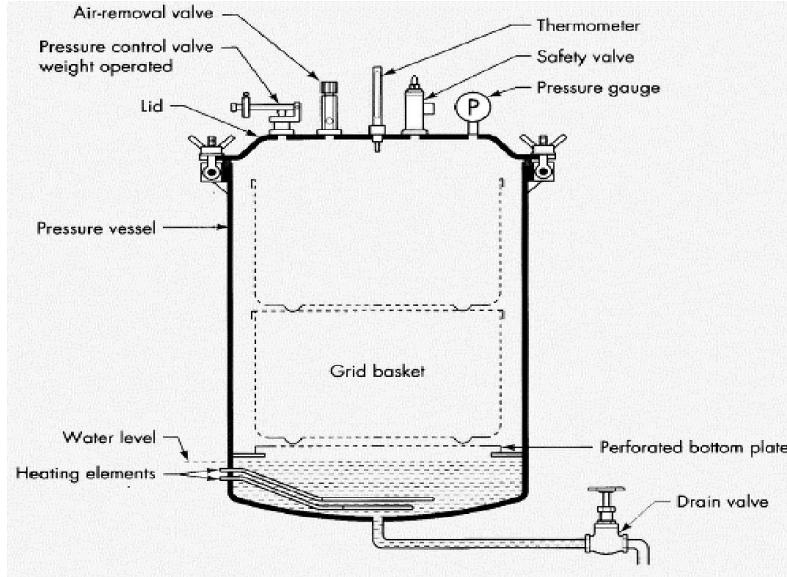


<p>e</p>	<p>Draw neat labeled block diagram of blood gas analyzer</p> <p>Ans</p> <p>4</p>	<p>4</p>
<p>f</p>	<p>Write application of chromatography equipment(any4)</p> <p>Ans</p> <ol style="list-style-type: none">1) Clinical laboratory.2. For detection of complex substances such as drugs & hormones.3. Useful in determining what drug or drugs have been taken in overdose cases.4 It is used to detect blood or alcohol levels in a patient's blood stream.5 It allows chemists to separate mixtures of gases, or substances that can be vaporized or gasified by heat	<p>4</p>

Q 3		Attempt any four	16
a	<p>Draw block diagram of flame photometer and describe its operation in detail.</p> <p>Ans</p> <div style="text-align: center;">  <p style="text-align: center;">➔ Fig. 7.1 Working principle of a flame photometer</p> </div>		4
	<p>OR any relevant diagram</p> <p>Working: The working principle of Emission Flame Photometry is that using compressed air, the diluted sample (often 1:100 or 1:200) is sprayed as fine droplets into a non-luminous gas flame which becomes colored by the characteristic emission of potassium metallic ions in the sample. Using a light filter or prism system, the light of wavelength corresponding to the metal being estimated, is selected. The amount of light emitted depends on the concentration of metallic ions present in the sample.</p> <p>Basic Constituents of a Flame Photometer:</p> <ol style="list-style-type: none"> 1. Nebulizer 2. Mixing chamber with baffles 3. Burner 4. Photosensitive element 5. Wavelength selector 		2
b	<p>Draw neat labelled diagram of autoclave explain its working.</p> <p>Ans: Once you close the autoclave sterilizer chamber, a vacuum pump removes all the air from inside the device or it is forced out by pumping in steam. If done the first way, the sterilizer is pumped with high pressured steam to quickly raise the internal temperature. On every autoclave there is a thermometer that is waiting for the 268-273 degrees</p>		4



Fahrenheit, and then it starts its timer. During the sterilizing process, steam is continuously entering the autoclave to thoroughly kill all dangerous microorganisms. Once the required time of sterilization has the elapsed, the chamber will be exhausted of pressure and steam allowing the door to open for cooling and drying of the contents.



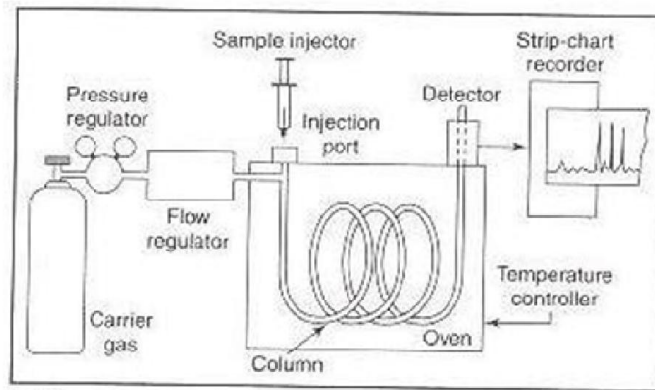
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2

c

Draw and explain block diagram of gas chromatography.

Ans:



4

2

The basic parts of a gas chromatograph are shown in figure

It consists of the following parts

- Carrier gas supply along with pressure regulator and flow monitor.
- Sample injection system.
- Chromatographic column
- Thermal compartment of thermostat
- The detection system
- The strip chart recorder

2

The carrier gas, normally N_2 , Ar or He is usually available in a compressed form in a cylinder fitted with a suitable pressure regulator. The gas is conducted from the cylinder through a flow regulator, to a sample injection port maintained at a certain temperature T_1 , which is such that it ensures rapid vaporization, but not thermal degradation of the solute. Gas and liquid samples are almost always injected by syringe through a self sealing silicon rubber diaphragm in the injection port. The solute vapor mixes almost



instantaneously with the flowing carrier gas and is swept into the chromatographic column, which is the heart of the chromatography.

It is there that the different solutes in the vaporized sample are separated from each other, by virtue of their different interaction with the column packing. The column is maintained at another temperature T_2 . This temperature determines the time for the passage of the solutes and to some extent, the resolution and efficiency obtained with a particular column. At the end of the column the solutes emerging individually enter the detector which produces an electrical signal corresponding to the quantity of solute leaving the column. The detector signal is supplied to a potentiometer recorder and a plot of the time signal amplitude called chromatogram is obtained.

d **Draw labelled diagram of single beam spectrophotometer and describe its working**
Ans:

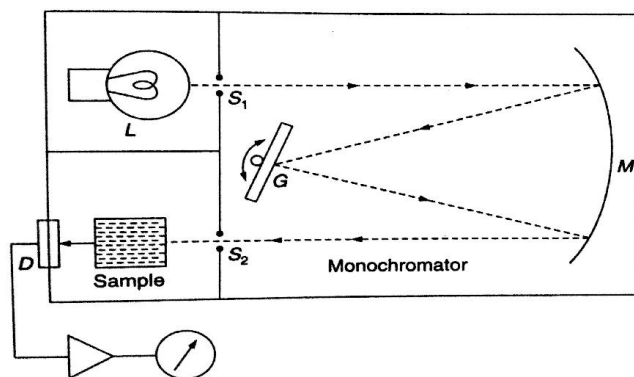


Figure 10.41 Spectrophotometer.

In this instrument, light from a halogen lamp is passed through a slit S_1 and incident on a concave reflector M which focuses the light on a diffracting grating G or on a prism to disperse light. The desirable wavelength from the dispersed light is obtained by taking it at the given direction, and then it is allowed to incident on the reflector. From the reflector, the light is directed through another slit S_2 to the sample. A photodetector D detects the transmitted light and gives an electrical output proportional to the intensity of the transmitted light. The amplified signal is given to a voltmeter which is calibrated with respect to the concentration of the substance. The rotation of the grating can be adjusted to measure at different wavelengths.

e **What is ultrasonic cleaner? Also write its four applications.**

Ans

Ultrasonic cleaner is a cleaning device that uses ultrasound from (15 to 400 kHz) & appropriate cleaning solution to clean delicate items. The ultrasound is not effective without the cleaning solution. Enhance the effect of a solution for the item to be cleaned & the soiling.

Ultrasonic cleaner produces high frequency waves through water & consequently cavitations process cleans the instruments.

The principle of ultrasonic cleaning process is as follows. Piezoelectric transducer is



attached to cleaning tank. They generate ultrasonic waves that vibrate the cleaning fluid at very high velocity creating a process called cavitation. Millions of tiny bubbles employed within solution can penetrate into every orifice of the item being cleaned removing dirt within seconds.

Applications: - (any four applications – 2marks)

1. Used for cleaning of dental & surgical instruments.
2. Used for cleaning lenses & other optical parts.
3. It can be used in operation theaters, optical & dental clinics, hospitals, laboratories & diagnostic centers.
4. Used for cleaning of jewelry, coins.
5. Used in industries for removing problem contamination.

2